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Appendix A

Appendix B

'Cabbages and Churches' (Scenario)

Broadening the Base and Deepening the Understanding in Problem-Based Learning

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Abstract

This paper explores the integration of both essential theoretical material and specialisations, at a deep learning level within integrated Problem-Based Learning (PBL) courses. This opposes what is seen as a simplistic approach to PBL in which student objectives are focused solely on solving 'practical problems', that is identifying what the problem is, identifying their learning needs, undertaking appropriate research and solving the posed problem. This simplistic view limits all learning to shallow thinking associated with the practical aspects of the problem to be solved.

This paper argues that a tertiary education setting should allow students to develop and master higher order knowledge, processes and attitudes in addition to basic skills and knowledge underpinning a discipline. PBL is presented as a concept and a strategy rather than as a formula to be followed. Discussion includes the opportunity created by the PBL approach for divergent search beyond the immediate problem for issues that may have an impact on the solution, followed by an analysis of the relative merit of the source material and the development of understanding of the usefulness of this material specifically for the problem and its usefulness for more general professional development for future practice.

This paper provides examples where, although the problem solved may be anchored in practical workplace settings, the issues that can be developed involve higher-order thinking and exploration of complex concepts. The paper demonstrates that the initial divergent search for material relating to the scenario can be used to concentrate in depth on issues that are normally taken as givens in workplace settings.

Keywords

Problem-Based Learning, Higher order learning

The structure of this paper is that the scope of Problem-Based Learning (PBL) as used in the paper is defined along with a broadened definition of what a 'problem', as used in PBL, might be. This is necessary to overcome the arguments about the possible inappropriateness of the terms 'problem' and 'Problem-Based Learning'. Discussion then covers the difference between the PBL approach to learning and traditional methods, especially as implemented in higher education. PBL uses less well defined problems requiring an extension of the orientation or briefing stage and an added dimension to the research stage – that of a divergent search for material and an analysis of the relevance of this material to the posed problem.

This preliminary discussion underpins the argument that the range of

issues is necessarily broadened when using PBL. Argument is proffered that this approach aids in the development of appropriate professional and social attitudes. Three examples are given to illustrate settings in which the use of complex, multi-faceted, ill-defined scenarios allow intense study of theoretical issues in considerable depth. Issues can be complex and range across political, social, societal and technical domains.

#### Terminology

Drinan (1991: 316–317) analysed many PBL courses and from this has defined a list of nine essences of PBL (Table 1). In these terms he suggests that the use of the term 'Problem-Based Learning' be restricted to:

“[those essences] where the desired or attainable end-point is the acquisition of relevant information and its organization into making decisions, and the capacity to go on learning independently” (Drinan 1991: 317)

He suggests the use of the term 'Experiential Learning' to encompass the full range of abilities including those that are directed toward critical attitudinal and personal orientation development.

Stretton (1985) also emphasises that the term 'Problem Based Learning' is somewhat of a misnomer. His preferred title is 'Education for Achievement'. What he is advocating is concentration on the positive features of developing ways of handling new or unknown situations and for developing learning strategies. In many of the applications of PBL it is the opportunities that accrue from a desire to change the existing scenario that are important.

The view taken in this paper is that we give to the methods and strategies used in our learning environments is not important. It is what we do to enable the maximisation of students' potential within that environment. In that light the term 'Problem-Based Learning' is used in this paper to encompass the full set of essences including those higher level attitudinal and personal development attributes.

1. Developing the ability to make decisions (solve problems).
2. Raising awareness of the complexity of real-world issues.
3. Acquisition of, or exposure to, a body of knowledge.

4. Motivation for learning through use of professionally relevant material.
5. Developing the capacity for self-directed learning.
6. Developing the ability to extend learning beyond the presented situations (problems) into new ones.
7. Generating the desire and ability to think deeply and holistically.
8. Generating an enthusiasm for learning from and utilizing all life's experiences in personal, professional and community development.
9. Encouraging a search beyond one's own preconceptions, so becoming ultimately innovative and critical with respect to self and one's profession.

Table 1 – The Essence of Problem-Based Learning  
(Drinan 1991: 316–317)

It is noteworthy that the higher level attainments contained in Drinan's list are the items recognised by professional bodies as being characteristics of practitioners achieving at the highest levels. Surely we should be aiming to help our own students develop these necessary attitudes within their personal make-up.

The term 'Problem' also needs clarification. The view taken in this paper is that the term 'problem' should be expanded to its fullest sense – that of providing a challenge. The common ground encompassing all discipline settings and implementations of PBL is that a complex, multi-faceted challenge is posed to which there may be one or more alternatives for improvement in existing conditions.

Drinan (1991) argues that the term 'problem' also is limiting and provides examples where the scenario presented is really a creative opportunity, an improvement of existing conditions and can be a

pro-active rather than reactive action (e.g. prevention rather than cure). Used in this way a 'problem' is really an opportunity that may be seized, such as the active engagement in some process to create an opportunity for the mutual benefit of the initiator and a recipient community. This is typical of entrepreneurial developments. In other cases there may be a 'problem' used in the sense of difficulty, crisis or unsatisfactory conditions. An extreme may be that stabilisation of a deteriorating condition is the optimal solution to the 'problem'.

Drinan does not suggest an alternative to the use of the word 'problem'. His objection is in support of the argument in favour of using the term 'Experiential Learning' rather than Problem-Based Learning.

Within the paper the terms problem, scenario, project, case and challenge are all used. Generally scenario is used to describe the 'brief' or 'setting' for the problem/project/case. Challenge is used in a more generic sense to suggest that the problems/projects/cases may allow a positive entrepreneurial role or proposal. The terms 'solution' and 'proposal' are used to mean the outcome presented by the student or processes suggested as being appropriate for the posed challenge.

PBL – A Concept and Strategy  
Planning for Change

Problem-Based Learning is a way of structuring the curriculum and teaching activities so that the emphasis is placed on contextual learning derived from perceived needs. There is no formula to be followed. Although most PBL courses have many features in common there are many variations and most teaching methods are used in some PBL courses.

There are many misconceptions about PBL and about what staff and other resource commitment is required to implement PBL. We often hear “the changes required to implement PBL are too drastic”, “it cannot work for us as we have such large classes”, “we can’t teach using tutorials only”, “PBL is only coordination of study disciplines, and we do that anyway”, and “PBL imposes too great a demand on the staff”.

From an investigation of many reports of PBL implementation it would be easy to conclude that PBL demands more resources than conventional learning approaches for given courses and, without the availability of additional resources, the increase is manifested in teaching staff overload and stress, space and infrastructure shortages and timetabling difficulties. Close consideration of the whole field of impact and interaction of resources within PBL courses, however, suggests that PBL itself is not the problem but that inadequate provision has been made for any change, PBL or otherwise, particularly in relation to programme evaluation, organisational development and staff development. Cowdroy and Kingsland (1992) have investigated this issue and argue that the adoption of PBL is no different from any other significant change in educational approach and, as such, demands the same consideration of infrastructure support, particularly organisational development and staff development in addition to more obvious consideration of programme issues.

#### The Problem-Based Learning Environment

When a PBL project/case/problem is presented to students the initial trigger is a scenario in a form typical for the discipline. This may be a letter from a prospective client (architecture or law), a video of a patient presenting at casualty in a hospital (medicine or nursing), an actor simulating a family dispute (social work or law), an advertisement in the paper calling for expressions of interest (Construction Management, Architecture, Business and Management, etc.) or in whatever form provides realism for the discipline in which the student is involved.

The common feature of this trigger is that a scenario is presented providing challenges for students to proceed towards some goal. The initial step for students is to try to understand what the proposed

scenario really requires – to redefine the problem in terms that help them identify their learning needs. This may entail seeking further information to enable them to define the problem more accurately. This problem clarification and definition stage is the first part of the project orientation and is necessary before students can accurately identify their learning needs. This, in turn, must be completed before they can define learning strategies to acquire the necessary knowledge

and skills to address the problem.

The major allocation of time is spent implementing these strategies, gathering and analysing data, considering possible solutions or proposals and arriving at a preferred solution or proposal.

Considerable time can be wasted if the preceding stages have not been completed thoroughly. Cowdroy and Kingsland (1993) describe how the learning and problem solving processes can include the use of pre-emptive and post hoc orientation, exploration and reflection. They have identified four stages in the learning process with PBL:

- an orientation stage, considering the general context of the project type;
- a divergent stage considering the field of relevance of the particular project;
- a convergent stage considering the possible solutions and consequences and arriving at a preferred solution for the particular project;
- a reflective stage, retrospectively considering the consequences of conclusions reached in the previous stages, and implications for future general application.

(Cowdroy & Kingsland 1993: 236)

#### Figure 1 – The Problem-Based Learning Process

(Cowdroy & Kingsland 1993: 236)

The divergent search stage is an important element in PBL. This mirrors professional practice in any discipline. Scenarios presented to practitioners in most disciplines are not self-contained and well defined. It is the responsibility of the practitioner to define the parameters of the problem or opportunity. This definition of scope is broadened or restricted according to resources available and is driven by professional goals and opportunities, by client requirements, societal demands and legal and economic requirements and constraints.

#### Consequences for Students and Staff

There are a number of consequences for both staff and student that arise from adoption of this approach to learning. The learner drives the learning process in conjunction with the academics who have designed the curriculum. The academic, informed by community and professional bodies, provides the educational setting having an overview of the longer term educational objectives. Students respond to the learning environment by identifying their own learning goals and needs. This method of learning respects students' ownership of the learning process. Students are empowered to identify their own resources, capabilities and limitations and add to these as needed to move forward in the learning process.

The responsibility of the academic in this process must be widened from that adopted in traditional settings. In traditional learning programmes the major responsibility is to provide expertise in the form of information and examples of the use of processes and contextual analysis. The emphasis of the lecturer is on the transmission of knowledge (or their particular interpretation of it) and examples of interpretation and implementation of the theory of the discipline. The responsibility of the student is to absorb this knowledge and to

demonstrate its application in a variety of settings.

In PBL there is much less emphasis on the academic's responsibility to transmit knowledge and much more on helping students to identify sources of information, then assisting them to interpret and apply this in context. Lectures and other fixed resource sessions may still be

necessary in PBL in some instances to allow efficient use of educational resources. A more important role for the academic, however, is that of guiding the student in acquiring lifelong learning skills in order to develop expertise within their chosen discipline.

Discipline experts need to be involved in students learning processes to ensure that the students become aware of relevant information, can interpret and prioritise information coming from a variety of sources and can understand the implications of the use of this information. It is the discipline expert who is most able to help the student identify possible learning resources and to help them interpret the information they retrieve. The discipline expert is also well placed to provide guidance as to progress and to help students synthesise this diverse information towards a solution or proposal.

This view is supported by Gonczi (1991: 29) who argues that expertise is domain specific. Gonczi's classification of expertise is the demonstration of high levels of competence in a contextual setting. Hager, Gonczi and Athanasou (1994) argue that for a practitioner to claim competence it is necessary for them to demonstrate use of knowledge and processes in context.

PBL assessment methods reinforce this view of the application of knowledge in context rather than the mere repetition of facts. PBL demands that students identify the necessary resources for the scenario and undertake appropriate research. They are then required to analyse the information they have gathered, hone skills and apply processes to complete the communication of their preferred proposal. The assessment used in PBL forces consideration of the complete process of problem definition, research and synthesis. Traditional methods of assessment (examination, essays, multiple choice questions) can only infer understanding of the material and do not demonstrate ability to apply skills and processes necessary for the successful completion of a complex, multifaceted project.

#### Development of Lifelong Learning Skills

Drinan (1991) distilled a set of "the essences of PBL and its derivatives" (reproduced as Table 1 above). The list is ordered from basic enabling skills to high-order attitudinal attainment. It is clear from the list that the aim of PBL is to encourage students to become self-actualising. An argument often proffered in support of higher education programmes is the development of lifelong self-directed learning skills, that is learning how to identify learning needs for the given scenario and to devise and instigate appropriate learning strategies to undertake the necessary development.

These learning skills are transferable to new situations and new knowledge (Woods 1994, Drinan 1991). If there are gaps in a graduate's

knowledge about their discipline their ability to undertake new learning in a self-directed manner will allow them to instigate appropriate action. Without entering the argument about whether or not traditional programmes require that students develop these skills a strong case can be made that PBL programmes do require this for students to complete the programme of study successfully.

Assessment is a strong motivational force in higher education. It often drives the learning process either in a positive or a negative manner. When traditional assessment methods are used it is inferred that students have acquired the ability to adapt to new situations from their development of skills in self-directed learning. Traditional assessment methods use discrete, well-defined problems and usually supply full information resources. In these instances a significant part of the challenge has been pre-digested. The problem definition stage has been addressed, and the student is deprived of the divergent search stage where resources are identified and located. The problem posed to the students has been refined to a stage where they apply only convergent processes.

PBL, on the other hand, usually has poorly defined problems with little

or no information directly supplied. This requires students to determine their learning needs, seek information, sort and analyse this information and to synthesise a solution or proposal. The first stage is orientation to the project type and to the specific problem followed by a divergent search for information that may be useful in addressing the problem. On completion of these steps, or sometimes in conjunction with them in an iterative manner, convergent processes are adopted to analyse the information that has been gathered and to synthesise a preferred solution or proposal. PBL thus requires students to address the full range of problem solving issues including the problem definition and orientation stages.

Student cannot acquire these self-directed learning skills by osmosis. Reliance on students applying self-directed learning techniques requires that we first assist students to develop these skills. In addition it does not abrogate our responsibility as academics to provide a learning environment where students are provided opportunities to cover an appropriate breadth of issues, attitudes and content. There are times when a practitioner will be required to have a thorough understanding of various items of knowledge without the need to undertake a research programme. These are the core enabling skills and knowledge for the given trade or profession. It is obvious that graduates must have developed competence in these matters. The community will not accept less and expects all professionals in each field to have developed minimum levels of competence appropriate to their discipline. In order for a practitioner to perform in a time-efficient manner they must have a deep, ingrained understanding of a broad knowledge base in their area of expertise. Many examples could be shown where this deep understanding is a matter of life and death. In other disciplines the stakes may not be as high, but nevertheless

the community, professional and regulatory bodies and employers expect certain minimum levels of competence across a wide range of abilities and knowledge.

#### Problem-Based Learning – Broadening the Base

In addressing the future directions for the American education system Brock (1993) observes that the world is radically different from when most academics were educated. This is also true in Australia even for most academics who have been in the system for less than ten years.

Brock states that:

An increasingly open, global economy requires—absolutely requires—that all of us be better educated, more skilled, more adaptable, and more capable of working collaboratively.(Brock 1993)

In addition, when reflecting on the current state of education, he observes that:

...an increasingly diverse society, battered (and that is not too strong a term) by accelerating change, requires more than workplace competence. It also requires that we do a better job of passing on to the next generation a sense of the value of diversity and the critical importance of honesty, decency, integrity, compassion, and personal responsibility in a democratic society. Above all, we must get across the idea that the individual flourishes best in a genuine community to which the individual in turn has an obligation to contribute.(Brock 1993)

Some of the suggestions put forward in the report are that society needs stronger, more vital forms of community. It needs an informed and involved citizenry. It needs people able to assume leadership roles. It needs a competent and adaptable workforce. It needs an affordable, cost-effective educational enterprise offering lifelong learning. Above all, it needs a commitment to the belief that all should have the opportunity to develop their talents to the fullest.

The tertiary education setting should allow students to develop these bodies of knowledge, processes and attitudes, and perhaps most importantly, to develop the ability to know how to learn and master new

things.

#### Integration of Theory

Most would agree that study at the tertiary level should involve higher-order thinking and exploration of complex concepts as well as the development of technical competence. It is argued that the flaw with PBL is that 'practical problems' are being addressed and therefore much of the learning taking place is shallow resulting from students addressing the technical considerations of the 'practical problem' to be solved. It is assumed that this precludes study in depth of issues at the periphery of the problem is not possible. Why should this be the case?

Adoption of the PBL method does not dictate a blinkered view of knowledge and attitudinal development and slavish pursuit of only that material directly needed to solve technical aspects of the problem. A major benefit of the PBL method is a divergent search for any knowledge

that may have an impact on the area within which the problem is posed. This is then followed by an analysis of the relative merit of the material and the development of understanding of the usefulness of this material both intrinsically for future needs and specifically for the problem as currently posed.

Extending this argument requires that we appreciate the unique position of the tertiary student as a developing member of the profession or within the specific discipline. They do not have all the skills and knowledge necessary to operate as competent practitioners or we would not need higher education programmes ranging from two to six years (and longer for certain specialisations). The problems and scenarios of PBL must be developed to allow students to question not only their level of knowledge and ability at practical processes, but also to address theoretical questions and to develop appropriate attitudes to allow them to take their place within their chosen discipline and as a member of the community.

In identifying the issues to be addressed students will discover that there is much they do not know about such issues, and even that there is a lot they do not know that they do not know (requiring that facilitation of learning addresses this need). Students will need to study and work through these matters in depth to understand the implications of these issues on all aspects of the problem. It is possible to use the scenarios as the generator of deep study of issues generally considered to be at the periphery of the 'practical problem' as posed. The benefit of such an approach is that students will see the reason for such study and be able to place their learning within a larger learning framework. This also provides the opportunity, once a deeper understanding of this material has been undertaken, for investigating the impact of broader issues on the immediate problem and on the problem type in a generic sense. It also allows the broadening of the problem to accommodate wider societal and community issues. The integration of knowledge and processes back into the 'problem' is where much higher level learning can take place as adjustments to priorities and compromises are negotiated in combining material answering multiple, complex needs (Ostwald & Chen 1994). Drinan suggests that education generally, and those involved in PBL in particular, must adopt the paradigm "...of the world as an organic unity in which relationships among all things are recognized to be as important as the constituent parts" (Drinan 1991: 320).

Extending the Limits of the 'Problem'

An important distinction of PBL from other learning methods is the requirement that student use the divergent search stage in addition to the convergent solution testing stage during concept generation and testing. The divergent search and concept proposal stage precedes the convergent preferred solution synthesis and testing stage. Many traditional courses use case studies and real world problems to illustrate the theoretical issues being addressed. In these courses the

divergent stage is usually omitted as all the necessary information is

made available. The problems are usually well defined having been consciously refined from more ambiguous, ill-defined, real world problems.

Case study based learning integrates the divergent stage only when the 'solution' or 'proposal' is not made available until after the case has been studied. Szabo (1994: 269-272) describes the use of this method and the educational theory underpinning its use. In this mode of presentation of case studies the student receives the scenario in a form similar to that of the specific discipline or in a more refined manner (according to the educational objectives identified by the academic). Students determine how to tackle the scenario, and undertake the brief analysis and problem redefinition stage. An example is described in 'Development in a Theoretical Setting' below. When the problem has been adequately phrased students identify learning goals, objectives and strategies and undertake research, analysis and synthesis. The scenario culminates with their presentation of their preferred solution or proposal. Students and staff review this work and make relevant observations to further the learning process. Students should also critically reflect on their work, processes and learning achievements. In the case study method used by Szabo it is only after all these steps have been completed that students are exposed to the solution or proposal from the real world scenario. The ramifications of the full case (or cases) can be discussed to complete the learning process. The advantage of this method of using case studies is that students are not blinkered by seeing the solution used in practice (or the solution that should have been used) as the only possible path. The full advantage of the divergent search stage can be achieved, whereas prior knowledge of the real world solution is likely to short-circuit this process.

#### Integrating Theoretical Issues within PBL

An aspect of most PBL scenarios is that they are complex, multi-faceted and ill-defined (Drinan 1991: 316, Kingsland & Cowdroy 1990, Cowdroy & Kingsland 1990). This can provide the ideal situation for teasing out complex social questions and some of the more esoteric aspects of the discipline. In this section three examples demonstrate the breadth of issues that can be incorporated into PBL scenarios. They show how complex theory can accompany the study of technical issues.

#### Development in Historic Precincts

The students in Architecture 1 are confronted with a number of issues that are grounded in theoretical frameworks that would normally be taken as read in normal professional practice. An example is where students are asked to place a new building between existing terrace house buildings with common party walls. The new building will touch both the adjoining buildings enjoying structural support from the common party walls. The precinct for this development is an area of recognised historical significance. An issue for students to come to terms with is to what extent they mirror the historical setting in which the building is placed, and to what extent they can summarise and abstract the elements of the adjoining buildings.

Students meet the client who is either the real owner of the property

or a simulated client. High on the agenda of this client is the desire to respect the historical nature of the locality. The client does not want slavish copying of features of adjoining buildings but hopes for a modern interpretation of the character of the district. The attitude of respect for one's neighbours is thus incorporated into the briefing stage for the project. The tutors require that students address this issue and are able to describe how their design answers the questions raised by this issue.

Legal implications of building in an area where the local council has heritage conservation covenants in place must also be identified and studied. Designs must reflect the needs of the community expressed in

these covenants. Students need to address that what extent they can deviate from established norms in addressing the client's desires for 'a modern interpretation of the character of the district'.

Another aspect of this project at which students are confronted with social issues is the briefing stage for the project. This is the students' first attempt at eliciting project details from a client. Initially the students are given a sketchy brief similar to those supplied by real clients requesting architectural services. Students identify a need for further information and clarification and request help with interview technique. They are given a resource session on this matter, then are asked to appoint directors (usually by election on one director per tutorial group) who will conduct the client interview. The students formulate what they think they need to find out from the client and determine how to run the interview. The directors and the client arrange a meeting time and place and proceed as if this was the initial client-architect meeting (with the exception that the rest of the class are also in attendance, but are not allowed to interject during the meeting).

The client-architect meeting raises many issues of interpersonal communication that students often have not foreseen. Humorous examples are dragging the client in and beginning the interview without even introducing the directors of the firm involved in the meeting. On one occasion half way through the meeting someone remembered that they were going to offer coffee to the client. Instead of asking if tea or coffee would be preferred a steaming hot cup of white, unsugared coffee was forced into the client's hand without any forewarning. Thankfully the client in this instance was another academic simulating the client. He was aware of the scenario and not too dismayed by this action.

In later reflection on this briefing session the students recognise many aspects of the interview session that they had not appreciated before. They recognise that the meeting appears, on the surface, to be for one purpose – to determine the client's real needs and priorities. After the meeting they begin to realise that this is the initial 'getting to know you' session, that each is trying to judge the performance of the other to see how they need to adjust their way of working to suit the new partnership. The sensibilities of the other party are important. They need to be eased into the relationship and

made to feel comfortable with the capabilities of the party involved. Resources are provided at this briefing session to meet some of the students' requested needs. They generally ask for assistance on the type of questions they should ask, what sort of things they can ask, how best to find out what the client really needs (rather than just what they think they need), and so on. It is usually not until the students have conducted the interview that they realise just how complex the briefing interview is and the need for a good understanding of interpersonal communication theory.

In one year the project proposed rehousing an advertising business onto the conservation area site. A group of students identified an ethical problem in dealing with such a client. This then became an issue that they incorporated into the project. It required that when their work was assessed that this view was recognised and the assessment weighted accordingly. This issue in another guise is also addressed as a significant part of the next example.

#### Development in Urban Settings

A very complex scenario embodying many complex architectural, political, social and societal issues in a high density, urban setting is the subject of study for most of the first semester for Architecture 4 and Construction Management (Building) 3 students. An abbreviated brief for the architecture student has been reproduced in Appendix A. This Urban Development/High Rise project addresses urban issues; pedestrian and vehicular traffic patterns and conflicts between the

two; social and political issues – ecological justification for concentration of populations vs ecological destruction due to motor vehicles; analysis of the value to the community of historical precedents and investigation of ways of preserving them in an area of significant development; issues of professional responsibility and professional conduct; and many other issues.

The 'Phase Document' for the project clearly sets out the context for the project and the educational directives underpinning it. The Phase Document is given to the students at the start of the project along with the client's brief to enable them to understand the educational context for the project. The Phase Document describes the project in these terms:

The high rise project is a key point in the architecture course. Planning and management of this phase of the course is based on extensive and ongoing research into educational processes, competency development, and the needs and directions of graduates in a rapidly changing profession, industry and society.

The choice of a high rise office project for this phase of the course is a reflection of its value as a representative complex problem and a vehicle for development of generic professional skills which are transferable to other highly complex project types (eg. hospitals, hotels), and to a wide range of career path options within the profession and in adjacent professions (eg, interior architecture,

project management). It is not based on any expectation that students will or should necessarily become high-rise office tower designers. The high rise project is coordinated for Architecture 4 and Construction Management [Building] 3 students. The Construction Management students are involved ... in the planning/design process from the outset, taking the part of construction management consultants in the planning/design team. This arrangement reflects progressive project management and professional practice for both architects and construction managers, and provides both Architecture and Construction Management students with valuable experience in extending their consultative and collaborative skills.

The choice of a South East Asian context for this project is a reflection of the importance of the region's neighbouring cultures and of the increasing involvement of Australian architects and construction managers in South East Asia. The choice of Singapore as the particular S. E. Asian location for the project takes into consideration the similarity of technology used in Australia and Singapore for the design and construction of the high rise project type and, therefore, the opportunity to continue development of generic design, technical and practice skills while considering the effects of differing cultural factors on major redevelopment projects in the two countries.

The project is a commercial reality, at the interface between the CBD zone and the Tanjong Pagar Conservation area, including airspace over the Tanjong Pagar MRT Station. The property has a reputation as a 'difficult one': it is at the interface between the forty and fifty storey individual towers of the CBD and the two storey shop houses of the Tanjong Pagar conservation area, and it includes a major multi-level pedestrian focus associated with the Tanjong Pagar MRT station, and the site contains a number of significant heritage listed buildings. (Cowdroy, 1994)

The client's brief for this project is deceptively simple: "What bid should I make if this property is put to tender?" Cowdroy (1994) has described the processes students will need to undertake to reach a successful conclusion for this project. The relevance of this project to the issues being addressed in this paper is that the students need to clarify a number of complex theoretical issues to enable them to determine the potential for redevelopment of the property. Determining the bid is not simply an exercise in economic feasibility: a building must be appropriately designed for the highly sensitive site and its

economic potential determined. To arrive at their proposals students undertake feasibility studies of possible redevelopment opportunities requiring the design and technical resolution of specific proposals and the evaluation of the economic return, but must also address the political and cultural questions embodied within the project. Complex issues must be addressed to arrive at a proposal acceptable to the client. Again the project's Phase Document gives a valuable insight to the process expected of students:

Economic potential does not depend on cheapest building, nor the

easiest, fastest, or most obvious solution. Position, prestige and image contribute to rental value and therefore to economic potential. Prestige and image depend on high quality architectural design and high quality materials and construction.

Each student is required to apply current design theory to the design process; to develop an appropriate proposal for the project; and to undertake an economic evaluation of the proposal that then forms the basis of the answer to the client's question. The achievement of a high quality design (and a prestigious and economically attractive development) requires the architect to take the initiative in resolution of the multiple and often conflicting issues and contributions of the various participants in the design process. Students are not expected to resolve all of these issues and are not expected to achieve a commercially realistic solution – this is a challenge to an experienced practitioner. The students are expected to identify and address the key issues and to develop strategies for their resolution. (Cowdroy 1994)

#### Development in a Theoretical Setting

The Faculty has also used a scenario that demonstrates both how theoretical material can be integrated into the scenario and that a single scenario can be used with a multitude of viewpoints and objectives (see Appendix B – 'Cabbages and Churches'). This scenario could form the trigger for an architectural project, a study in politics, economics or law, and suggestions have even been proffered as to its use in investigating community medicine, social work and environmental management.

This scenario was developed for use in introductory seminars where the nature of Problem-Based Learning is investigated. It is not discipline specific and participants at workshops have, after initial rejection of the scenario, found that with minor amendment it can be adapted to their own discipline. Many have found that it can be used in its current form. Generally the only amendments required are in the trigger to provide the discipline specific setting. A report may have been requested by the Mayor's Office, or the client may be one of the stall owners at market requiring a study of some specific condition as part of raising an objection with the administration. The trigger may be a commission to design the multistorey carpark and other facilities for the square in such a manner that accommodates the needs of those currently objecting to the proposal. A report may be required by the central administration about current pollution levels and the likely effect of concentrating vehicular traffic by providing the multistorey carpark. The trigger is set up in terms appropriate for the particular discipline utilising this scenario.

In using this scenario students are expected to undertake several steps in deciding what the scenario is asking them to do. This orientation stage is where the general context of the project type is studied (see figure 1). Students need to identify the important learning objectives and goals (usually driven by their understanding of their place in the community, profession, university, etc.). From this they should then determine the most effective learning strategies for each objective and

identify likely sources of information. An important step in the identification of learning strategies is to determine those which need to be learnt in isolation from the main case. This isolation may be

necessary to understand complex concepts before trying to prioritise needs and understand how compromise can be reached when these issues are brought into contact with issues from other discipline areas. Following identification of the learning goals, needs and strategies it is important that students reach agreement with staff about the most appropriate method of confirming that each of the objectives has been met (= method of assessment and assessment criteria). This allows the students to see if any of the objectives cannot be met by the intended strategies that, in turn, prompts them either to modify the strategies until the objectives can be met, or to modify the method of confirming that the objectives have been met.

The 'problem' presented by this scenario can be read in many ways and can be addressed on many levels. This scenario may be used for first year students allowing them to learn something about urban sites, accommodation for pedestrian and vehicular traffic, government processes, forces in a capitalist market, the political power of community pressure groups and the balancing of conflicting community needs by those entrusted with political office. For architecture students at more senior levels this scenario could be used to allow the students to weigh the needs of the community for alleviation of the chaotic traffic conditions and more orderly parking against the strong historical character of the square and its existing architectural setting and to suggest how compromises could be achieved to maximise the potential of the development.

Students can begin to understand that all things are not simply black and white although this article appears to present a single-dimensional two-sided argument. In proposing a solution to the 'parking problem' some inventive thought will be necessary as one solution immediate creates other problems. A solution would have to combine sensitivity to the needs of tourists for untainted views of areas of historical beauty with the needs of patrons of the supermarket and nightclub and the local community and adjoining market gardeners with their strong feelings for the current character of the market and the square. There is also an obvious desire by the local community for more order in the use of the square by vehicular traffic and for more parking opportunities.

In setting this scenario for first year students the architectural brief may be simply to create a car parking facility that respects the setting and has the minimum architectural impact possible. The brief for the senior students would include the need to incorporate a compromise proposal that integrates the 'vegetable markets' within their combined solution, providing increased amenities for those who would otherwise be displaced, and yet also respects the historical and social setting of the square.

At both levels there is a strong need to identify the social milieu and

to study the implications of architectural decisions for each of the identified stakeholders in this setting. Any solution would have to be a compromise. Part of the process would be to identify how to assess the merit of the proposed development in terms that respect the views of each of the stakeholders. This requires deep study of the various social forces that are evident in this setting.

#### Conclusion

This paper has argued that a broad definition of Problem-Based Learning allied to a similarly broad definition of what a 'problem' might be enables theoretical issues to be studied with equal status as the technical matters necessary for proposing a course of action to a 'practical problem'. PBL uses less well-defined problems and requires an extension of the orientation or briefing stage and an added dimension to the research stage – that of a divergent search for material and an analysis of the relevance of this material to the posed problem. By incorporating this aspect of problem definition and solution practice within the specific discipline is more correctly

simulated.

The range of issues is necessarily broadened when using PBL. The development of attitudes such as honesty, decency, integrity, compassion and personal responsibility in a democratic society are more easily incorporated into the higher education agenda by careful selection of appropriate scenarios. Three examples were given to illustrate settings in which the use of complex, multi-faceted, ill-defined scenarios allow intense study of theoretical issues in considerable depth. The examples addressed issues ranging across political, social, societal and technical domains.

Various preliminary steps were identified as being necessary for identifying relevant issues for a specific project in the PBL setting as part of an orientation stage of the project. Students need to undertake these steps to identify the direction of their learning due to the ill-defined nature of problem found in or derived from real practice. Failure to complete this stage thoroughly will probably lead to inefficient research strategies and gathering of data irrelevant to the completion of the project. Due to the ill-defined nature of these problems it is importance that a divergent concept generation and search stage is incorporated as part of the learning strategies. If staff involved in a PBL programme want to proceed along the path of maximising self-directed learning then they need to bear the responsibility to help students acquire the necessary skills. In addition there is a responsibility to provide a learning environment where the opportunities provided cover an appropriate breadth of issues, attitudes and content.

A final word is that PBL implementation has often been associated with high levels of staff stress and high workloads both by students and staff. This is usually due to poor planning rather than due to the adoption of PBL. These matters have been addressed in some depth elsewhere (Kingsland & Cowdroy 1992, Cowdroy & Kingsland 1992, Cowdroy

& Kingsland 1990) but the point needs to be emphasised that to reduce the probability of this the institution adopting PBL must plan for change and provide resources to enable suitable staff development activities to smooth the change process.

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The material reproduced as Appendix A is used during the 'Introduction to Problem-Based Learning' workshops conducted by the Faculty's PBL research and development team.

#### References

- Boud, D. Feletti, G. (eds) (1991). *The Challenge of Problem-Based Learning*. Kogan Page: London.
- Brock, W. (1993). Chairman's Preface. *An American Imperative: Higher Expectations for Higher Education*. Report of the Wingspread Group on Higher Education.
- An electronic version of the report of the Wingspread Group on Higher Education is available on INTERNET through anonymous ftp at the University of Wisconsin-Milwaukee. To locate the report, ftp to `csd4.csd.uwm.edu`, change directory to `pub/wingspread/report.txt`.
- Chen S.E., Cowdroy, R.M., Kingsland, A.J. and Ostwald, M.J. (eds) (1994). *Reflections on Problem Based Learning*. The Australian Problem Based Learning Network (APBLN): Sydney.
- Cowdroy, R.M. (1994). *Architecture 4, 1994. Phase 4, Phase Document*. Department of Architecture, The University of Newcastle.
- Cowdroy, R.M. and Kingsland, A.J. (1993). *Decompressing the Timetables in Problem-Based Learning*. In Ryan, G., Little, P. and Dunn, I. (eds) *Research and Development in Higher Education*, 16. Higher Education Research and Development Society of Australasia (HERDSA): Sydney, pp. 235-240.
- Cowdroy, R.M. and Kingsland, A.J. (1992). *Problem-based learning is not resource extravagant OR Problem-based learning is not a problem*. In Parer, M.S. (ed.), *Research and Development in Higher Education*, 15, HERDSA: Sydney, pp. 519-526.
- Cowdroy, R.M. and Kingsland, A.J. (1990). *Assessment of Complex Multiple Criteria: Focus on Professional Development*. In Ross, B. (ed.) *Research and Development in Higher Education*, 13. HERDSA: Sydney, pp. 150-156.
- Crebbin, W. (1994). *Teaching in Higher Education for Active & Lifelong Learning*. University of Ballarat.
- Drinan, J. (1991). *The Limits of Problem-based Learning*. In Boud, D. and Feletti, G. (eds) *The Challenge of Problem-Based Learning*. Kogan Page: London, pp. 315-321.
- Gonczi, A. (1994). *Competency Based Assessment in the Professions in Australia*. *Assessment in Education*, 1 (1), pp. 27-44.

- Hager, P., Gonczi, A. and Athanasou, J. (1994). Competency Based Assessment in the Professions in Australia. *Assessment and Evaluation in Higher Education*, 19 (1), pp. 3–16.
- Kingsland, A.J. (1993). Problem-Based Learning: Efficient, affordable and stress-free implementation. In Ryan, G. (ed.) *Research and Development in Problem Based Learning*, 1. APBLN: Sydney, pp. 311–320.
- Kingsland, A.J. and Chen S.E. (1993). Defining, Developing and Assessing Higher Order Competencies: Focus on Learning Outcomes in Higher Education. In *Conference Proceedings After Competence: The Future of Post-Compulsory Education and Training*. Centre for Skill Formation Research and Development (CSFRD), Griffith University: Brisbane, pp. 193–200.
- Kingsland, A.J. and Cowdroy, R.M. (1993). Competence without Attitude is not Competence. In *Conference Proceedings After Competence: The Future of Post-Compulsory Education and Training*. CSFRD, Griffith University: Brisbane, pp. 201–209.
- Kingsland, A.J. and Cowdroy, R.M. (1990). Assessment of Complex Multiple Criteria: Focus on Skills. In Ross, B. (ed.) *Research and Development in Higher Education*, 13. HERDSA: Sydney, pp. 163–168.
- Ostwald, M.J. and Chen S.E. (1994). Marginalisation of Theoretical Issues in a Professional PBL Course - A Structural or Attitudinal Problem?. In Chen S.E., Cowdroy, R.M., Kingsland, A.J. and Ostwald, M.J. (eds) *Reflections on Problem Based Learning*. APBLN: Sydney, pp. 87–104.
- Ostwald, M.J. and Kingsland, A.J. (eds) (1994). *Research and Development in Problem Based Learning*, 2. APBLN: Sydney.
- Stretton, Alan. (1985). Problem-Based Learning and the Academic-Practitioner Gap. In Boud, D. (ed.) *Problem-Based Learning in Education for the Professions*, HERDSA: Sydney, pp. 59–66.
- Szabo, A.B. (1994). Changing the way we Educate Law Students: Problem Based Learning. In Ostwald, M.J. and Kingsland, A.J. (eds). *Research and Development in Problem Based Learning*, 2. APBLN: Sydney, pp. 261–284.
- Woods, D.R. (1994). *Problem-based Learning: How to Gain the Most from PBL*. McMaster University: Hamilton.

Department of Architecture  
The University of Newcastle  
Architecture 4, 1994  
Phase 4 Brief (Abbreviated)

Developed by R.M.Cowdroy and R.J.Moore

Faculty of Architecture, The University of Newcastle, April 1994.

#### INTRODUCTION

The Client is an international consortium comprising an Australian developer with Japanese connections, a major Japanese retail chain, and

a Singaporean development bank. The client wants to tender for the right to develop a landmark property for which tenders have been invited by the Urban Redevelopment Authority (URA).

The property is within the CBD Zone, towards its South Eastern end and on its Eastern perimeter, adjoining the Tanjong Pagar Conservation Area and is also bounded by the rear of the White House and Traffic Police Station, both of which are listed for conservation. The area adjacent to the Tanjong Pagar MRT station will form the secondary commercial node, which the URA envisages will complement the existing financial centre centred at Raffles Place. The Tanjong Pagar Conservation Area, however, will retain its present traditional form of urban development characterised by shop houses of two and three storeys. The property is therefore at the interface between CBD urban development characterised by forty and fifty storey individual towers, and the contiguous three storey traditional urban development pattern.

Current planning for future development provides for extension of the CBD Eastwards from its Raffles Place focus into a new Central Subzone and then Northwards into a Bayside Subzone. These future proposals will embrace Marina Bay, and will re-establish the historic focus of commerce around the port facilities and maritime activities.

The property is adjacent to a major traffic focus at the complex of intersections of Maxwell Road, Cecil Street, Robinson Road and Anson Road. The Tanjong Pagar MRT station is a major pedestrian traffic focus.

The location therefore has several significant aspects: it is at the interface between the forty and fifty storey individual towers of the CBD and the three storey shop houses of the Tanjong Pagar Conservation Area; it includes a major pedestrian focus associated with the Tanjong Pagar MRT station; it adjoins a major traffic focus at the complex of intersections of Maxwell Road, Cecil Street, Robinson Road and Anson Road it adjoins a major government office precinct on Maxwell Road.

#### DEVELOPMENT POTENTIAL

The location of the site and its importance in the URA's objectives and strategies offer a number of valuable opportunities for our clients.

The location and proposed pattern of development suggest that prestigious occupants will be attracted to both commercial facilities, and residential accommodation. The location and importance of the site also offer valuable opportunities for our firm. The challenges of resolving multiple complex business, social, planning, urban design and architectural issues on such an important and sensitive site provide an opportunity for the firm to achieve further international prominence and recognition for excellence and innovative approaches and solutions. The proposed development is likely to include elements associated with all of the established (existing) and planned (future) activities and development patterns which will adjoin the property. That is, the proposed development is likely to be an extension of several disparate types of activity and patterns of development. The International Plaza provides some indication of the likely development potential of at least part of the property. It is a commercial development consisting of a retail podium and office tower above, with car parking above the retail. The government heritage office buildings on Maxwell Road, and the proposed reinstatement of the shop housing on Peck Seah Street also provide some indication of likely development potential on other parts

of the property.

#### DEVELOPMENT CONSTRAINTS

##### URA Policy

The URA considers the proposed development as a key element in achieving its objective to develop an effective secondary commercial node, which the URA envisages will complement the existing financial centre at Raffles Place

The URA's concept is that it is important that the proposed development responds sensitively to its context and creates a sense of place for

the area and, therefore: Its unique position at the transition point between the new high rise commercial district at Cecil Street/ Robinson Road/ Shenton Way and the old low-scale residential/commercial conservation areas should be addressed; it should optimise its location as an important commercial focal point for pedestrian and vehicular movement, with emphasis on creating pleasant and convenient pedestrian access to and from the MRT station; landscaped parks and plazas should be planned to enhance this commercial node.

#### PROFESSIONAL EXPERTISE REQUIREMENTS

The property is so important and so sensitive that the successful tender may be any one of a wide range of possible solutions to the complex issues involved. The tender is therefore subject to political and public opinion considerations as well as to financial considerations. It is therefore expected that the successful tender will be the proposal which most convincingly addresses the complex of issues involved and which satisfies the objectives of all the main vested interests.

The importance and sensitivity of the property and the complexity of the issues also suggest that success will require creative innovation and an integrated approach to the design and technical resolution of all aspects of the development. This integrated approach requires the highly developed urban and architectural design skills for which we are known. We therefore have the opportunity to reinforce and expand our reputation for architectural excellence.

Analysis and resolution of such a complex array of issues, and the resolution of design and technical aspects of specific buildings requires the architect to offer extended professional services. The architect must provide some specific project management services, particularly leadership of a multidisciplinary team through the analysis, briefing, approval and design development stages, and integration of advice from a range of consultants during the design process. Construction management consultants will be part of the design team from the outset, and investment and retail management consultants, construction, structural and services consultants will be brought into the team at appropriate stages in the design process.

The design process for such complex projects therefore requires highly developed management and leadership skills, as well as excellence in design and technical resolution skills. Effective communication of the proposal is also essential to the outcome and success of the proposal,

particularly in the demanding and discerning forum of Singapore. Only the highest professional standard of visual presentation is likely to succeed.

Individual proposals will be submitted for assessment within the office. A shortlist of the best proposals will then be established for presentation to the client and the URA. It is intended that a selection of the shortlisted proposals will be taken to Singapore for public exhibition.

#### FIAT FIASCO

Rome, Wednesday A protest meeting today in the Centrale (market square) of Caligula near here, was told of a Town Administration plan to close the market to turn the square over to multi-storey parking in a bid to solve some of the town's chronic traffic and parking jam. A petition for the change came from a supermarket which opened recently in a disused warehouse, and from a nightclub located above the tavern. Both supermarket and tavern face onto the square, and both claim that the traffic congestion around the market and market stalls themselves prevent parking within two blocks. This prevents shoppers using the supermarket during the day and tourists using the nightclub at night, they claim. Unconfirmed reports indicate that the City Fathers are considering relocating the market outside the city wall on land presently occupied by market gardens

Protesters claimed that the market had operated in the square for at least 800 years, and that its removal would destroy an essential part of the city's cultural heritage.

Environmentalists claimed that the move would increase pollution in the centre of the town and would increase the decay of the old baptistry, all that remains of a monastery thought to have been built by Leonardo da Vinci.

Market trader Luigi Vecchio said that he had been selling cabbages in the market for forty years and that his family had "occupied the same corner of the square for at least seven generations".

When asked if they had always sold cabbages, he said "of course! you keep doing what you do best". He also said that he sold some other vegetables as well, but that cabbages were the staple diet of the region.

Other traders echoed this, saying that this was the biggest market in the province, and that "to change the market would destroy the town's main business". Besides, they said, the market is a major tourist attraction, and the change would drive tourists away.

A spokesperson for the supermarket said that "Caligula had to move with the times. Open markets no longer provided shoppers with the range and quality of food they wanted. They also wanted to park close to shops and to enjoy one-stop shopping."

"Tourists came to see the church", she said, "not the market, and the additional attraction of a nightclub would increase the tourist potential, not reduce it. Besides, the ability to bring coaches right

into the square would bring more tourists to the church. This has never been possible while the market was there”, she said.

Mayor Obese Pomposo said that no decision had been made, and that “the administration would consider all points of view” before making a declaration. He said that he had “no financial interest in the supermarket or the nightclub”.

Microvan driver Mickey Tropolino said he didn't think parking was a problem. He always parked on the footpath. He also thought that if the market was removed “all the cars in Caligula would park there and he would still have to park on the footpath”.

Market gardener Largo Ritardando said that putting the market where the gardens were was “incomprendo”. He would have to move his farm away from the market-up to two hours delivery time as he had only a horse and cart. “I can't afford a car, or drive one”, he said.

Trattoria owner Uno Grandioso said the change would ruin the restaurant trade, which was geared to the traders and buyers who came into town for the market. More tourists simply meant more work, he said. And he would have to modernise and enlarge his restaurant, and where would the money come from, he asked.

The matter is listed for discussion at the next meeting of the City Administration on Friday.