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Problem-based Learning in Early Childhood and Primary Pre-Service Teacher Education: Identifying the Issues and Examining the Benefits

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PROBLEM BASED LEARNING IN EARLY CHILDHOOD AND PRIMARY PRE-SERVICE TEACHER EDUCATION: IDENTIFYING THE ISSUES AND EXAMINING THE BENEFITS

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Abstract: Problem Based Learning (PBL) has been used with increased frequency in Higher Education settings since first introduced by Barrows and Tamblyn during the 1980's. Since this time PBL has been used in medical, engineering and education faculties to support pre-service students in the acquisition of skills and content knowledge relevant to their disciplines. This paper explores the perceptions early childhood and primary pre-service teachers held regarding their participation in a unit of study structured around the use of a PBL scenario. The paper examines the frustrations pre-service teachers experienced within the PBL scenario as well as the perceived benefits regarding their participation in the unit of study.

Introduction

Problem Based Learning (PBL) has been used with increased frequency in the Higher Education sector since first developed by Barrows and Tamblyn at McMaster University during the 1980's (Major & Palmer, 2001). Initially used as a means of ensuring that medical students were able to apply knowledge and respond to 'real-life' situations rather than simply acquire course content, PBL has evolved over the intervening years into a popular learning approach (Edens, 2000, p. 55). PBL draws on constructivist and social constructivist principles of learning, advocating student centered engagement with course content and peer-to-peer interactions as central to the learning process. PBL is not discovery learning, case-based learning, inquiry learning or project-based learning. Rather PBL is learning that occurs through immersion in a specific problem that requires students to apply reasoning and research skills to its solution (Barrows & Tamblyn, 1980). A particular emphasis in PBL is on allowing learners to explore the theory-practice relationship so that they are able to apply theoretical knowledge to their particular professional contexts (Savin-Baden, 2000, pp. 5 – 6). In the past, PBL has been viewed as an appropriate pedagogical tool for preparing graduates across a range of professions including, nursing, medicine, engineering, and law.

More recently, PBL has attracted attention in the teacher education literature. The approach has been considered an important means of exposing pre-service teachers to situations they are likely to face as professional educators whilst simultaneously employing a teaching and learning approach that encapsulates the central tenets of constructivist and social constructivist learning theory (Ahlfeldt, Mehta & Sellnow, 2005; Dean, 1999). Previous research into the use of PBL in teacher education programs has shown that the approach supports pre-service teachers to acquire theoretical concepts related to practice, as well as supporting the development of

interpersonal skills associated with working in professional contexts (Murray-Harvey & Slee, 2000).

Traditional approaches to teacher education based on the technical-rational model of development and knowledge generation have come under increased scrutiny as an inappropriate means of supporting pre-service teachers to understand the relevance theory holds to their practical work (Korthagen, 2001, p. 8). Korthagen (2001) argues that a more effective approach to teacher education needs to provide pre-service teachers with opportunities to construct understandings of practice which draw on relevant theory to inform understandings of the teaching and learning process. PBL arguably provides a vehicle for such opportunities as students must necessarily start with the problem situation embedded in the PBL experience and move from this towards a consideration of the theoretical perspectives of relevance to the problem. This means PBL allows pre-service teachers to experience situations that mimic the need for theory, rather then pre-loading them with knowledge considered a pre-requisite to participation in the field (Keppell, 2006).

Literature associated with the use of PBL across a range of professional development contexts tends to focus on the positive learning and skill acquisition outcomes for students engaged in PBL scenarios (Martin, 2003; McPhee, 2002). However, Savin-Baden (2000) notes a recent shift "towards critical analyses of PBL, which are more sensitive to the complexities of this approach to learning and teaching [and] are demonstrative of the increasing move away from the 1980's decade of evangelism towards a deeper consideration of the emerging themes and issues" (p. 3). This movement has been characterized by studies examining the issues related to using PBL in addition to its perceived benefits. For example, Holen (2000) has identified issues for students required to work within the group structure considered a hallmark of PBL, arguing that lecturers need to be sensitive to fluctuations in group dynamics rather than simply assuming that group participation will result in positive learning outcomes for all students (p. 488). Further research supports this point, with McPhee's (2002) examination of pre-service teachers' participation in PBL indicating that issues associated with group work including dynamics, personality clashes and conformity limited the effectiveness of some groups in solving the problem (p. 69). A further issue associated with the use of PBL as a learning approach has focused on students' responses to the problem forming the basis of the experience. Dahlgren and Dahlgren (2002) found that actually delimiting the issues related to the problem hampered some students in their ability to address the problem itself, suggesting that participating in PBL may not necessarily be a positive experience for all students. Eden (2000) has similarly established that some students are in fact perturbed, rather than engaged and excited, by the open-ended and changing nature of PBL (p. 59).

PBL is an enigmatic learning approach, drawing on established principles of pedagogical effectiveness, including student engagement, active learning, social interaction and learner relevance. As an approach it has attracted considerable attention as a means of preparing graduates to work in complex fields, enabling the development of skills considered necessary to participation in the modern workforce. However, like any approach, PBL is likely to hold issues and frustrations, in addition to benefits and lessons, for its participants. Reflecting on both the issues and benefits associated with the use of PBL as a pedagogical approach in teacher education holds the potential to refine its use, leading to improved educational experiences for pre-service teachers. This paper reports the findings from a case study of a PBL scenario employed in an undergraduate teacher education program at a large Australian university. The paper

focuses on examining the responses pre-service teachers had to their participation in the PBL scenario in terms of its perceived issues and benefits.

Methodology
Study Context

The project was conducted as examination of pre-service teachers' perceptions of their participation in a unit of study focussed on theories of child development that employed a PBL model to interface theory and content. Participants were enrolled in either the Bachelor of Education (Early Childhood) or the Bachelor of Education (Primary) and were in their second or third year of study. Both male (20%) and female (80%) pre-service teachers aged between 19 – 40 years participated in the project. Participation in the unit involved students working in groups of five to address the learning and developmental needs of a fictional child named Laura. Each member of the group was assigned a different stakeholder role in Laura's life, including her mother (Chantelle), early childhood educator, case-worker, primary teacher and the parents of Laura's peers. The problem aspect of the scenario involved the pre-service teachers responding to weekly chapters on Laura's life which were posted to the unit website. Pre-service teachers were required to respond to the information contained within the chapters according to their particular stakeholder roles. This meant that the events occurring in Laura's life unfolded in 'real-time' during the semester, mimicking as closely as possible a real life teaching situation in which pre-service teachers would need to evaluate information, engage with other professionals, make pedagogical decisions and change their plans for the child as the child's circumstances altered.

The first chapter presented Laura as a tall child of 4.9 years of age. Various behavioural patterns regarding her social, emotional and cognitive function were described. Information regarding Laura's custodial status was also presented, with pre-service teachers made aware that Laura had recently been removed from her mother's custody after Chantelle had been arrested for soliciting at the Melbourne Docklands whilst Laura was in her care. Later chapters contained information about Laura's moral and creative development, her interactions with peers and issues associated with her transition to primary school. This information was contextualised by references to Laura's family experiences with her mother, foster carers and the later death of her absent father.

Pre-service teachers worked in small groups of five with each group containing one of the stakeholder roles relevant to the problem scenario. Addressing the problem involved the pre-service teachers working together according to their assigned stakeholder perspectives in order to address Laura's immediate and long-term learning and developmental needs. The unit was delivered using a traditional Lecture/Tutorial format. Lectures were used to address topics relevant to the unit of study and were paired with a matching event in Laura's life which appeared in the weekly chapters (for example, the week where the lecture topic was 'Children's Reactions to Death and Grief' was the same week that Laura's father died). Assessed tasks included peer presentations on Laura's needs, the development of a learning plan for Laura and a reflective essay. Tutorials were used for the peer presentations and provided time for completion of Laura's learning plan. Further opportunities for discussion and engagement were made available electronically through the unit website which was heavily integrated with the scenario (Edwards, 2005).

Study Aim

The aim of the investigation was to examine pre-service teachers' perceptions of their participation in the PBL scenario. The main concern was to identify the issues and perceived benefits associated with the pre-service teachers' participation in the experience.

Data Collection

Data regarding the pre-service teachers' perceptions of the PBL scenario were collected using an anonymous questionnaire administered at the conclusion of semester (n = 52). The questionnaire contained ten statements linked to a five point Likert scale [strongly disagree (1) to strongly agree (5)] as well as the use of three qualitatively orientated statements aimed at determining benefits and/or frustrations students perceived as characterising their participation in the PBL scenario. Data arising from the responses to the Likert scale were calculated in percentages, mean scores and standard deviations (Edwards & Hammer, 2006). Data from the qualitative responses were coded in NVIVO and analysed thematically. This paper is based on responses from two of the qualitative questions which dealt with pre-service teachers' perceptions of their participation in the PBL scenario, including:

1. What were the issues, frustrations or difficulties that you faced when participating in the Problem Based Learning scenario?
2. Do you recommend that Problem Based Learning be used in this unit next year?

As the questionnaire was not trialled prior to implementation this paper is of primarily descriptive value; describing and analysing the various issues and benefits associated with participation in the PBL scenario reported by the participants in relation to relevant literature. Qualitative responses to questions one and two are supported with reference to data generated by the pre-service teachers' contributions to the unit website, including their postings to the asynchronous discussion forums and records of their engagement in synchronous chat sessions held with lecturers.

Findings and Discussion

Coding of the data for questions one and two resulted in the identification of three themes per question. The identified themes are presented in Table 1 under the headings Issues (question one: what were the issues, frustrations or difficulties that you faced when participating in the PBL scenario?) and Recommendations (question two: do you recommend that PBL be used in this unit next year?)

	IDENTIFIED THEMES
ISSUES	• Need more direction about how to approach the task and the assessments • Problems working with other people in the group • Difficulty understanding stakeholder roles
RECOMMENDATIONS	• No, because it is too hard to understand the stakeholder roles • Yes, because the learning is realistic • Yes, because the learning is empowering as a student and future teacher

Table 1: Identified themes comprising the pre-service teachers' responses to questions about the issues and their recommendation regarding their participation in the PBL scenario

Issues

Three main issues were identified in the pre-service teachers' responses to the question, *'what were the issues, frustrations or difficulties that you faced when participating in the Problem Based Learning scenario?'* Students noted difficulty understanding the task and the assessed requirements, working other people in the group and understanding their stakeholder roles. Each of these is discussed in turn.

Task and Assessment Expectations

The first issue noted by the students involved understanding what was expected of them with respect to the problem and the assessed tasks. This frustration was evident where the pre-service teachers described not knowing "*where to start*" and identified "*difficulties in understanding exactly what was required of us during the presentations and what was to be involved*" (questionnaire data). Uncertainty regarding the problem and how to react in order to engage with the assessed tasks appeared quite early in the semester and was evidenced by online postings which highlighted the pre-service teachers' lack of direction and task focus, for example *"How and where do we start researching our presentation?"* and *"Ok., so what exactly are we supposed to start with in here? I am drawing a complete blank right now, so I thought I'd at least get some feedback to get things kicked started"* (discussion forum data). Other pre-service teachers focussed on the assessment as the source of frustration, indicating that more guidance in this area may have reduced their confusion and enhanced their ability to respond to the problem situation, suggesting that *"the lack of boundaries and guidelines on assessment tasks was a problem"* and that *"I was not really clear on what was expected, there was a lack of clarity in the explanation"* (questionnaire data).

Of interest to these findings are the perceptions the lecturers held in relation to the pre-service teachers' concerns regarding the clarity of the assessed tasks and the problem situation in which the assessments were embedded. The assessment guidelines involved a series of statements regarding what each presentation was to contain (for example, identification of the issues facing Laura, a summary of the theory relative to these issues and the articulation of strategies from the identified theory aimed at supporting her learning and development). As each student was allocated a different stakeholder role the assessment guidelines did not outline exactly *what* each

stakeholder would be expected to identify as problematic and which theoretical perspectives would be of use in addressing the identified issues. Rather, as is the purpose of PBL, the students were expected to examine the problem from their particular stakeholder perspectives, identify the relevant issues regarding Laura's development and learning; source theory and/or research that informed the identified issues; and argue why the theories/research supported the strategies they were proposing to support Laura in her learning. Pre-service teachers participating in the scenario reported the experience as being *'unclear'* (questionnaire data) of not *'knowing where to start'* (discussion forum data) whereas the lecturers perceived the assessment guidelines as representing a generic description of the way in which the pre-service teachers were expected to develop a response according to their perspective on the problem. These findings are important to the use of PBL in teacher education because they suggest the lecturers' perspective may in fact have represented an assumption that the students would be able to examine the problem, identify the relevant issues and source appropriate theory simply by engaging with the problem itself.

This particular assumption is informed by work regarding the use of PBL in medical education conducted by Charlin, Mann and Hansen (1998) which found that PBL is characterised by three fundamental principles including; 1) the starting point for learning is the problem; 2) PBL is an approach to learning that differs from direct teaching and; 3) PBL is fundamentally learner rather than teacher centred (p. 324). Charlin et al. (1998) argue that these principles result in a series of issues for students that are not commonly faced in more traditional teaching and learning approaches, including the need to respond to a problem as opposed to a clearly delineated task and the need for students to take responsibility for their learning. Thus whilst PBL can arguably empower students in their learning, such empowerment cannot be considered "an all or nothing matter" that is embedded in experience of the problem itself. Rather, success depends on students' abilities to "formulate appropriate learning objectives, choose learning resources and determine the depth of their learning and self assess their learning activities" (p. 324). The confusion and uncertainty reported by the pre-service teachers with respect to their engagement in the problem and completion of the set tasks was possibly a function of the differences in learning style driven by the principles of PBL. Therefore, what the lecturers considered a generic description of the task was perceived by the participants as an ill-defined and unclear assessment which expected them to take charge of their own learning. This difference in perspective is very important, since it indicates that pre-service teachers may need more time and support to understand what is expected of them as *learners* when participating in PBL experiences. In other words, a clearer explanation of why the assessment guidelines were generic in relation to the unfolding problem may have assisted the students to approach the task with more confidence. Furthermore, such explanation would have taken into consideration the students' previous inexperience with PBL, and allowed opportunities for the nature of PBL to be discussed prior to exposing them to the problem itself. This need was identified by two pre-service teachers who indicated that the newness of the approach meant that they didn't necessarily have the learning skills that enabled them to solve the problem: *"to begin with, I didn't understand what we had to do, as we had never participated in this before and I found it difficult to complete the first assignment until a few days before"* and *"since this was a new way of doing a subject, everyone was quite stumped on what to do"* (questionnaire data). Charlin et al. (1998) also identify responding to the problem situation as a source of frustration for students engaged in PBL experiences. This is characterised by the fact

that participation in a PBL activity is defined by two central tasks; the first being to "identify and solve the problem at hand and the second to identify, search out and learn the knowledge required to understand and solve the problem" (p. 327). According to Charlin et al., (1998) there is often a lack of understanding on the students' behalf that these two tasks coexist and that both must be addressed almost simultaneously in order to address the problem (p. 327). It is possible the pre-service teachers participating in this scenario found it difficult to identify these two tasks as related to the processes that were necessary to allow them to begin solving the problem. This meant that their early efforts focussed simply on posting questions to the website that asked *"what do we do?"* Examination of these posting and lecturers' responses to them shows how the lecturers worked to support the pre-service teachers to understand what the problem was asking them to do without necessarily telling them which issues they should identify as relevant. For example, in response to the question *"how and where do we start our presentations*?" (posted by a student assigned the role of Chantelle), the following feedback was provided by a lecturer:

> When you present to the others you should have already developed a sense of Chantelle's background. Your actual presentation you should do from Chantelle's PERSPECTIVE. You need to have identified the issues confronting Laura (i.e. what does the research say about children and their development who are taken from their parents?) You might decide on the basis of your research to fight to get Laura back; or you might rock up very down and say "it is too hard, I have no money, my lifestyle is too bad etc she is better off where she is." It depends on how you want Chantelle to be. Maybe Chantelle has had some support services (which you could list in your summary) and is trying to get her life back together and so you will present so as to get Laura back. As Chantelle the direction you choose to take is up to you (discussion forum data).

This feedback was aimed at supporting the pre-service teachers to address the two central tasks of PBL and represented an important scaffold for the participants. Empirically the data informing this paper does not allow for an examination regarding the extent to which online feedback from the lecturers worked to reduce confusion surrounding the problem and the tasks, however, extensive reading of the discussion forum and chat transcripts highlights the pre-service teachers' growing confidence with the task as support was provided. Had additional pedagogical measures been implemented prior to the pre-service teachers participation in the problem the need for such support may have been reduced. For example, brainstorming with the pre-service teachers how they had solved problems in the past prior to introducing them to the problem may have offered them a skills-based foundation on which to base their initial response to the problem. Allowing the pre-service teachers to consider the tasks actually involved in solving a problem prior to presenting them with the scenario may have enabled them to approach the situation knowing they needed to identify the issues and information relevant to the scenario rather than simply asking "what do we do?" These findings highlight the notion that PBL itself cannot be invested with the responsibility for ensuring that students learn from their engagement with a problem (Casey & Howson, 1993 p. 362). Rather, lecturers employing this approach should consider providing learners with opportunities to examine how PBL works and how they could most productively approach the tasks associated with solving the problem prior to exposure to the situation in which they will participate.

Frustrations Associated With Working in a Group

The second issue identified by the pre-service teachers as a frustrating aspect of the PBL experience included the need to participate in group work to engage with the

problem scenario. For some pre-service teachers this frustration centred on others missing tutorial sessions in which peer presentations and planning were scheduled for the groups, for example *"every week some people were away and this let the team down a bit"* and *"the main frustration I found was centred on being in a group and having some students not attending classes"* (questionnaire data). Group member absences had a significant impact on the groups' ability to proceed with their plans for Laura as it was difficult for decisions to be made when various stakeholders were unavailable for consultation. One group experienced the absence of Chantelle for two consecutive weeks and in attempt to deal with this frustration incorporated her lack of attendance into their storyline. In this situation, the caseworker told the other stakeholders that Chantelle's absence represented her disinterest in regaining custody of Laura. This group structured their response to the problem and their planning for Laura around Chantelle's lack of attendance. This strategy raised interesting issues for the group when the role of parenting on children's development was considered as a lecture topic and they needed to address this in their peer presentations.

Previous research has identified group work as a possible concern for students asked to work in PBL scenarios (Dahlgren & Dahlgren, 2002; Holen, 2000 and McPhee, 2002). Chief amongst these concerns can be issues associated with personality clashes between group members and individual experiences of the group dynamic. Rather than being considered an outcome of PBL itself, these issues are perhaps common to any situation in which people are required to work collaboratively in group situations, whether these be in the community, workplace or formal educational settings. However, when employed as a function of a pedagogical approach, such as PBL, the issues themselves require consideration, particularly where students are in a situation in which their participation and contribution to a group outcome forms the basis of their assessment. Thus, Holen (2000) argues that group dynamics are important to the PBL experience, suggesting that a climate of "security, freedom, mutual respect, openness and a certain tolerance for diversity" (p. 486) is necessary to allow participants to learn from the experience. In this project some pre-service teachers reported situations in which openness and mutual respect were not necessarily evident in the group suggesting that *"people in groups have fixed ideas and are not open to others"* and *"stakeholders try to push their own agendas"* (questionnaire data). One pre-service teacher rather adroitly described the difficulties associated with group work from her own perspective, noting that *"it is hard to respect the rights of other people who have different opinions to myself"* (questionnaire data).

The issues identified by the pre-service teachers associated with their participation in the groups forming the basis of the PBL experience are important from a pedagogical perspective in that these issues could potentially impact on the learning occurring for students and/or on the outcome of assessed tasks. In this respect, the findings suggest that more attention to group dynamics and the facilitation of relationships may be needed to support learners to address issues associated with interpersonal interactions within a group context. From a PBL perspective this could include building an avenue of mediation into the problem so that learners are able to approach lecturers for assistance within the problem context should additional support be required. However, a more pragmatic view might hold that experiencing issues associated with collaborative group work is useful for pre-service teachers as this represents the very context in which they will be asked to work upon graduation. The opportunity to learn how to relate to others, contribute to group outcomes and respect a diversity of opinions prior to graduation is a way of providing pre-service teachers with the development of a relevant skill set for working with people in addition to the

teaching of pedagogical and content knowledge. Monitoring the tensions between these two perspectives cannot necessarily be achieved by prescribing one of greater importance than the other. Rather, it may be more a function of the pedagogical skill, ability and insight of the lecturer in determining where, how and when support and intervention may be needed in a group context so that learners are not overly focussed on distressing group dynamics and issues at the expense of the learning experience.

Difficulty Understanding Stakeholder Role

The third issue considered a frustration for the pre-service teachers was associated with the stakeholder roles assigned to them. In the main this frustration was evident for those assigned roles that extended beyond their normal experience as pre-service teachers where they were asked to take on *"the roles of stakeholders whose job we hadn't studied before"* (questionnaire data). The pre-school and primary school teacher roles were evidently more comfortable for the pre-service teachers than the other roles, including Chantelle, the caseworker and the parents of Laura's peers. Adopting these alternative roles was considered challenging as they required pre-service teachers to experience perspectives that were unknown to them which contributed to uncertainty associated with their responses to the situation. For example, one pre-service teacher assigned the role of a parent of Laura's peer group suggested that a significant frustration for her was *"not fully understanding my role. I think the parents and the Chantelles probably faced a more challenging area [than the preschool or primary teachers] since it really moved away from what we know"* (questionnaire data). This issue was further examined by the pre-service teachers assigned the caseworker role during a synchronous chat session in which they reflected on their learning during the PBL experience. Here the pre-service teachers described frustrations associated with being assigned an unfamiliar role:

> **Mary:** the assignment wasn't too hard, just a bit confusing as to what our role in the assignment was
> **Jasmine**: personally, I learnt a lot by reading up on what we have to write and the strategies we have to use... but I felt that being a case worker is not a right role...
> **Frances:** I think it was challenging but not impossible it just meant really applying theories and doing all the research
> **Lauren:** it was challenging. Especially knowing what to include, and knowing how far case workers go
> **John:** I think that if we had a better understanding as to what roles a case worker takes on, the input would have been more valuable.
> **Lauren**: I fully agree John. Unless you know a case worker yourself, you have no idea of their roles
> **John:** I think the case worker role is a good one to give a different perspective, just not an area we know too much about

For these pre-service teachers participating in the PBL scenario as caseworkers was considered challenging as the role itself was unfamiliar to them and perhaps required greater information and support. These learners were required to not only respond to the PBL situation but to also develop an understanding and background knowledge of an alternative perspective to the one they were training for upon graduation. This situation was similar for the Chantelles whose experience was further challenged by the surprising levels of professional discrimination they faced from the

other stakeholders, including the pre-school and primary teachers and the caseworkers. One Chantelle described professionals who needed to '*get real and stop talking about useless theories*' (discussion forum data) in their plans for Laura and her development. Another reported *"the other stakeholders did not listen to me as Chantelle'* (questionnaire data). The disempowerment and silencing of the Chantelle role was further expressed by a pre-service teacher in the online forum where she sought information from other Chantelles about their experiences and interactions with the other stakeholders:

> I don't know how you guys all went during the first 'meeting' with everyone, but I found it kinda scary. Everyone was having a go at me!! I'm really not sure where to take it from here. I think I'm going to go with a Chantelle who is going to try and clean up her act and get Laura back. I was thinking about taking parenting sessions and anger management programs (discussion forum data)

Empirical limitations in this project make it difficult to attribute cause to what the Chantelles experienced in the PBL scenario. However, references to the 'silencing' these learners experienced in the role suggest that Chantelle's background as a single, under-educated mother and her choice of employment was a possible factor in the level of disempowerment she experienced from the other stakeholders. It is interesting to note, that these learners commonly reported being '*talked at*', '*not being listened to*' or '*everyone having a go at me*'. Opportunities for Chantelle to present her case were possibly undermined by her very position as a single mother with limited educational and work choice opportunities. Whilst other pre-service teachers may have found taking on alternative stakeholder roles challenging they seemingly adjusted quickly to type in foisting their knowledge on what was best for Laura onto Chantelle.

The findings associated with the pre-service teachers concerns regarding their level of unfamiliarity with some of the stakeholder roles utilised in this project raises an important question for the use of PBL in teacher education. Namely, should all PBL used in teacher education revolve around pre-service teachers appropriating the teaching stakeholder role? Or, is there benefit in pre-service teachers being asked to operate beyond the role they will assume upon graduation into those (i.e. other professionals and/or parents) characterising the people they are likely to work with as future educators? There are two possible responses to this question, the first being that all pre-service teachers should be assigned teacher-roles in PBL scenarios so as to remain consistent with the professional development needs of their selected careers. The second suggests that experiencing teacher-work from an alternative perspective (i.e. as a parent) might alert pre-service teachers to some of the issues and frustrations that the recipients of their professional expertise might experience. Experiencing this as a pre-service teacher could possibly inform their development as professional educators, shaping their philosophical beliefs and approaches to their work. For example, what differences are likely to be expressed with respect to the philosophical beliefs and practices regarding parental involvement between those pre-service teachers assigned the role of Chantelle and those assigned the role of teachers in this project? In other words, what impact does operating outside the expected role of the 'teacher' have on the developing capacities of pre-service teachers when they engage in PBL scenarios that push them beyond their normal experience of teaching from the teacher's perspective?

Recommendations

Recommendations refer to the pre-service teachers' views on whether or not a similar PBL experience should be used again in the unit of study. Two students suggested that PBL should not be repeated as it was too difficult for students to understand the various stakeholder roles involved in the scenario. The remaining students (n=50) indicated that PBL should be used again, suggesting that the learning was a) a realistic experience and; b) one that was empowering for them as pre-service teachers.

Learning is realistic

This benefit focussed on the realistic nature of the PBL experience as the basis for its future recommendation as a pedagogical approach in the unit of study. Pre-service teachers described their participation in the scenario as providing them with a context in which to consider and apply the theoretical content that was associated with the unit of study. Terminology such as 'real life' and the 'realities' of teaching were used to describe the experience as a contributor to the pre-service teachers' learning, for example:

> I really enjoyed it and feel that it was a great way to look at different issues. It gave you a real life example to relate your strategies and theories to" and "although it was extremely time consuming and difficult to work through, the learning and the understanding obtained from the experience was immeasurable. It was almost like being on a practicum and working on a real life situation. It suggests that when teaching I will need to adapt to a range of experiences that may occur and develop skills to deal with these (questionnaire data).

The sense of reality associated with the experience was perceived as allowing the pre-service teachers the opportunity to develop skills they considered relevant to their future work offering *students hands-on experience and practice before having to take on situations like this in real life*" (questionnaire data). A group of pre-service teachers participating in a synchronous chat session discussed the realistic nature of the experience:

> **Jamie:** I have really enjoyed this style of assignment. It has given me the opportunity to seek out different resources and sources of information to broaden my knowledge.
> **Lecturer:** Do you feel like you have learnt more working this way instead of an essay on influences on children's development?
> **Jamie:** YES!!!!!
> **Lecturer:** WHY?
> **Natalie:** Yes, but it has been a challenge!
> **Jamie:** You have to think on your feet and by not getting Laura's story in one dose it has made me think about real life and the fact that you don't get the whole story of children's lives in one dose
> **Natalie:** Trying to get my head around what we were suppose to do
> **Jamie**: I found it challenging working with people I haven't worked with before and seeing their perspective and agenda on Laura's story has been very interesting.
> **Natalie:** Yes that too

> **Jamie:** This whole exercise has certainly given me a lot of information to reflect upon

This excerpt shows how the 'real-life' aspect of the experience was valued by the pre-service teachers. For example, Jamie discusses how the experience made her realise that she would not get all the information she required in '*one dose*' as can occur when pre-service teachers complete traditional case-study assignments. Rather, the weekly chapters containing information about Laura meant that the pre-service teachers needed to '*think on their feet*' which provided opportunities to '*seek out different resources and sources of information to broaden knowledge*'. The value placed on the realistic nature of the experience by the pre-service teachers could be attributed to the way it operated as a vicarious form of practice enabling them to utilise the problem as a basis for understanding the theoretical content (Edwards & Hammer, 2006). Starting with the practical experience and moving towards the use of theory is a process Korthagen (2001) argues is necessary to support pre-service teachers to understand the relevance of theory to their practice. Beginning with theory and asking pre-service teachers to articulate this to their practice increases the likelihood that the theory will be perceived as separate from practice, thus giving rising to the infamous (and perceptual) 'gap' between the two (Korthagen & Kessels, 2001, p. 30).

Addressing the gap between theory and practice is arguably one of the strengths of PBL as it requires learners to begin with a problem situation in which the practical necessarily drives the application of the theory rather than the theory being artificially applied to learners' conceptions of their future practice once they graduate. Keppell (2006) writes of the benefits of PBL for teacher education suggesting that the approach is a useful means of bridging the gap between theory and practice for pre-service teachers:

> Just as medical students need exposure to real patients, teacher-education students need exposure to authentic cases that may help them bridge the gap between theory and practice … it may be worthwhile to consider that all content learned by student teachers in the teacher-education setting is still only theory and it is only when they enter practical teaching is it considered to be practice and not theory (Keppell, 2006, pp. 227-228).

In this project, pre-service teachers described the theory as accessible and relevant because the PBL experience was perceived as contextualising theory in relation to practice, therefore, *"The learning acquired was made practical and easier to relate to the real world and the theory was therefore more applicable"; "Application of theories about learning in a 'real' scenario has made it easier to understand the theories better"* and *"By making the scenario real it is putting theory into practice"* (questionnaire data). Whilst traditionally employed in areas of professional development other than teacher education, PBL is perhaps ideally positioned as an approach aimed at supporting pre-service teachers to understand the relationship between theory and practice, if only because it enables the learning of how to become a teacher to be more '*realistic and better than dumb theory*' (questionnaire data; cited in Edwards & Hammer, 2006).

Learning is empowering

The second recommendation regarding the pre-service teachers' perceptions of the PBL experience suggested that participation in the experience had empowered them as learners and as future teachers. This sense of empowerment was connected with the realistic nature of the experience, which in turn was argued to have supported the pre-

service teachers to develop skills they considered relevant to their future work. For example, one student described the experience as giving *"students hands-on experience and provoking them to see a scenario from all different perspectives. It empowers us with all the skills related to our field of teaching"* (questionnaire data). In this example the sense of empowerment does not necessarily refer to an understanding of theoretical content as much as it is associated with the acquisition of skills that are considered relevant to teaching. Empowerment is associated with a sense of capability, of having developed a skill-set that was perceived as useful to the pre-service teacher's future work. Another pre-service teacher described a similar outcome, suggesting that *"participating in the PBL encourage[d] student teachers to better understand themselves, their responsibilities and provide[d] them with valuable tools when handling a similar situation"*.

The sense of empowerment noted by the pre-service teachers following their participation in the experience was unanticipated by the lecturers. The major rationale for the implementation of the PBL experience had been to establish a context for the examination of the theoretical and content knowledge relevant to the unit of study. In this respect, the unit and the PBL experience had been designed so that the pre-service teachers would need to draw on theoretical content in order to engage with the problem from their various stakeholder roles. The major focus during the design stage was on supporting pre-service teachers to work within a study situation that interfaced theory and practice, rather than presenting theory as a body of knowledge that needed to be applied to practice. The sense of empowerment reported by the pre-service teachers' was probably more a function of the attention paid to the development of the study situation in the first instance than an explicit expectation on the lecturers' behalf. The quality of learning experienced by the pre-service teachers during their participation in the PBL scenario was also highlighted as an empowering experience. One pre-service teacher suggested,

> it is a great way to help us develop more skills and a greater understanding of the ideas that were covered. Allowed us all to be become better learners and therefore better teachers. I was able to look at my teaching ideas and build upon these. We also gained more of a professional view on the PBL (questionnaire data).

This particular comment is insightful in its recognition of the relationship between learning and teaching, with the pre-service teacher able to articulate awareness that understanding herself as learner would contribute to her ability to teach well. In this example, PBL was considered beneficial as it had supported the pre-service teacher to understand more about learning from a learner's perspective. This type of understanding is perhaps critical to the development of effective teachers since the focus is on *nature of learning* rather than techniques associated with 'how-to-teach'. This idea was one examined in some depth during a online synchronous chat session between a lecturer and the pre-service teachers assigned the role of parents of children also attending Laura's preschool. During this discussion the pre-service teachers reflected on how the PBL experienced had forced them to accept responsibility for their own learning and how this had influenced their conceptions of the differences between learning and being taught:

> **David** I know you guys tried to incorporate the topics into the story but I feel I haven't actually covered those topics fully, as it is up to the group to provide us with the information
> **Elissa** I think its a lot more practical doing it this way

Lecturer David how much of it is your responsibility to follow and learn when given the lead in the story though?

David True... I agree... and I will admit I have been a little slack in that area... I dunno it's just a different experience

Lecturer Do you think PBL makes the learner more responsible? Or less?

Angela More

Anna Responsible and independent

David More responsible definitely... you have to be

Lecturer So David is that a good thing or not?

David Yes it's good and bad, I mean it teaches us initiative, independence and responsibility for our learning, however saying that it can lack some guidance at times and some structure overall

Lecturer Does the problem lack structure, or is it the issue that the students are forced to structure the ideas and content themselves?

Angela The students are forced

Sally I think that the lack of direction prompts your interest to find out more, so I think PBL works well in that sense

Angela It's more lifelike too

Anna I think its because we had to structure, it was a shock to the system because we have in a way always been spoon fed our sessions and assignments

Angela Exactly Anna

Anna It wasn't just research we were the major decision makers

Richard We need to be more responsible for ourselves

Angela I think people got very confused because we have never been able to make decisions like that before and usually Uni is very structured in what it expects of us

David And I have loved the experience

Anna You see in other subjects everything is all the same assignments and they are set out what is required to the letter

David I think we need more experiences of it at uni

Anna Definitely

Lecturer Why David?

David Because like I said, it gives us more responsibility for our learning, and therefore the experience will be more fulfilling and we will get more engaged in what we have to do

Richard Us learning more than just being taught

David Absolutely... this is the first time for the 3 years I have been here that I have actually thought hang on a sec, we are learning about things to do when we go out to teach (synchronous chat data, cited in Edwards, 2005).

In this example, the pre-service teachers examined their conceptions of learning in relation to their experience in the PBL scenario. Critically, these pre-service teachers were able to describe challenges faced in the scenario as related to previous learning experiences in formal educational settings. Here, previous ways of behaving as a learner were associated with '*very structured expectations*', completing essays that '*set out what is required to the letter*' and with being '*spoon fed our sessions and assignments*'. These ways of behaving were associated with certain conceptions about learning and teaching which positioned the learner as fundamentally passive. That pre-service teachers come to understand these beliefs matters to their practice because the beliefs teachers hold "with regard to learning and teaching determine their actions"

(Korthagen, 2003, p. 5). If pre-service teachers' beliefs about teaching and learning remain unchallenged (or are reinforced) during their professional preparation they are unlikely to utilise teaching approaches in practice that reflect the frequently cited indicators of best-practice, including the provision of learning experiences that are learner centred, actively engaging and socially-based. David's realisation that *"this is first time for the 3 years I have been here that I have actually thought hang on a sec, we are learning about things to do when we go out to teach"* is telling regarding the need pre-service teachers have to participate in experiences that challenge their thinking about learning as well as teaching.

Conclusion

PBL is an approach to learning that emphasizes the relationship between theory and practice. The findings reported in this paper indicate that PBL offers the potential to support the learning and the developmental needs of pre-service teachers by providing a realistic and empowering learning experience. However, frustrations associated with the experience need to be moderated by lecturers implementing the approach, with careful attention paid to factors such as supporting learners to engage with the problem, understand their stakeholder roles and deal with potential issues arising from group work. As an approach PBL draws on many of the fundamental principles associated with constructivist and social-constructivist philosophies of learning and is perhaps ideally positioned to support the development of skills and the acquisition of content knowledge necessary to learners within many practice-orientated professions such as teaching. Whilst this paper has addressed several frustrations associated with pre-service teachers' participation in PBL, the issues themselves are not an inherent function of the approach and are easily remedied with due attention to their cause. The perceived benefits of the approach, particularly in terms of challenging pre-service teachers' conceptions of learning and supporting the development of teaching-relevant skills suggests the approach has a great deal to offer teachers of teachers who seek to challenge and engage their learners.

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