Reflecting On The Need For Problem Triggers In Multidisciplinary PBL.

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Abstract

Problems are central to learning in Problem Based Learning (PBL) curricula. Problem typologies differ across disciplinary areas and high quality problems are fundamental to engaging students and achieving the intended learning outcomes. PBL continues to be deployed in a range of disciplines; however, outside of the medical domain, there is a chronic lack of documented problems. This paucity has particular implications for those aspiring to adopt PBL, especially those who lack faculty support and may be acting on their own initiative. In this paper, the need for quality problems is motivated. A number of sample problems from a range of disciplines are described. It is envisaged that the provision of such problems will seed the initiation of new PBL initiatives in various disciplines outside of the medical domain.

Keywords: Problem Based Learning, Problem Design, Problem Triggers.

1. Introduction

Problem Based Learning (PBL) is a total approach to education that involves students working in small teams on problems that are presented at the start of the learning process (Barrows, 1989). Aspiring PBL practitioners face a number of challenges when considering how to introduce PBL into their own curricula; institutional policies, adverse reactions of colleagues and students and their own fear and lack of confidence in the PBL approach may all seemingly conspire against its use. In making the decision to introduce PBL, it is natural that other people's experience in a similar or cognate discipline may be canvassed. Also, it is here that a key difficulty is first encountered. There is not an abundance of sample PBL problems, outside of the medical domain, for new PBL practitioners to learn from and adopt for their own use.

While PBL is well established in some disciplines in higher education such as medicine and cognate subjects, generally, it is not adopted extensively across other disciplines such as law, archaeology, social science, computer science, business, art and design. Sample problems can provide an example or an approach to problem design. Such problems can also trigger ideas and create connections. However, there is a noticeable lack of documented problems in the literature. This paper motivates the need for good problem triggers, and illustrates a number of sample problems for a variety of disciplines outside of the life sciences.

2. The Quest Of Problem Design

Problems have always mobilised and stimulated thinking and learning; they energise our activity and focus our attention. When problems are experienced as relevant and important, people are motivated to direct their energies towards solving them (Barrett & Moore, 2011, 3). Well-designed and authentic problems are crucial to the success of PBL (Gijselaers & Schmidt, 1990; Jonassen & Hung, 2008), being central to learning in PBL curricula, as they 'initiate students' learning processes' (Sockalingam & Schmidt, 2011, 7). PBL practitioners have benefited from much advice from the literature about problem design that tells them that quality problems should be: authentic, engaging, deliberately loosely-structured, linked to learning outcomes and key concepts, multidimensional, and graduate attributes and professional practice focused (Barrett 2005; Barrows & Tamblyn, 1980; Conway & Little, 2000; Gijselaers, 2005; Margetson, 1997). In addition some theoretical models have been provided to give problem designers new ways of thinking about and hence new ways of engaging in problem-design. Hung's (2006; 2009) 3C3R (content, context, connection, researching,

reasoning and reflecting) and Barrett's (2006) re-conceptualisation of problems as provokers of liminal spaces provide us with some theoretical frameworks for designing problems. Problems may be well designed or poorly designed, depending on their purpose. Their design could be governed by the knowledge and the ability of their recipients Von Korff, Hu, & Rebello, 2012). With the development of information technology, problems may be presented in a number of different formats (Barrett & Moore, 2011). In a recent study by Maldonado (2011), the use of multimedia clinical cases showed an increase of 12% on clinical reasoning and a saving of 41% on faculty time. Maldonado suggests that savings of this nature may well encourage the incorporation of PBL into more programmes. The major contributors to the PBL problem debate argue that high quality problems play a central role in the success of PBL (Norman & Schmidt, 2000).

Problems that are well-structured and have the right level of complexity are critical to the student learning (Jacobs, Dolmans, Wolfhagen, & Scherpbier, 2003). Jacobs et al. (2003) argue that while there is a body of knowledge in the literature providing a structure for problem development, it lacks empirical evidence. Consequently, they have developed a framework in the form of a short questionnaire to validate the structure and complexity of quality problems. Weiss (2003) also offers a two stage process for problems that will develop higher order of thinking. This process focuses on the educational reason and the intended use of the problem. However, determining the nature of a high quality problem can be difficult, and leads to a second debate in the literature on the role of the tutor as a subject matter expert. The role that tutors play in the PBL tutorial is complex (Papinczak, Tunny, & Young, 2009). Tutors are expected to create an environment where the student acquires knowledge and develops lifelong learning skills (Mohamad, Chen, Isahak, Siraj, & Das, 2010). Empirical research suggests that the facilitation style of the tutor is also critical to the success of the PBL process. This has strong implications for the training and development process of the PBL tutor. Tutors are faced with many challenges during the tutorial process, some of which include carrying out regular reviews of the actual tutorial process, focusing on team interaction and team dynamics.

The tutor's interaction in the tutorial is closely linked to the quality of the problem presented to the students. Schmidt (1994) argues that the inconsistencies in the literature regarding the skills required by the tutor may lie in the course structure or the structure of the problem. Gijselaers (1995) suggests that students will always seek help in a problem-related environment. This help may be from the tutor, the group or from the problem. The literature explores the argument that poor quality problems or lack of prior knowledge on behalf of the students places greater support pressure on the tutor. Thus the need for subject matter

experts as opposed to generic PBL tutors.

Research shows that there is a negative correlation between the quality of the problem and group attendance at the PBL tutorial (Berkel & Schmidt, 2000). In essence, the poorer the problem the higher the group attendance as students compensate by using the group and/or the tutor for any deficiencies in the problem.

2.1 The need for Problem Triggers

Designing PBL problems, and making the necessary modifications to the curriculum, remains a challenge for individual educators due to the time-consuming and research-intensive nature of these activities (Goodnough & Hung, 2008; Simons, Klein & Brush, 2004). Indeed, the preparation time necessary for PBL usually exceeds what educators expect, but this may represent a management issue rather than a pedagogical one (Bouhuijis, 2011). Nonetheless, this situation must contribute to a shortage of trained faculty, a key barrier to the implementation of PBL (Azhar, 2012; Vahidi, Azamian, & Valizadeh, 2007). Other implementation hurdles have been documented (Ertmer & Simons, 2006). However, it can be easily surmised that the identification and definition of suitable problem triggers is a singular activity that will at once consume facilitators time as well as representing a key determinant in the student learning experience. Faculty support is important. The effectiveness of PBL problems has been estimated at 62% in cases where instructors had significant faculty support (Hung, 2011); thus, it may be conjectured that the effectiveness of problems conceived by instructors operating on their own initiative will be less.

A cursory examination of the literature indicates that, since PBL originated within medical education, there is a considerable suite of sample problems available for this domain. However, what is not evident in the literature is where novice PBL practitioners might access appropriate sample problems relevant to their disciplinary area, and as such, inform their expectations as to what the problem definition process might entail. Such insights are important, both for the individual and faculty, and well as in situations where a Community of Practice (Spronken-Smith & Harland, 2009) may be established.

One logical approach for an aspiring PBL practitioner is to review the research literature for case studies on PBL implementations in their own domain. While they may well uncover a number of experiential and perspective type papers, the degree to which problems used in individual courses are documented may vary considerably. For example, in a recent analysis of PBL in computing, it was discovered that the penetration of PBL into the curriculum was broad but shallow; more importantly, only 19% of the papers included descriptions of sample

problems (O'Grady, 2012). Why this is the case is open to conjecture - space limitations in many journals and conference proceedings is may be one pragmatic explanation. Experience suggests that this situation is not peculiar to the computing domain. Further research is needed to ascertain the level of penetration into various curricula outside of the medical domain, and the degree to which a lack of documented problem triggers hinders the uptake of PBL.

For the remainder of this paper, a number of trigger problems are discussed. In the first instance, it envisaged that such a discussion will aid those tentatively exploring PBL from a realistic understanding of problem triggers within a multidisciplinary context. Secondly, it is hoped that such an understanding will quicken the process of transformation to a PBL curriculum. Thirdly, where the documented problems encompass the domain of the reader, such readers are of course free to adopt and modify the problems as they see fit. Finally, it is hoped that the presentation of this problem set may set in motion a compendium of sample problems in any or all disciplinary areas where the PBL approach is viable.

2.2 Sample Problems

In the following sections, a variety of problems from a range of disciplines are described. These are based on or are applicable to real-world scenarios. Each problem is presented by giving a short background to the problem. The problem is presented exactly as the students receive it. Finally the problem is discussed and the some transferable features of the problem design identified.

A common theme amongst this set of problems is that of the senses. Many PBL problems focus on the use of the “higher sense” of sight (text-based and pictorial-based problems) while the “lower” senses of smell, taste and touch – are rarely engaged by the curriculum, as they are not considered to provide “ways to wisdom” (Classen, 1999, 271). We suggest that there should be no hierarchy of senses in higher education and ‘exactly which of the senses may or may not be most important at any particular moment depends on the activity or task being undertaken, and the context, and cannot be specified in advance’ (Tilley, 2004, 16). Therefore, the potential for learning from problems could be further exploited by consciously focusing on a fuller range of senses: sight, hearing, touch, taste and smell.

2.2.1 Hearing the words and undertones: a conversation on the factory floor

2.2.1.1 Background

The Certificate in Management programme is offered to front line managers at the University of Limerick and delivered through PBL. The managers attended the university for one day per month over a nine months period. They covered several different management topics in addition to the preparation of a reflective journal and participating in a range of skills-based exercises. In the case of a Management and Leadership module the problem is addressing the development of Pat, a front line manager, into a more organised and disciplined manager and leader. However it highlights the need for Pat to manage and listen to his subordinates. Coupled with this, Pat needs to interpret the undertones of a conversation with his boss. The problems below was presented to the students aurally only but are presented here in text format to share with the readers.

2.2.1.2 Problem Statement

Pat: So sorry that I'm late for our meeting. Not enough hours in the day. The canteen is very busy this morning. Just came from the production planning meeting; cannot trust those planners to get things right. Mr James' priority order for the UK will be late.

[Clink of cups].

Mary: No worries. I just wanted to have a word with you about getting some time off.

[Crash of canteen tray]

Pat: Sorry, Mary, what did you say?

Mary: It's just that I may need some time off to handle a personal issue.

[Loud music playing on over canteen intercom]

Pat: What personal issue???

[Pat's mobile rings]

Mary: My husband…

Pat: Hello [Pat's phone].…….No!! No problem I can be there right away. Sorry Mary must dash. Mr James needs to see me at once urgently - an important issue.

Mary: When can we talk?

Pat: Later today, or tomorrow. I'll catch up with you! Must go!!)

Mr James: Pat…take a seat

[*Low hum of traffic in the background]*

Pat: Lovely office Mr James. Great natural light.

Mr James: How are our customers?

[*Scuffle of papers and click of Parker Pen*]

Pat: I have just come from the production planning meeting; a few issues; nothing that cannot be sorted.

[*Clears his throat*]

Mr James: Was Tom at the meeting?

[*Short silence*]

Pat : Nooo…didn't see him.

[*Pat's face went red. Strong eye contact from Mr James*]

Mr James: I suppose you heard he's leaving us…..This will create an opportunity for the right man.

[*Silence. Only the clunk sound of Mr James glasses case being closed snapped Pat back to reality, the General Managers office*]

Pat: Noooo. I mean yes.

Mr James: We can leave it at that Pat. Keep up the hard work. Good bye.

2.2.1.3 Discussion

This problem has two parts; it is introduced with loud background sounds of a busy canteen. The disorganised Pat arrives late for his meeting with a staff member (not listening to her) and displays no real management or leadership skills. The second part shows Pat meeting with Mr James in his office Pat is trying to interpret the undertones from the conversation but is lost for words, total silence. The problem allows the student to identify the need for Pat to listen and embrace the importance of time management and prioritising. Pat would need to develop deeper insights and understanding into personal management strengths and development areas. This problem addresses a real life situation and this style of problem could be applied to a number of situations.

2.2.2 Getting communities in touch with their past: doing archaeology in the real world.

2.2.2.1 Background

This problem is the first of two on a module in community engagement for archaeology, designed for students with an advanced understanding of archaeological theories, methods and contemporary practice (i.e. final level undergraduate or MA students). Alternatively, it could also be specifically targeted at professional archaeologists, who are currently struggling to find employment in mainstream archaeology, wishing to develop new skills in community engagement.

2.2.2.2 Problem Statement

You are working as a team in a small archaeological research organisation and receive the following letter:

Dear Sir / Madam,

We, the Ballybeg Archaeological and Historical Society, have raised €1000 to investigate a site in our locality known as the 'fairy ring' (see enclosed map). But our County Heritage Officer told us that as non-professional archaeologists we are not allowed to carry out any archaeological work. All we want to do is find out as much as possible about the history of our own area and present it to the wider community. What can we do?

2.2.2.3 Discussion

Given the strict legislative framework protecting archaeological sites and monuments in Ireland (Government of Ireland 1930; 1954; 1987; 1994; 2004), it is very difficult for community groups that take a keen interest in the history of their locality to find ways to actively investigate such places. Therefore this problem addresses a real life issue for many people around the country and the second problem involves putting this into practice through an actual collaborative engagement with a community group with a view to producing a strategy for a community-based archaeological research programme.

Despite having a longstanding tradition as an amateur and voluntary activity, community based approaches to archaeology have only recently been recognised as making a valid contribution to the discipline. Consequently, this area is significantly under-theorised and without a blueprint for best practice. Moreover, practical approaches to community

archaeology vary greatly between countries, due to differing traditions and legal frameworks concerning the treatment of archaeological remains. For these reasons a problem-based approach would seem well-suited to exploring the issues and challenges arising in relation to the practice of community archaeology. A PBL model will also allow the students to engage directly with community groups in developing community-based archaeological research programmes. This will also address the fact that archaeology students generally are not trained in working collaboratively with non-professionals. At the same time, there is a great public interest in the workings of archaeology and this model represents an excellent opportunity to bring archaeology closer to public audiences and into communities.

Archaeology deals with the material remains that people left behind, with the aim of gaining an understanding of their social, cultural and economic lives. In essence, archaeology grants us access to the past through the sense of touch, by engaging with the physicality of artefacts, structures and landscapes that have been shaped by people in the past. But often this past also forms part of our present, as we all inhabit places shaped by previous generations. In this sense doing archaeology, through being actively engaged in excavating, surveying, documenting and interpreting, can enable people to get in touch with their own history and identity.

These problems allow the students to apply their knowledge of archaeology to the benefit of the wider community by enabling members of the public to participate directly in an otherwise highly specialised and restricted activity. Clearly, issues of access and expertise are not peculiar to archaeology. Hence a similar approach could easily be adopted in relation to a different, non-archaeological, subject matter, be it environmental, social or cultural. The problem trigger could be in the form of a letter, an e-mail or a telephone conversation requesting assistance from specialists to work with amateurs to work on a local social, community, economic or technological project.

2.2.3 Visualising participatory arts, and culture in community contexts

2.2.3.1 Background

This problem will be given to a group of postgraduate students. Typically students will already have an undergraduate qualification in Fine Art or Design, and hope to work within the area of socially engaged arts practice. As part of the programme students are required to undertake a community-based placement. A PBL approach will be adopted for this module to encourage active participation, problem solving and collaboration among students. The module aims to enable students to plan, facilitate and evaluate participatory arts activities in response to

identified needs within a community.

Studio practice has been the dominant model in art and design higher education for many years. Consequently, participatory or socially engaged arts found it difficult to gain a foothold in the arts world. However, it has become a recognised feature of visual arts education and practice, with some innovative and sophisticated models emerging. Funding for participatory arts is difficult to acquire and in the current economic climate funds for projects and activities are especially scarce.

Figure 1: the Fatima flat complex in Dublin's south inner city prior to re-development.

2.2.3.2 Problem Statement

Emergency Meeting

An emergency meeting has been scheduled in the local community centre to consider ways to address the crisis facing south inner city communities as a result of cutbacks. You are one of several visual artists invited to the meeting to contribute ideas and propose ways in which you could participate in arts, and cultural activities locally. Ideas or proposals should be sustainable and in keeping with models of socially engaged art practice. There is a strong activist tradition within this area and the arts are often used to address social and developmental issues locally. You have forty five minutes to present using visual and audio facilities.

2.2.3.3 Discussion

The community this problem is identified with exists in the south inner city of Dublin; it is known as Fatima (Figure 1), and has been transformed as a result of an urban regeneration project. The initiative began over a decade ago; since then there have been major physical, social and cultural changes, resulting in the demolition of old corporation flats which have been replaced with new two storey dwellings, and a community and cultural centre. Previously the area was stigmatised by housing problems, drug issues and unemployment. Several urban regeneration projects are underway in Ireland. Fatima represents a positive collective response to issues of change, urban renewal and cultural identity. Arts and culture have been central to strategic planning for the regeneration of the area. Key moments of transition and transformation in the life of the community are recorded in a range of visual arts and performance projects.

Placement can be a challenging experience for students, particularly as communities have distinct social and cultural identities. The problem presented here as a funding crisis is common in the arts, though resources alone will not solve the issues. Students will be required to navigate the complexity of community, arts and participation, at a local level, whilst recognising that established or inherited visual arts practices may not fit within this context. A PBL approach should facilitate students to discuss, examine, and create solutions in response to the challenge. Visual artists, and designers are visually aware, they acquire a visual language through exploration and experimentation. This visual sensibility manifests itself in their work and approach to learning, consequently the outcomes here will be visual. This style of presenting a problem in both visual (e.g. photo) and textual formats, and expecting students to present their work on the problem visually as well as with words, can be effective in many disciplines for helping students visualise creative future possibilities while resolving problems.

2.2.4 ‘Sniffing Out’ legal issues: using PBL to teach European Union internal market law at masters level

2.2.4.1 Background

A central skill which must be acquired to become a good lawyer is the ability to 'sniff out' the legal issues buried in a sometimes complex matrix of facts. The opportunity to innovate in developing such skills recently presented itself in teaching a postgraduate course involving a weekly two hour class taught over six weeks on European Union Internal Market Law at UCD Dublin Law School.

2.2.4.2 Problem Statement

Provide legal advice to Horace, Boris, Norris and Doris.

Horace is a Haitian carpenter who worked in France for years but whose qualification is not recognised in Ireland. Boris, a Belgian Russian-trained doctor, has worked in Portugal and is being charged a fee for recognition of his qualification. Norris, an Irish Danish-educated therapist, can't get his Danish qualification recognised in Ireland. Doris is a German clockmaker who can't get her German course recognised because it is shorter than the equivalent Irish course.

2.2.4.3 Discussion

A ‘mixed’ rather than pure form of PBL was used in the class (Bailey, 2006). Each week, a complex problem relating to a particular area of internal market law was put up on the class internet page.

Two students were assigned principal responsibility for the problem and requested to come back one week later to present and discuss possible solutions. Powerpoint presentations soon became standard among students, adding a valuable visual element and facilitating in- and post-class study. Problems were thoroughly discussed in class.

This approach involved a sensory approach on several levels. The metaphorical ‘sniffing out’ of legal issues combined fun with intensive learning. Power-point presentations used students' sense of vision. Listening to their peers in pre-class and in-class discussions was a valuable - and for some students - a very new learning experience. Student reaction was positive, aided by there being no final examination and the relatively relaxed atmosphere. The quality of presentations varied, but tended to be high, and occasionally exceptionally so, with students working harder than they would have using standard lecturing methods and demonstrating knowledge of cases decided by Courts only days previously.

This is an example of a problem that is deliberately short and loosely-structured, which forces students to sniff out and define for themselves what the key issues are. It gives them freedom to maximise the use of a range of up-to-date resources to work creatively and to a high standard on these issues. In addition to these transferable features we can all use humour as a powerful medium for engaging students, regardless of the discipline.

2.2.5 Feeling the Pain: Utilising the film 'Ladybird Ladybird' as the problem in child welfare education

2.2.5.1 Background

The film 'Ladybird Ladybird' (Hibben, 1994), a 'docu drama' directed by Ken Loach is a highly emotionally charged film and its portrayal of a family's encounter with social service and social work interventions in relation to care and protection of the children is raw, unnerving and highly emotional. The emotional resonance evoked by the social issues depicted in the film, while being entirely fictional, make it extremely well suited as a problem for the teaching of a child welfare module at Masters level for students with limited child welfare experience.

2.2.5.2 Problem Statement

After receiving an introductory overview of child welfare in which the interconnectedness of relationships, context, process and outcomes is stressed, the students watch the entire film in one sitting. Cinema conditions are recreated as far as possible without the advantages of the ice cream and pop corn!

Prior to watching the film, the students are divided into groups of 7/8 and each group is presented with a selected juncture within the film. These junctures are based on the evolving story line in the film and they are also mapped onto the child welfare continuum: family support - child protection - alternative care options.

The students then have to track issues and identify questions in terms of the emotional impact of the designated film juncture. This provides the basis for discussion immediately after the screening and facilitates the processing of the emotional and cognitive reactions. Secondly, each group has to prepare a 30 minute presentation which addresses the key practice, policy, legal and value issues the respective juncture raises within an Irish context and make recommendations for any change needed based on a best practice framework. The creative use of multimedia is encouraged for the presentation.

2.2.5.3 Discussion

Film has a role in education (Blumer 2010) as it has the capacity to evoke emotion and jettison the viewer into a heightened emotional state and, through watching it, the viewer's own narratives and identity can be constructed, reinforced, challenged, and opened up. This can potentially lead to a process of change in the viewer's beliefs, actions and understandings. As most students will not have solid practical experience of child welfare, it is useful to utilise a case study as an anchor for child welfare education. The fictional element allows for multiple possibilities to be explored. The raw emotion in the film engenders a strong emotional response. This can help the students to make connections between 'head' and 'heart', thus tuning into their own feelings and emotional responses, which is extremely important in professional social work education programmes.

However, the use of film and audio-visual media as a problem trigger has clearly much wider applicability in PBL. In particular, such media can create a uniquely strong emotional response among students, as is the case with the example presented here. Therefore the judicious use of film and video clips allows students to appreciate the roles and responses of different stakeholders in a given scenario, and provides them with opportunities to clarify their own emotional and planned professional responses to problems within established best practice frameworks.

2.2.6 Reconciling conflicting senses: applying mobile computing in a botanical setting

2.2.6.1 Background

Mobile computing is the dominant paradigm for computer usage. Yet the classic workstation remains the predominant platform through which computing concepts are taught, resulting in a generation of graduates having completed their studies without exposure to mobile computing. Indeed, their experience of configuring such devices may be limited to them changing the ring tone. At present, mobile computing is usually taught at graduate level, as students will, at this stage, have mastered key computing constructs. However, while there are commonalities between both paradigms, there are significant differences. To understand these, students need to be exposed to situations where such differences, and the implication of such, are clearly illuminated.

2.2.6.2 Problem Statement

A curator at the National Botanic Gardens (http://www.botanicgardens.ie/) has hypothesised that conventional mobile phones may be used the augment the experiences of visitors in a variety of ways. However, the implications of this from a financial and technological perspective, remains to be seen. Advise the curator as to what options might be pursued. Recommend a solution, and implement it as a prototype that demonstrates the requisite functionality to the widest possible audience. The prototype should be robust enough to conduct initial user trails so that visitor attitudes can be gauged, thus informing a potential final system.

2.2.6.3 Discussion

Services and applications for mobile users are usually accessed in non-conventional settings. Indeed, it is impossible to predict the prevailing context when a service might be required. It is this unpredictability that students must first understand. To achieve this, the problem must, in the spirit of PBL, be grounded in a real world setting. A botanical garden is one useful setting for this, but other settings could be used without compromising the learning objectives.

From a technological perspective, students will explore a number of technologies and be obliged to make choices that they can defend. More importantly, the question of interaction must be considered and what modalities or combinations of senses do they envisage using in this scenario. A critical challenge for them here is how they reconcile two conflicting issues. Computing devices by their nature tend to monopolise the senses. Yet in this instance, the objective is to discreetly bring attention away from the device itself and direct it to select aspects of their immediate environment, including the visual, auditory and olfactory. How effectively this conflict is managed will determine the success of their respective prototypes.

This style of problem, which is a consultant's brief from a client and involves visiting and surveying a public venue and analysing its services, in addition to talking with the client in order to apply an up-to-date technology solution to a real world problem, can be adapted to many disciplines. Working on a project in a high profile venue can challenge the students to higher levels of creative and critical thinking than working on a simulated problem on-campus.

2.2.7 Choose the media to work through the problem: Connect with your senses and develop your creativity

2.2.7.1 Background

The context of the next problem that will be presented was a module on PBL that was part of a staff development Postgraduate Diploma in Learning and Teaching in Higher Education. These PBL students were all lecturers in higher education in Ireland. The lecturers came from a variety of disciplines including engineering, business, art and design, nursing and architecture. These participants were problem-based learning students for this module. The aim of the module was to enable participants to design, deliver, assess and evaluate problem-based learning curricula critically and creatively in their own contexts. The participants used a PBL process guide as an aid in assisting them working through the PBL process. Thus, both the content and the process of this module were problem-based learning. The second problem that the participants were presented with was as follows.

2.2.7.2 Problem Statement

Help!

The Centre for Teaching and Learning in Higher Education will be facilitating a two-day workshop on Problem-based learning for Heads of School. You have been asked to do a presentation of your experience of the PBL process and teamwork. Your presentation is on the second day and is for two hours. You are free to work in any media.

2.2.7.3 Discussion

One team chose to do their presentation using shadow acting. A group of participants acted as a PBL team behind a sheet. Thought bubbles were projected onto the sheet. One narrator narrated the story of the PBL team as it developed every week. A second narrator linked what was happening in the PBL tutorial to theory and research of the PBL process. Two students (who were given pseudonyms} from this team commented:

Maura: In terms of our own learning…mm…some of us who had never engaged in that type of learning before, you know, so, or active before, so it was important for the team as well that there were people in the group that had a lot of experience of this kind of presentation. So it stretched the boundaries a wee bit for some of us.

Hanora: How many of us have been on a course and we would have had the freedom to do something so creative, so when the idea came up even though some of us were quite nervous about doing it, but we said let's give it a try and see how it works.

Giving students the freedom to work in different media encouraged both these students and their audience to learn through a range of media by connecting with many of their senses (sight, hearing and touch). Higher education aims to develop creative thinking and giving students the choice of media so that they can play with the inter-relationships of ideas and media is key to this. Creativity is characterized by Robinson (2001, p. 211) as having four main elements: -

the importance of the medium -

the need to be in control of the medium -

the need to play and take risks, and -

the need for critical judgement.

There is much written about the importance of developing students' creativity in higher education (Jackson et al., 2006; Kleiman, 2008). One approach to bringing forth creativity is to add the sentence "You are free to work in any media.", or an equivalent, to the end of a problem that is presented to students. This option can be incorporated into a multitude of problems in any domain. Giving students a choice about the structure, content and media to work with is an engaging and challenging approach to encouraging creativity.

3. Conclusion

Aspiring PBL practitioners will invariably encounter various obstacles when seeking to implement new PBL initiatives. This process is time consuming and fraught with difficulty. Defining appropriate problem triggers is of fundamental importance; yet such problems are poorly documented in the literature, constituting a crucial lack of resources for many. This paper seeks to remedy this paucity in a very limited manner. Nonetheless, it is envisaged that the discussion therein may promote an awareness amongst the PBL community as to the need for a richer documented problem set in multiple disciplines than is currently available.

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