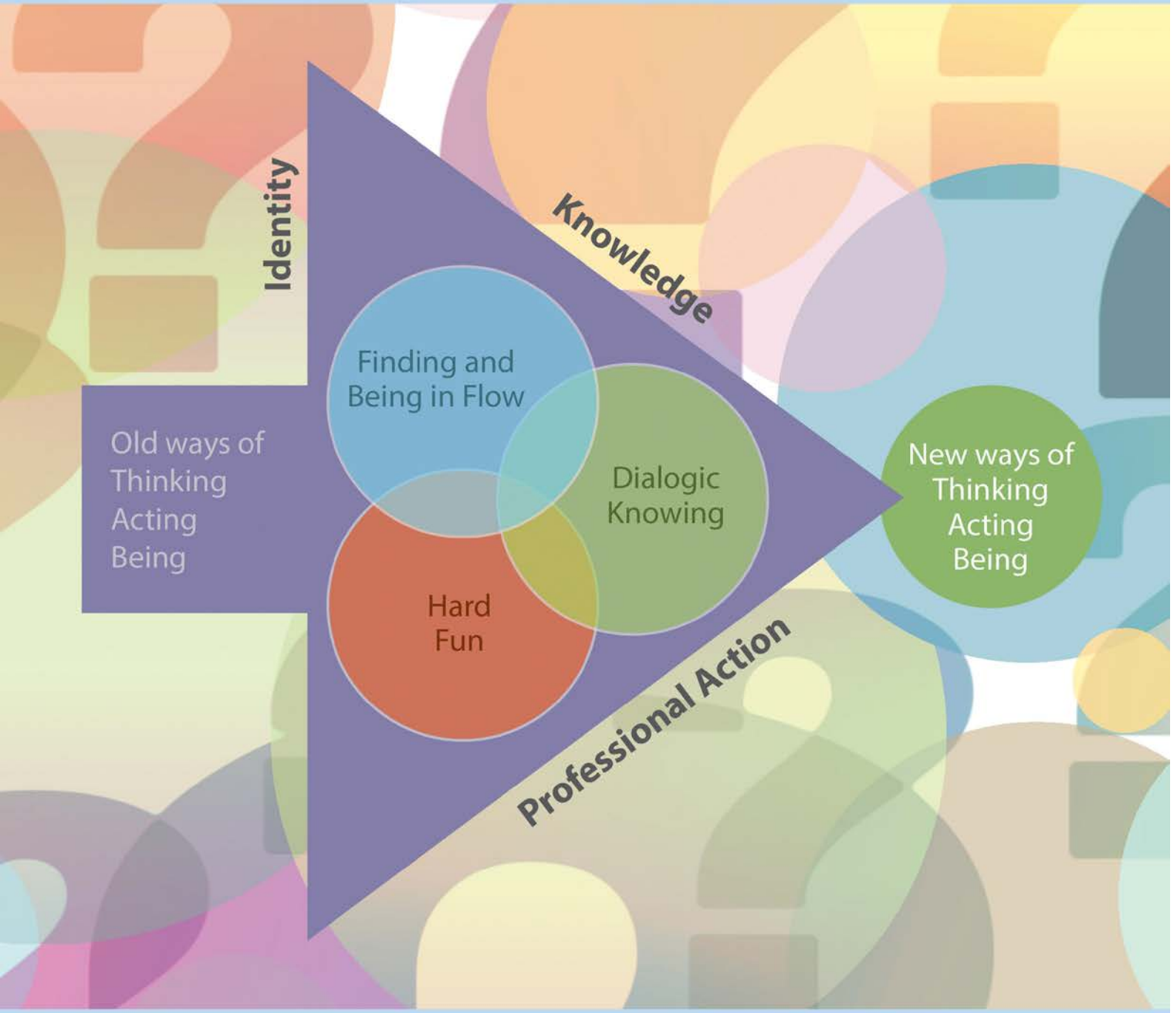
A NEW MODEL OF PROBLEM-BASED LEARNING

Inspiring Concepts, Practice Strategies and Case Studies from Higher Education

Terry Barrett



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Terry was a founding member of the All Ireland Society for Higher Education (AISHE) and is the co-chair of Facilitate (The Irish Enquiry and Problem-based learning network) and a SEDA (Staff and Education Development) Fellow.

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The PBL students I have facilitated have inspired me as to the potential of PBL for dialogic knowing, creativity and hard fun and I am grateful for that.

Dedication

May this book contribute to providing challenging, collaborative and creative learning environments for students across the globe and across a range of disciplines.

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Chapter One

Introduction

Why should you read this book?

This problem-based learning (PBL) book is the first to place students' talk at its heart. It focuses on the valuable lessons we can learn about problem-based learning from listening to students talking in PBL tutorials. The uniqueness of this book is its focus on the power of student discourse in tutorials to teach us how to both understand and practise problem-based learning. It uses a discourse analysis study of students' naturally occurring talk in PBL tutorials (Barrett 2008) as a starting point. Although students' talk in tutorials is the pivotal learning site in problem-based learning, it has not been given the attention it deserves (Clouston 2007). This talk can be made up of brainstorming, debate, arguments, knowledge sharing and synthesis, jokes, decision-making and presentations. Talk is action (Fairclough 2003). We have much to learn from what students are doing through their talk in tutorials.

This book is for both experienced problem-based learning (PBL) practitioners and people starting a new PBL initiative. As PBL practitioners you will be able to re-imagine and re-invigorate your problem-based learning courses through adapting the concepts, practice strategies and case studies presented in this book to your own context. The new inspiring concepts elaborated in this book are fresh ways of re-conceptualising problem-based learning. New concepts are important, as we need new ways of thinking about PBL in order to find new ways of designing and implementing PBL. Practice strategies linked to these concepts are presented in ways that will enable you to choose and adapt the ones most relevant to your context. International case studies of PBL practitioners using these strategies from a variety of disciplines provide examples to offer you inspiration. Questions and online resources provide you with further material to develop your PBL initiatives.

What is Problem-based learning?

Barrows defined problem-based learning as:

> the *learning* that results from the *process* of working towards the understanding of a resolution of a *problem.* The problem is encountered first in the learning process.

(Barrows and Tamblyn 1980: 1 my emphases).

Many learning strategies use problems, but a key and defining characteristic of problem-based learning is that students experience the problem at the *start* of the learning process before other curriculum inputs. This *motivates* them to gain new knowledge through independent study, constructing knowledge together in tutorials and learning from other curriculum inputs. The four key characteristics of PBL are:

1) The problem
2) The PBL tutorial
3) The PBL process
4) Learning

For people new to PBL who want to see what PBL looks like in practice and for experienced PBL practitioners looking for new video-clips of PBL to show staff and students you may want to begin by viewing some of the following.

Figure 1.1 Problem-based learning in practice

Problem-based Learning at Stenden University https://www.youtube.com/watch?v=-5omNEmWicU PBL at Maastricht University https://www.youtube.com/watch?v=lZS2MbxBGCM FH Wein, University of Applied Sciences, Austria http://www.youtube.com/watch?v=gE04TbxQWS8

Learning about problem-based learning from listening to students' talk in tutorials and PBL practitioners' practice

As teachers, researchers and theorists in your own discipline and as PBL practitioners you look for educational strategies that are supported by research and have theoretical foundations. The research study at the core of this book is a discourse analysis study of the naturally occurring talk of the PBL tutorials of two teams of students (Barrett 2008). In the study, two teams of eight lecturers completed a module on problem-based learning that was part of a Postgraduate Diploma in Learning and Teaching in Higher Education. Although they were lecturers in their own disciplines, for the purpose of this module they were PBL students. The aim of the module was to enable participants to design, facilitate, assess and evaluate PBL curricula. The content of the module developed out of the students' work in teams on two consecutive problems about PBL. The participants were facilitated by PBL tutors and used a PBL process to work through the problem. Thus, both the content and the process of this module were PBL. All the tutorials for both teams were video and audio recorded. Pseudonyms were given to these PBL students, the name of their programme and the teams. You may find that some of the words of these academic staff will resonate with you and your experience as a teacher interested in PBL.

Throughout the problem-based learning (PBL) process, students' talk both generates and demonstrates learning .The practice strategies recommended in this book are based on this discourse analysis research study, and on my professional experience gained from over twenty years as a problem-based learning curriculum designer, programme director, education developer, tutor, researcher and research supervisor. It also draws on my experience of teaching problem-based learning staff development workshops, courses and summer schools for academic staff in a range of disciplines and countries.

PBL practitioners that I have worked with generously provide case studies of these practice strategies in action.

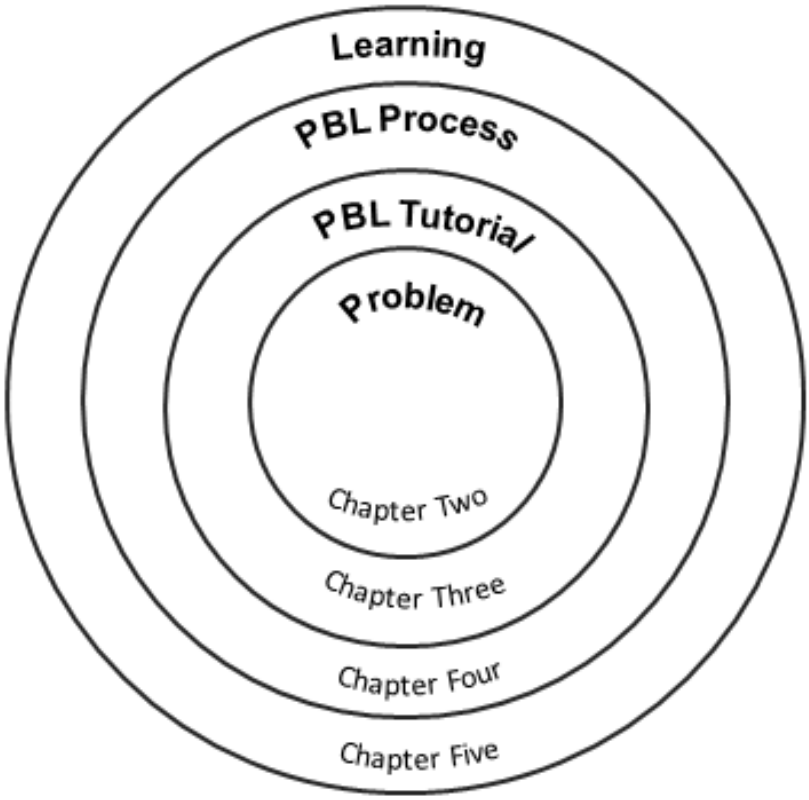
This book addresses the common concerns of PBL practitioners including:

- How do I design engaging and challenging problems for my students?
- How can I be an effective PBL tutor?
- What about PBL with a large number of students and a small number of tutors?
- How can I use PBL to encourage student creativity?
- Do I need to change the assessments?
- How do I prepare students for PBL?
- What are effective and interesting ways of facilitating PBL staff development?

What is the structure and outline of the chapters of the book?

The four core chapters of the book (two, three, four and five) focus on the four key characteristics of PBL namely: the problem, the PBL tutorial, the PBL process and learning.

Figure 1.2 Book chapters and the four key characteristics of PBL



Chapter two is entitled: **Suggestions for Designing Problems to Expand Students' Knowledge, Professional Action and Identity Development.** It discusses designing problems/triggers/scenarios to develop your students learning. Well-designed problems are a key success factor for PBL initiatives. This chapter presents the concept of *the problem as a provoker of a liminal space.* This liminal space is an in-between space between

1) current levels of knowing and new levels of knowing,

2) habitual forms of professional action and forms of professional action new to the learner and

3) satisfaction with current identities and a desire to explore other possible identities.

You can select practice strategies for operationalising this concept in your teaching practice. These are presented as suggestions for designing problems to expand students' knowledge, professional action and identity development. Case studies of sample problems from different countries bring these practice strategies to life.

Students discuss the problem in the PBL tutorials. Chapter three is entitled: **Possibilities for Promoting Student Dialogue and Learning in Tutorials.** The PBL tutorial is a key defining characteristic so no matter how large the number of students you have, it is important to divide them into teams of eight or less. In PBL, students work in small teams in a tutorial to resolve the problem. Chapter three presents the concept of *the PBL tutorial as a potential site for dialogic knowing*. This highlights the capability of PBL tutorials to provide fertile ground for students to create knowledge together and to learn from one another. Practice strategies for promoting student learning and dialogue in tutorials are elaborated. These are specific strategies for promoting democratic social relations, the co-construction of knowledge through co-elaboration and shared control. The examples of these strategies in action will help you to choose from the range of possibilities.

The PBL tutorial is part of a wider PBL process. Chapter four is entitled: **Strategies for Encouraging Flow, Creativity and Mindfulness in the PBL Process.** Some people think PBL consists solely of students working on problems in tutorials and doing independent study. This is *not* the case. The PBL process is an expansive learning environment including independent study consulting a variety of resources, preparing presentations/reports/ related to problems together with presenting these and receiving feedback. The problem drives the design and sequencing of the other curriculum inputs. These other curriculum inputs can include lectures, seminars, skills training sessions, work placements and practicals. Students are challenged to make connections between the different elements of the PBL process. Designing the PBL process to foster creativity, flow and mindfulness is the focus of chapter four. It presents the inspiring concept of *the PBL process as finding and being in flow.* Practice strategies are discussed as options for

encouraging flow, creativity and mindfulness in the PBL process. The related case studies are from a variety of disciplines. A PBL practitioner's response to the chapter is inspirational as it recounts the ups and downs of one university lecturer's journey of encouraging creativity through PBL.

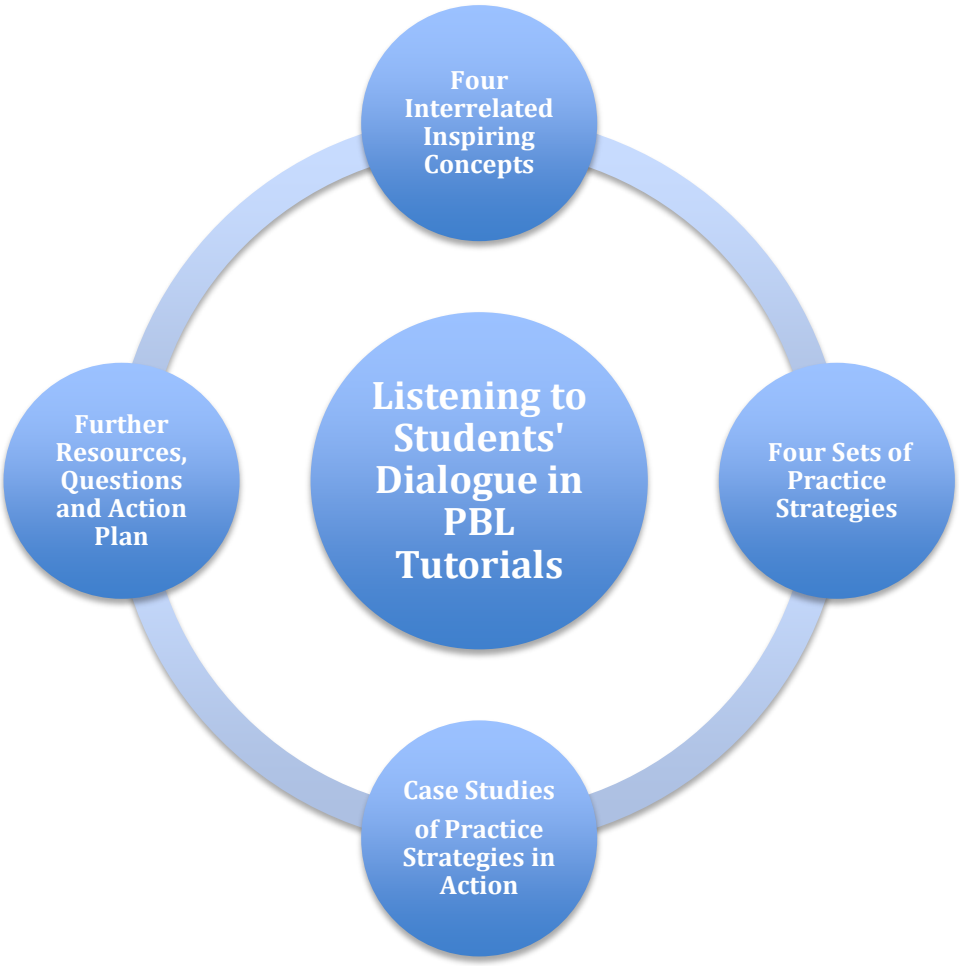
A defining characteristic of problem-based learning is a focus on students learning rather than on teachers' teaching. This learning is the topic for chapter five, which is entitled: **Enhancers of Learning as Hard Fun.** Chapter five presents the illuminative concept of *learning as hard fun*. Student dialogues show that learning was fun and hard at the same time. A variety of practice strategies that are enhancers of hard fun are explored and illustrated with case study examples.

This book revolves around these four illuminative concepts linked to four key characteristics of problem-based learning, namely,

1) *The problem as a provoker of a liminal space*
2) *The PBL tutorial as a potential site for dialogic knowing*
3) *The PBL process as finding and being in flow*
4) *Learning as hard fun*

Chapter six, the final chapter presents and discusses the new model of problem-based learning that is the interrelationship between these four concepts. It offers you the last of many specific spaces in this book to reflect on and plan your PBL initiatives.

Figure 1.3 Key elements of the book



How should you use this book?

Many people may choose to read the book straight through. However if you are interested in a particular aspect of problem-based learning you can skip to that chapter. For example, if your current concern is with facilitating PBL tutorials you can skip to chapter three. The practice strategies are presented and discussed in the body of the chapters. These strategies are summarised in a list at the end of the chapters. Many will read the sections of the chapter in order. Others may prefer to read this list first and then read the rest of the chapter.

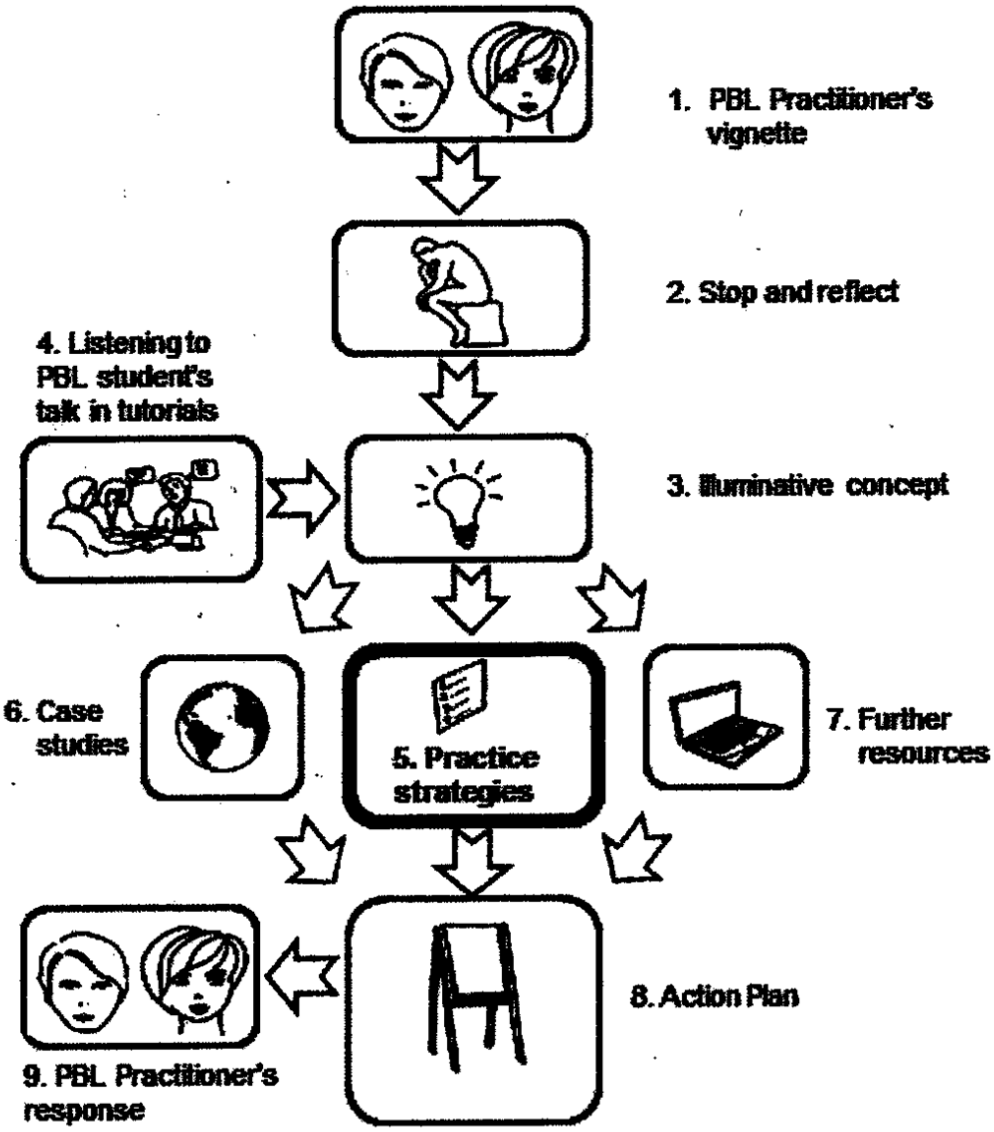
Each chapter begins with PBL practitioners' vignettes where they comment on their concerns in relation to the characteristic of PBL that is the topic of the chapter. You can see if these concerns resonate with you. This is followed by an overview of the chapter. Then there is an opportunity for you to stop and reflect on the experiences and questions you bring to reading this chapter.

Next you are introduced to an illuminative concept that provides you with new ways of thinking about the key characteristic of PBL. This inspiring concept is based on listening to students' talk about the characteristic in the discourse of the PBL tutorials, and extracts from these student dialogues are presented and analysed. Then practice strategies, ways of translating the inspiring concept into actions, are presented and discussed.

Case study examples using these strategies in a variety of disciplines and countries are explored. Some of these may be particularly relevant to you. You can then decide which of the online further resources provided you want to use. Next you are encouraged to make an action plan. You can combine your understanding of the illuminative concepts, your choice of practice strategies and the information from the further resources to inform your action plan for designing, implementing or re-energising your PBL initiative.

Lastly each chapter finishes with a response to the chapter from a PBL practitioner. The following figure shows the sequencing of the sections in each chapter. You can look out for the icons that signal the different sections throughout the book.

Figure 1.4 The sequencing of sections within each chapter



And now the first of your many opportunities in this book to stop and reflect

Stop and Reflect

- What are your motivations for reading this book?
- What type of inspiration are you looking for?
- What do you like most about facilitating learning?
- What are your specific concerns about PBL practice?
- What have you learned about learning processes from listening to your students?
- What types of resources would you find helpful?

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Chapter Two

Suggestions for designing problems to expand students' knowledge, professional action and identity development

Introduction

A PBL Practitioner's Vignette

"Terry, will you come to us in Finland and facilitate some problem design workshops. Our PBL programmes in different disciplines have been running for a number of years and we now want to write some more new problems".

Marja-Leena Lahteenmaki Principal Lecturer TAMK
University of Applied Science, Tampere, Finland

I replied that I would be happy to do this as I was writing a book chapter on problem design and could send her a draft version and base the workshop on this. Some of the problems that different Finnish teams designed now appear as sample problems in this chapter. Marja-Leena has written a PBL practitioner's response at the end of the chapter.

For me, facilitating problem design workshops is a very creative and energetic experience. Designing high-quality problems is a key success factor for PBL initiatives and I thought it was good that they were investing time and resources into doing this well. I hope that you as PBL practitioners will find this chapter helpful in doing the vital work of designing problems.

Chapter Overview

This chapter will help you to:

- Think in fresh ways about problem design
- Use a new inspiring concept to shape some of your approaches to problem design
- Choose from and apply some of the practical suggestions for designing problems
- Learn from sample problems in various formats designed in diffferent disciplines and countries
- Use questions, triggers and further resources to develop new strategies for problem design in your PBL initiatives

You bring what you already know about using problems in education, both as a student and as a teacher to the reading of this chapter. So begin by tapping into your experience and understandings from having worked with problems as a student.

Stop and Reflect

Think of a specific problem that you learnt much from as a student

- How was the problem presented to you?
- Why was the problem effective and memorable?
- What new knowledge, skills or attitudes did you develop?
- What are your current issues about designing problems for your own students?

Problem and Trigger Design

A “problem” is a trigger that acts as the starting point for learning in the problem-based learning process. In problem-based learning initiatives some people choose to use the word “problem” (for students to work through).

Others prefer to use the words “trigger” (to prompt learning) or “scenario” (to understand and respond to) or a “starting point’ to begin a journey of learning. I will use “problem” in the generic sense to cover all these problem formats.

Philosophical perspectives on the importance of problems in problem-based learning

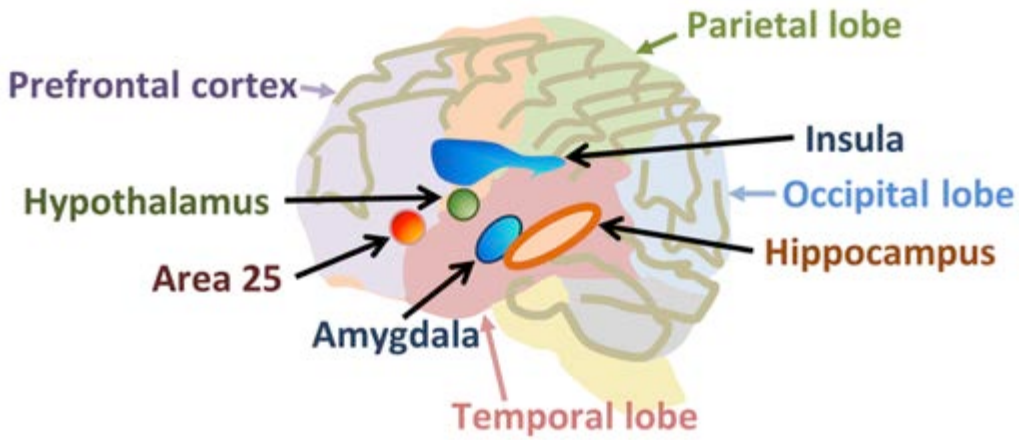
Paulo Freire provides us with a philosophical understanding as to why education should start with problems. Freire asserts that we can only know something if we problematise it and that knowledge acquisition must begin with problems, puzzles and tasks (Freire 1972). And so we give PBL students a problem. We deliberately catapult them into a situation where the only way that they will solve the problem is to develop new knowledge of different kinds. Freire states that: “in problem posing education people develop their power to perceive critically the way they exist in the world with which they find themselves” (Freire 1972: 117). Thus, in problem-posing education we invite students to think critically and to journey to deeper levels of consciousness: Thinking and acting critically is key to developing as a person, as a professional and as a citizen.

Neuroscience perspectives on the importance of problems in problem-based learning

Sadlo (2011) and O’Connor (2010, 2012) provide us with inspiring neuroscience perspectives on the importance of problems in PBL. Our brains are hotwired to solve problems so problem-based learning is compatible with our brains’ natural highly evolved ability to respond to problems, challenges and threats in our environment:

> There is evolutionary evidence that problem solving is the hallmark of our species (Nataraja 2008). The human brain grew in size as our predecessors had to learn new information to solve problems of living in new territories (Wilcock 2006). Our huge prefrontal lobe is ‘designed’ to analyse new complex situations (cognitive processing) (Sadlo 2011: 434).

Figure 2.1 The Human Brain (O'Hare 2012)



O'Connor (2012) highlights the importance of the problem in PBL from a neuroscience perspective as a device for harnessing the problem-solving capacity of the brain by providing a focus for students' attention and a target for student learning.

> Learning is a matter of attention - of choice, and most important to the dynamic of learning is the *what* - the target; rather than the *how* - the path. The frontal lobes of the brain focus attention on what is to be learned while the subconscious mind in part located in a deeper brain structure called the midbrain delivers the drive to achieve it. … PBL is a good example of a social learning environment that capitalizes on using the drive to solve a problem to create a learning target in our brains. This is the golden key to accelerated learning for without a target the brain is not involved in deep learning (O'Connor 2012: 38-39).

We need to design problems that are so intriguing they mobilise the brain to make many connections. Well-designed problems provide engaging and stimulating starting points for learning and O'Connor stresses that the

> initial moment of learning is important as the more brain structures recruited and therefore the more connections created the easier it will be to recall that information (O'Connor 2012: 38).

Context in learning is key as it is easier for students to recall learning in a specific context if they have initially acquired this learning in a similar context. Thus problems that mirror real-life professional practice can help students to see the relevance of what they are learning in the first instance, and later to recall this learning in professional contexts, as “the learning environment and the recalling environment should be equivalent since the chances of recall are improved” (O’Connor 2012:38).

Designing high-quality problems

A key characteristic of problem-based learning is that students are presented with the problem at the *start of the learning process b*efore other curriculum inputs (Hung 2016). Other teaching strategies use problems but this is often after students have experienced lectures and other curriculum inputs. Some teaching strategies leave working with problems till the end of the module or unit or for more senior years of the curriculum.

Why use problems in education? The five arguments that Jonassen (2011) proposes is that working with problems is:
1) Authentic learning
2) Transferable learning
3) Meaningful, intentional and mindful learning
4) Time effective learning and
5) A set of opportunities for students to practice the key skill of problem solving.

Why does PBL start the learning process with a problem? Problem-based learning starts the learning process with a problem in order to:

- Engage students actively in their learning
- Motivate them to learn more
- Encourage them to see the relevance of the knowledge they will learn to their future career
- Activate the prior learning of all the students
- Develop their critical and creative thinking and

- Give them opportunities to construct knowledge together from elaborating their knowledge from their independent study and working together in tutorials to resolve the problem.

Well-designed, high-quality problems are a key success factor in problem-based learning initiatives and great attention should be given to problem design (Gijselaers and Schmidt 1990, Schmidt and Moust ,2000, Azer 2007, Barrett, Cashman and Moore 2010, Jonassen 2012, Hung 2016). Simply put the quality of the problems affects the quality of the learning.

The quality criteria for effective well-designed problems or triggers in problem-based learning are; real-world, authentic, motivating, engaging, activating of prior learning, targeting of new learning, challenging, somewhat ill-structured, multi-dimensional, presented in different media and generative of learning issues and group discussion. (Conway and Little 2000, Gijselaers 2005, Jonassen & Hung 2008, Barrett, Cashman and Moore 2010, Jonassen 2012, O'Connor 2012, Hung 2016). Quality problems are planned to achieve the learning outcomes and acquisition of the key concepts and transferable skills of the module/ course/unit together with the broader graduate attributes, including teamwork and critical thinking. A meta- analysis of teaching strategies that promote critical thinking indicated that "the exposure of students to authentic or situated problems and examples" had a positive impact on the development of students' critical thinking (Abrami et al 2015: 275)

This chapter will provide you with suggestions for designing high-quality problems for your students. These suggestions are informed by both the illuminative concept of *the problem as a provoker of a liminal space* derived from analysing PBL students' talk and my experience of working as an education developer on PBL initiatives across a range of disciplines and countries, where I introduced people to this concept. In order to design more effective problems we need new ways of thinking about the nature of problems. We need new concepts.

The Illuminative Concept of the Problem as a Provoker of a Liminal Space

This new concept of *the problem as a provoker of a liminal space* emerged from a research study (Barrett 2008**).** The concept of liminal space is from the Latin word *limen*, meaning threshold or boundary (Meyer and Land 2005). A liminal space is an in-between, betwixt and between state (Meyer and Land, 2006). Liminal spaces as in-between spaces have a special function, as sometimes we cannot go directly from an old state to a new state, rather, we need first to go to an intermediary state that is neither the old nor the new. Sometimes people need liminal spaces to learn, to grow, to explore identities, to work on problems and to be creative. Liminal spaces can become places of transition, transformation, stagnation or attempted regression.

Stop and Reflect

- What were some of these liminal in-between spaces in your own life (study, work, research, personal)?
- What did you learn from your experiences in these liminal spaces?

From the data of the research study (Barrett 2008), I interpreted that the two problems in the module provoked liminal spaces for the students. The PBL problems created liminal spaces that challenged students to learn, in order to know more and to move forward, to move “beyond the fields we know ” in the words of the Irish playwright Dunsany (1972). To use a rural metaphor, a liminal space is like a threshold space by the hinge of a rustic gate that marks the space between familiar fields and the start of the fields beyond, a space of possibilities.

Figure 2.2 A liminal Space, a threshold at the hinge of a rustic gate that marks the space between the familiar fields and the fields we do not know (Barrett 2008: 120)

Meyer and Land (2005: 380) argue that: “the connection between liminality, creativity and problem-solving would also merit further enquiry”. This chapter contributes to the existing literature on liminality in learning by exploring the relationship between PBL problems and liminal spaces and its application in the design of problems. This liminal space prompted by the problem in PBL has three dimensions: a knowledge dimension, an identity dimension and a professional action dimension. The PBL problems in the study provoked liminal spaces between 1) current levels of knowing and new levels of knowing, 2) habitual forms of professional action and forms of professional action new to the learner and 3) satisfaction with current identities and a desire to explore other possible identities,.These liminal spaces are seen in the students’ naturally occurring language in the PBL tutorials.

Figure 2.3 The Problem as a Provoker of a Liminal Space: Moving to New Ways of Knowing, Acting and Being (Terry Barrett and Shelly Barrett)

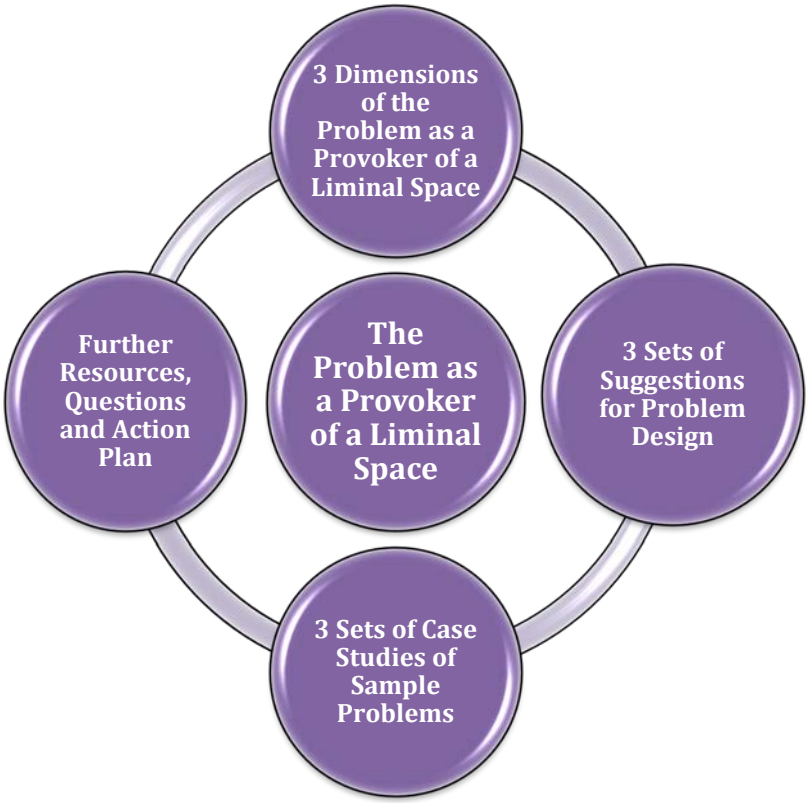
This chapter builds on my earlier presentation of this concept (Barrett 2013). Since then I have developed this concept theoretically and practically by elaborating nineteen suggestions for problem design and providing case studies of sample problems. This concept prompts us to design a set of problems that cover all three dimensions. Some problems may cover all three dimensions and some problems may have a particular emphasis on one particular dimension. Participants in the Finnish and other problem design workshops found that the concept of *the problem as a provoker of a liminal space* inspired them to write new types of problems.

Chapter Structure

Each of the three dimensions of the problem as a provoker of a liminal space (knowledge, professional action and identity) will be discussed in turn as the three major sections of this chapter. Each section begins with an analysis of

the student dialogue in tutorials about the particular dimension. Secondly, practice suggestions for high-quality problem design informed by this dimension are elaborated. Thirdly, sample problems that illustrate these practice suggestions are presented. At the end of the chapter there are questions for reflection and further resources you can use to inform your problem design and action plan.

Figure 2.4 Chapter Structure



The Knowledge Dimension of the Problem as a Provoker of a Liminal Space

In the study, the problems created liminal spaces where the knowledge required for working on them was not obvious and straightforward but unclear and troublesome (Barrett 2008). The students were lecturers, working on problems about problem-based learning. The dialogues quoted in this chapter illustrates how the students could not have resolved the problem with their

existing level of knowledge and that they needed to acquire new knowledge in order to reconceptualise the problem and resolve it. Furthermore, problem-based learning offered students ways of learning that combined professional and personal development in an integrated way of knowing. I gave the pseudonyms Glendalough and Skelligs to the two teams of students.

Students' Talk about the Problem as a Provoker of a Liminal Space between Old and New knowledge

The students talked about three types of knowledge: knowing " that", knowing "how" and self-knowledge. When the students were working on the first problem they were conscious of the fact that they knew something "about PBL", but that they had to know more about PBL. The name of the first problem was: "The Professional Body has Spoken". IBEC is the national organisation of employers in Ireland.

Figure 2.5 "The Professional Body Has Spoken" Problem

The Professional Body has Spoken

Your professional body has come up with suggestions for preparing the professional of the future. They want people with specialist knowledge. However they emphasise that they want people who will not only continue to develop their technical skills but who will also continue to develop their communication, problem-solving, learning to learn and teamwork skills. Your institution's strategic plan has an underlying theme of "the promotion of the capacity to learn and reason, and of learning skills, as being of greater importance than the changing nature of learning content." Other colleges have also emphasised the importance of developing key skills. IBEC, have repeatedly stressed that employers are looking for graduates with key skills (e.g. communications, problem-solving, learning to learn. and teamwork) in addition to technical skills.

Your course team is redesigning a total programme using a Problem-based learning approach. You are requested to redesign *your module* using a PBL approach to enable graduates to develop these attributes. Your module descriptor and evaluation plan are due in on 22 October for a team meeting.

You have also been asked to give a 20-minute presentation on your module descriptor, the problem(s), the assessment strategies and your plan for evaluating the module at this meeting.

When the Glendalough team were discussing this problem Noel remarked:

Noel: But the only thing is that we don't know that much about PBL, we are part of the kernel, not the whole kernel.

Noel realised that he knew something about PBL but that he did not know "that much" about PBL and that he did not know enough about PBL to resolve the problem. He recognised that he needed to acquire more personal knowledge and he needed to find out more "about PBL". Noel perceived that working on the "Professional Body Has Spoken " problem (that the students

contextualised in terms of a human resource module) involved naming the space between prior knowledge and the new knowledge required to work on the problem, as he said:

> *Noel:* One of the big things is we organize prior knowledge, what do we know about it, I suppose to some extent what do we know about this interview with human resource management and then, to, eh, to identify the areas that we know nothing about.

The first dimension of t*he problem as a liminal space* is the knowledge dimension.

Suggestions for designing problems to maximise the knowledge dimension

Suggestions for designing problems to maximise the knowledge dimension.

1. Design problems around threshold concepts
2. Identify the threshold concepts, learning outcomes, key topics and core transferable skills that you wish the problems to address for a given module/course/unit/programme
3. Design somewhat ill-structured problems
4. Design problems that encourage students to explore the interrelationship of concepts/dimensions/models/theories

Suggestion One: Design problems around threshold concepts

The students in the module grappled with the threshold concept of problem-based learning. I argue that it is imperative to identify threshold concepts and design problems around these as a way of stimulating students to new levels of knowledge. Threshold concepts are difficult to understand, key concepts in a discipline or profession. They are the concepts that once you understand them you think and act in new and different ways. They are:

> akin to a portal opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of

> understanding or viewing something without which the learner cannot progress (Meyer and Land 2006, 3).

They are the conceptual gateways to the discipline or profession and are considered to have the characteristics of being transformative, irreversible, integrative and troublesome (Meyer and Land 2006).

Figure 2.6 Design problems as portals to new ways of thinking and practicing (Photograph Geraldine O'Neill)

Threshold concepts are the concepts that are easy to mimic an understanding of, but hard to demonstrate a deep and personal understanding of, in ways that show that this understanding can be transferred to different contexts (Meyer 2016). Problems can provoke a liminal space where students encounter a new concept and makes sense of it (Land 2014). Then they have opened a new gate or crossed the threshold of a portal and now have a higher level of understanding.

Figure 2.7 Working on a threshold concept leads to higher levels of understanding

Focusing on threshold concepts is one way of tackling the real danger of too much content overload in modules. In Finland in the introductory lecture, participants were asked to identify some threshold concepts in their discipline around which they could design problems. The following figure identifies threshold concepts in different disciplines from some of the different workshops I have facilitated.

Figure 2.8 Some Threshold concepts in specific disciplines around which workshop participants designed problems

Discipline	Threshold concept
Physiotherapy	Motor learning
Physiotherapy	Stages of tissue healing
Nursing	Person-centredness
Nursing	Aseptic
Nursing	Advocacy
Medicine	Compassion
Medicine	Pain
Immunology	Cell diversity
Chemistry	Moles
Physics	Gravity
Higher education	Problem-based learning
Forestry	Quality of the forest site
Horticulture	Salinity
Career development	Strategic choice
Community development	Participation
Engineering	Design thinking
Business	Body language

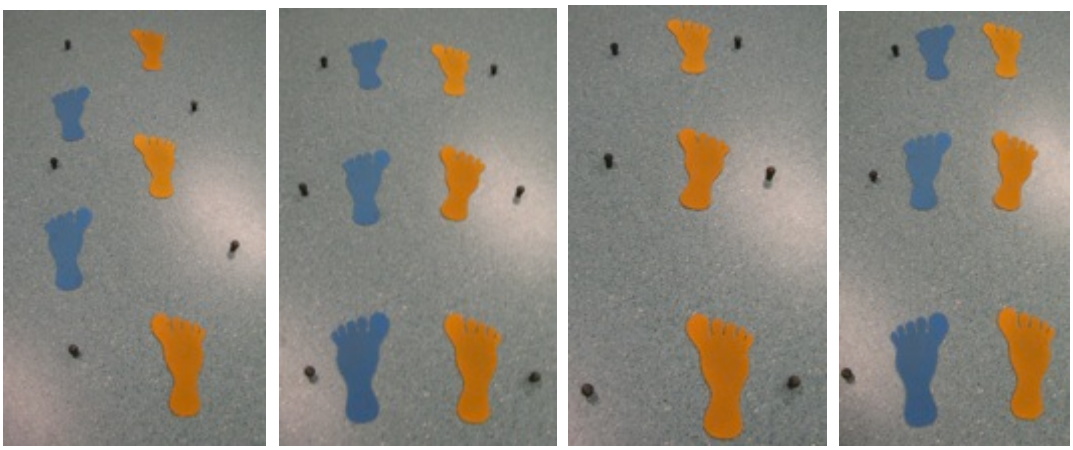
Case Study of a Problem Designed around the Threshold Concept of Motor Learning

In the Finnish workshop a group of physiotherapists designed a problem around the threshold concept of motor learning. They marked out footprints and the prints of a crutch with tape on the floor. The students would then walk on these footprints with a stick as their starting point for learning. The students would experience this problem visually and physically as they walked on the prints with a stick.

Marja-Leena Lahteenmahaki explained that in addition to targeting this threshold concept the problem had the three dimensions of the liminal space. This problem connects the theory of motor learning and the theory of walking with different walking difficulties and techniques of walking. It also connects

these with the practice of using walking aids in different situations and with the way of being with patients and guiding them to use walking aids**.**

Figure 2.9 Walking with a crutch, Four photos of different floor prints, Marja-Leena Lahteenmahakii, Hannele Anttila and Liisa Sittig



Stop and Reflect

- What are the important threshold concepts for your students?
- If you could only have three threshold concepts for your module/course what would they be?
- What are your ideas about designing problems around these threshold concepts?

Suggestion Two: Identify the learning outcomes, key topics and core transferable skills that you wish the problems to address for a given module/course/unit/programme

You can represent the overall plan for a unit visually by a grid that shows the relationship between the learning outcomes and the problems. I have found if people are working on an old module that already has learning outcomes that

a good starting point is to review and edit the outcomes. Sometimes it is advisable to write them again from scratch looking freshly at the unit and the potential of the PBL process. For example, some people would not originally have had the development of problem processing skills as an outcome but now as the module is a PBL module they may want to write learning outcomes in the area of teamwork, critical thinking etc.

Figure 2.10 The relationship of the problems to the learning outcomes

Learning outcomes	Problem 1 (name)	Problem 2 (name)	Problem 3 (name)
1			
2			
3			
4			
5			
6			

This grid is also useful to demonstrate to others that all the learning outcomes are worked on at least once through the problems and some outcomes are worked on more than once. A key question curriculum designers need to ask themselves is whether the learning outcomes of the module would best be achieved through students working on one large problem or three medium size problems or five small problems or another number of problems that would work in a particular context. Concept maps are useful showing the relationship of the concepts to one another, where the problems are designed around concepts and their interrelationships. Learning outcomes grids and concept maps can operate as effective visual advanced organisers and summaries for the PBL tutors.

It is important to write a problem overview for each problem and these together with the learning outcomes grid/ concept map/topic tree will form the kernel of the PBL tutor handbook.

Figure 2.11 Problem Overview Template

Title of Problem	It is good to give a short or catchy title to the problem so tutors and students can refer to and make connections between this problem and other problems and curriculum inputs.
Authors	It is important that problem designers are given credit for their work. It is also key that the coordinator has the name of the problem designers if the problem needs to be redesigned or updated.
Module/Unit/Course	Name and number.
Date	This helps plan when problems need to be reviewed.
Threshold Concepts/Learning Outcomes/Key Topics/Key Principles/Graduate Attributes	It is very helpful to map this for each problem separately and then for the unit as a whole .
Problem Presentation	It is vital to present the problem exactly as the students will receive it (e.g. word for word, picture by picture). Nothing else.
Enquiry Resources	If you are supplying any additional resources that are part of the problem include them here (e.g. a data set).
Independent Study Resources	Naming key ones here enables planning for student access to these resources.
Problem Implementation	Highlight any practical issues e.g. if this is a progressive disclosure problem what is the plan for students receiving different parts of the problem.
Curriculum Overview	Specify the links and sequencing of this problem with other relevant curriculum inputs e.g. skills training, resource session, research seminar, lecture, work placement. Specify the link between the problem and assessments.
Advice to Tutors	Give specific advice to PBL tutors facilitating teams working on the problem. They may have not all have been part of the design team so elaborate any information or resources they would need.

The third key element that is essential in the tutor handbook is the detailed timetable that shows the links between working on the problems in PBL tutorials and other curriculum inputs. This can be shared with students so that they can see the sequencing of all the curriculum inputs e.g. PBL tutorials,

workshops and research seminars and take the responsibility for actively using all of these to progress their work on the problem and their understanding of the interrelationship between the key concepts they are exploring.

Suggestion Three: Design somewhat ill-structured problems

Problems should be deliberately somewhat ill-structured to allow different resolution pathways. They should resemble the messiness of real life problems. Two important first steps in knowledge acquisition for students are *defining the problem* and *naming the research questions* they want to do further work on to resolve the problem. It is crucial not to define the problem exactly in the problem presentation but to leave it somewhat ill-structured. Problem designers are advised not to put questions at the end of the problem presentation. Rather it is the students' job to identify their learning issues and phrase these as questions. Sometimes in problem design workshops, groups have included questions in the first draft of their problem. The level of ill-structuredness will vary with the stage of learning and the contexts of the course.

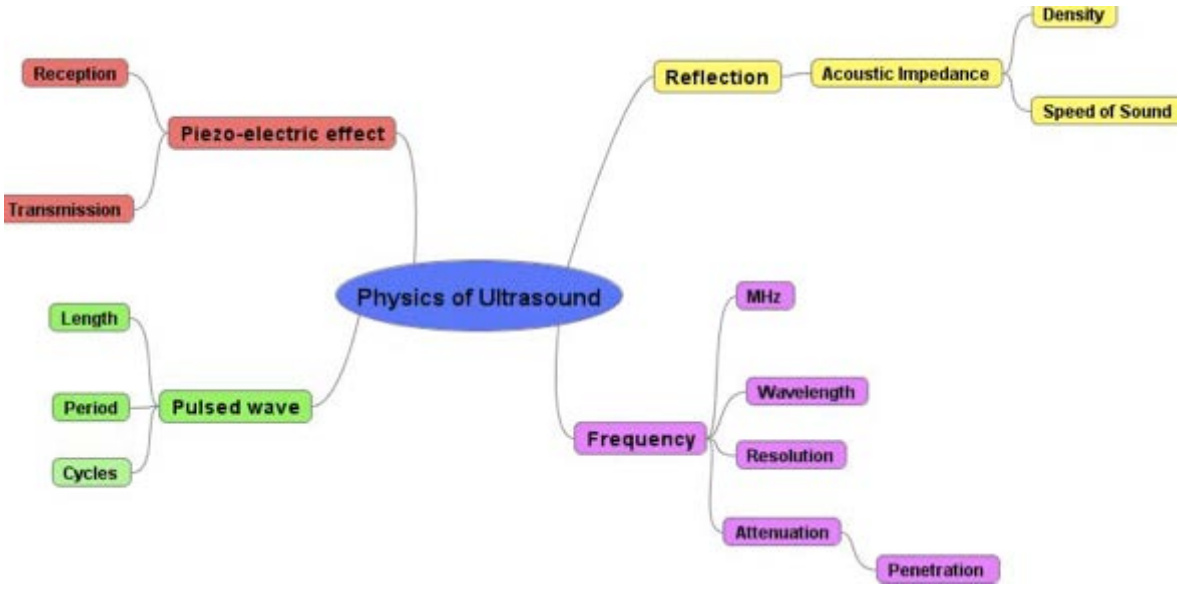
Suggestion Four: Design problems that encourage students to explore the interrelationship of concepts/dimensions/models/theories

Problem-based learning is a total multi-dimensional approach to learning. In 'The Professional Body Has Spoken' problem, students are prompted to explore the interrelationship between different dimensions of PBL e.g. between the problems and assessments. In addition to dealing with practical work situations, some problems should prompt students to grapple with understanding key concepts and their interrelationships. This conceptual understanding provides the foundation and rationale for their work. Two useful problem types that are particularly useful for this work are incomplete concept maps and contrasting texts. Contrasting text problems can take the form of two letters to the editor from different viewpoints or two opposing journal papers.

Case Study of a Problem on the Interrelationships of Concepts in the Physics of Ultrasound

The following problem is from a masters programme in ultrasound and it encourages the students to explore the key concepts of the physics in ultrasound and to name the relationships of these concepts by adding in appropriate link words on the lines and expanding the concept map. Developing this incomplete concept map further facilitates students' conceptual understandings and the relationships between these concepts and their clinical practice.

Figure 2.12 The Physics of Ultrasound, Marie Stanton



See the further resources section at the end of this chapter for more information about concept maps. In addition to designing problems that focus on "knowing that", problem designers should create problems that use the

potential of PBL problems in developing the “knowing how’ capabilities needed for professional practice.

The Professional Action Dimension of the Problem as a Provoker of Liminal Space

The students talked about different aspects of the professional action dimension: professional skills; self-reflection; ethical behavior and changing the approaches to professional work when new knowledge and insight became available. They talked about the professional action dimension of the problem in terms of developing key professional transferable skills or “know how” (e.g. communications, teamwork). This “know-how” was developed both through the content of the problem and the process of working through it.

Students’ Talk about the Problem as a Provoker of a Liminal Space Between Habitual and New Forms of Professional Action

Kate, a member of the Glendalough team, was aware that they needed new personal knowledge and they needed process knowledge:

> *Kate:* We now believe that we don’t know “that”, we don’t know “how” *(laughter)*

While working on this first problem, Sue developed her teamwork skills and her ability to relinquish individual control:

> *Sue:* I have learnt a lot about teamwork…Can I let go a little bit more, yes I can.

Working on this PBL problem prompted Sue (as a PBL student) to move from her current level of teamwork skills to new levels. After the module she developed her teamwork skills further by encouraging her PBL students to work as teams and relinquishing her control of the teams, more than in her previous approach to group work. Developing new teamwork skills is crucial. This links with Eraut’s (1994) argument that learning to work effectively in

teams is often inadequate in professional education. This type of process knowledge is "essentially knowledge of how to do things and how to get things done" (Eraut 1994, 93).

Students' talk about The Professional Body Has Spoken" Problem

I now focus on the students' talk about working on "The Professional Body Has Spoken " problem that involved them designing problems for a module for other students (see Figure 2.5 for full text of the problem). Students in the Skelligs team were in the process of debating what the problem was about and engaging in problem definition. The students chose to rewrite the problem in terms of the context of a module on professional and personal development for a nursing programme that one of the students was teaching. They later decided that other lecturers could adapt this module in their contexts**.** In the following extract, the Skelligs team was talking about designing problems for a module on professional and personal development for nursing students.

Betty: Isn't personal not characterised in professional, within a professional setting its how you conduct yourself within a professional setting, its context.

Hanora: That is it, that is it. Yeah, I personally…(*laughter)*….. I don't think we can, for me I can't separate the two because I have seen a huge leap for me on a personal level and I have brought that, how I have developed as a person in relation to my lifelong learning techniques. I know I have developed in my critiquing ability or my reflective ability, which has been huge for me lately. And I am so glad that I was, that part of the course was there for me. And I have been able to bring that, consciously into my job because I can maybe see things in a different light and say hang on, I am not too happy. I am no longer so accepting because somebody has helped me develop a lateral vision and I can now look at things, I am not afraid to maybe think laterally and confront, if that is what it is. If you have to confront. The course for me personally has gone right into the professional development and maybe that is why in this particular area of nursing that you can't separate the two of them. Maybe in other areas you can, but here they are married together. I think they are incredibly good, because the person in this context does refer to me, impinge on how people develop and progress and behave professionally. That is how I feel, that inner personal strength.

The major theme of how the Skelligs team talked about the problem was in terms of: “Problem: Professional Development versus Personal Development.” The Skelligs team argued that the problems they were designing for this module would go “beyond skills” to develop “that inner personal strength”. In other words, professional skills are not merely a question of technical know-how but involve the integration of personal knowledge and the embedding of appropriate attitudes**.** A key to being a professional is continually developing “reflective” and “critiquing” abilities in order to self-assess your own work and colleagues’ work as appropriate.

The professional action dimension of the problem as a provoker of a liminal space is that betwixt and between space, between habitual forms of professional action and forms of professional action new to the participant. So the professional action dimension is not only in terms of developing professional skills but also in terms of major professional attitudinal change. As one participant working on a problem in the module said during a tutorial:

Mary: Well I just feel this is going to challenge me to change. Profoundly change my approach to teaching.

The professional action dimension of the problem in this module was present because the participants were full-time lecturers who were engaged in the professional practice of teaching in higher education and were doing this module on a part-time, professional development basis. The extract of the student dialogue illustrates this dimension by showing how working on “The Professional Body Has Spoken “ problem was challenging Mary to change the professional action of her teaching. Frank talked about working on the problem as prompting the participants “to change from old style teaching to problem-based learning”. Part of working as a professional is being able to adapt critically and creatively to change and to be open to changing current ways of working.

Suggestions for designing problems to maximise the professional action dimension

Professionalism has been defined as having three elements: knowledge, empathy and self-reflection (Olkers et al 2007). Professional action is planning and carrying out actions in ways that combine these three elements. Designing problems to develop professionalism must therefore move beyond students being challenged to show that they can apply their knowledge but also that they can do so in ways that demonstrate empathy and the habit of continuous self-reflection. I share a number of suggestions for expanding the professional action dimension of problems and triggers. Choose from these according to your context.

Suggestions for designing problems to maximise the professional action dimension

5. Design a set of problems with an awareness of the range of problem types
6. Design problems in a range of media
7. Push out the boundaries of what constitutes a “real-life” problem
8. Combine problem-based learning with action learning
9. Involve key stakeholders in designing and reviewing problems together with assessing problem outputs
10. Design inter-professional problems
11. Design problems connected to work placements
12. Design problems with professional ethics elements
13. Design problems to enhance empathy and compassionate action.
14 .Plan the integration of the problems with the other curriculum inputs of the module/unit.

Suggestion Five: Design a set of problems with an awareness of the range of problem types

Problem designers need to be cognisant of not repeatedly designing the same type of problems but rather designing problem types across the full repertoire appropriate to the profession. Jonnassen (2011:11) elaborates eleven kinds of problems and this prompts us to design new types of problems:

1. Logic problems
2. Algorithms
3. Story problems
4. Rule using/rule-induction problems

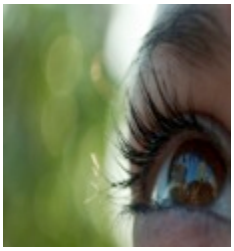
5. Decision making
6. Troubleshooting
7. Diagnosis-solution problems
8. Strategic performance
9. Policy-analysis problems
10. Design problems
11. Dilemmas

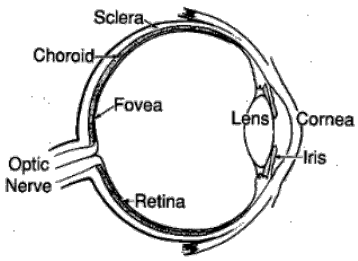
We can use this understanding of the range of problem types to design a variety of problem at different levels of structure, challenge and complexity to stimulate students' interest and professional development. For example in problems for health science professionals the problems should not only include a diagnosis-solution element but also other problem types.

Case Study of a Problem that includes different types of sub-problems

The following problem given to students on a Masters in Ultrasound programme incorporates dilemmas, troubleshooting, policy-analysis and decision-making sub-problems.

Figure 2.13 In the eye of the Beholder, Marie Stanton





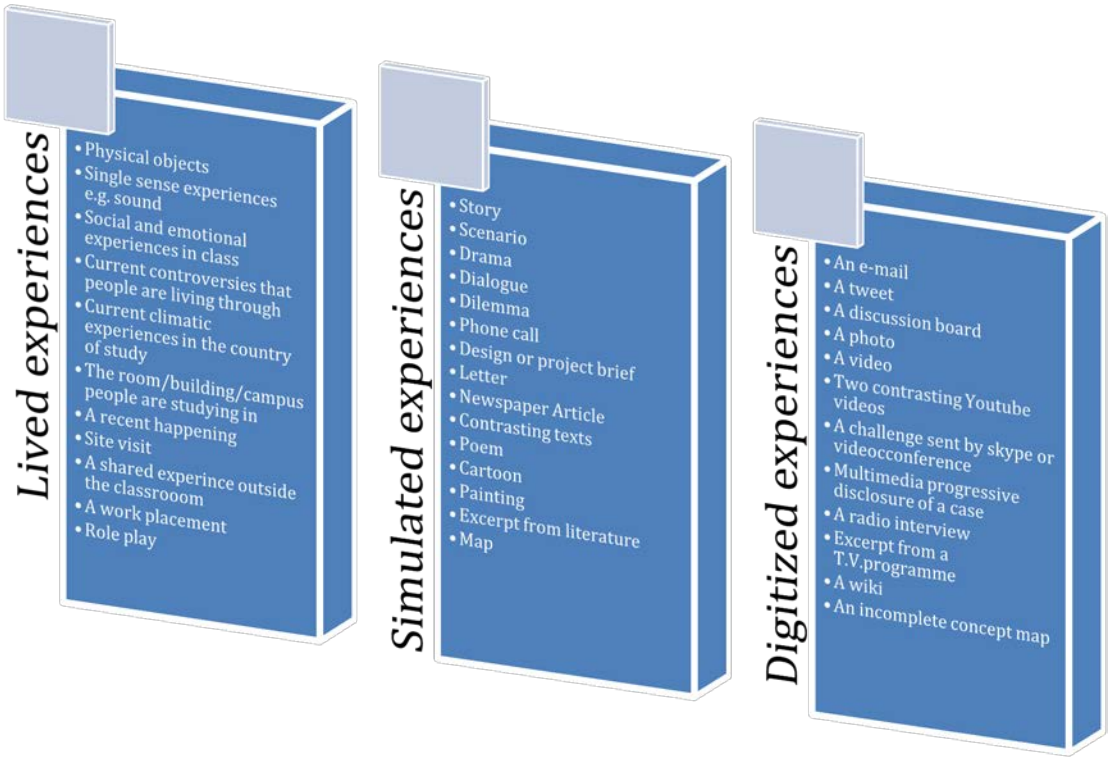
Lorraine Fahy a new clinical specialist in the ultrasound department has instigated regular staff meetings to discuss any missed pathology. She summarises that in a number of recent cases lesions have been missed that she would have expected to be reported. While the lesions were quite subtle the right viewing conditions should have ensured that they were picked up, while so little time is devoted to each examination.

Mary agrees and says that accuracy would improve with longer time slots.
Jim agrees with Mary & Anne. The Imaging Services Manager states that this is unacceptable, a lot of work has gone into setting times for examinations and they are in line with international standards.
Maeve also states that she thinks the time slots are very short, but she also thinks that the viewing conditions in the ultrasound rooms are not ideal. Other staff join in stating that the viewing monitors in various offices are not great either and maybe this contributes to missed pathology.
The Imaging Services Manager suggests that a working party be formed to review the viewing conditions in both the ultrasound examination rooms and on any monitors used in departmental offices. She states that funding will be found to make improvements, if sufficiently strong evidence is put forward that accuracy could be improved by optimising viewing conditions.

Suggestion Six: Design problems in a range of media

In professional life problems present in different media e.g. a phone call, an e-mail etc. Professionals also use different media in working through a problem and in presenting the solution to others. Student learning is stimulated by variety in the media of the problem presentations. The following diagram shows some of the different media that you can use to design problems.

Figure 2.14 Designing problems in different media



In the workshop in Finland the participants were stimulated to design problems in a range of media. One group decided to use an audio clip of a physiotherapist doing an assessment with a patient. This was to get the students focusing on the language and communication between the physiotherapist and the patient. In the same workshop, a group from a business programme decided to use a video clip of a negotiation between two teams to act as a trigger to learn about verbal and non-verbal communication in negotiations.

Some problems are designed as progressive disclosure problems as a number of disclosures are revealed one after the other to reflect the sequence in professional practice. These problems lend themselves to using a range of media for the different types of disclosures.

Case Study of a Progressive Disclosure Problem in Speech Pathology

The following is an abstract of a speech pathology problem designed by Ingrid Scholten, Flinders University, Australia, that uses progressive disclosure

Figure 2.15 Mrs Mc Crea Problem abstract, Ingrid Scholten Flinders University, Adelaide, Australia

Mrs. McCrae is a 65 year-old woman who presents to speech pathology at a relatively advanced stage of bulbar onset motor neuron disease. Students explore issues related to clinical and instrumental assessment of swallowing in this context. As the case unfolds students explore the nature of the declining communication and swallowing and appropriate strategies for intervention, including artificial feeding and respiration and augmentative and alternative communication (AAC). Students meet Mr. and Mrs. McCrae via a series of video clips in which they discuss the impact of the disease. They also access authentic videotape of instrumental swallowing assessments in order to determine the nature of the disorder as a basis for intervention planning.

The case provides students with the opportunity to briefly explore the concept of death and dying and their own reactions to the death of a client they have come to know in some depth.

The first tutorial evolves through 4 disclosures and focuses primarily on the impact of the condition on the client and her husband and assessment of the presenting swallowing difficulty. Early in the tutorial students watch a short confronting ad (Sarah's Story) about MND (www.sarahsstory.org.uk -- http://www.youtube.com/watch?v=4b-h_XBArC4. They are prompted to reflect on their own reactions to the video and to consider the producer's reasons behind the provoking imagery used.

Clinical assessment reveals significant dysarthria and dysphagia (speech and swallowing difficulties), with Mrs. McCrae requiring communication augmentation and a modified diet of soft and pureed solids, mainly to cope with swallowing inefficiency. Mrs. McCrae copes well from a safety perspective, possibly because of the intact sensation associated with the disease.

There are 3 disclosures in the second tutorial, which introduces students to instrumental assessment of swallowing via Fibreoptic Endoscopic Evaluation

of Swallowing (FEES), the importance of client-centered practice and the ongoing management of speech and swallowing in MND.

The final tutorial includes three disclosures that deal mainly with the issue of preparing for death and the professional burnout that clinicians need to guard against when working in a demanding role with a population who will not recover and will die in a potentially distressing way, often after long-term regular and intimate contact.

A problem can contain a range of different media and the students are prompted to use the combination of these presentations as starting points for the explorations of the problems

Case Study of a Science Problem using a Mixture of Media:

Figure 2.16 The dopamine vs. glutamate debate by Craig Slattery, Elaine Keogh, Keith Murphy, Terry Barrett and Kathy O'Boyle

John's brother Kevin had his first breakdown at the end of final year in school. John wasn't surprised – he had seen that his brother was becoming increasingly isolated, paranoid and convinced that their parents were trying to control his thoughts. It took a while for Kevin to get the help he needed; he had to be hospitalized on two occasions but eventually he was diagnosed with schizophrenia and prescribed neuroleptic medication, which seemed to work, although there were a lot of side effects.
John was often angry with his brother for disrupting the family home; however, his strongest emotions were concern and fear. In trying to understand what had happened to his brother, John began to search the internet and found this video clip which he found useful:
http://www.dnalc.org/view/814-Dopamine-Hypothesis-of-Schizophrenia.html

Around the same time, a friend of John's who was studying in England posted a link on his Facebook page to a newspaper article.

Cambridge students paid £250 to take horse tranquiliser drug ketamine 'for schizophrenia research'
By DAILY MAIL REPORTER
UPDATED: 13:38 GMT, 21 December 2010

Read more: http://www.dailymail.co.uk/news/article-

1340473/Cambridge-students-paid-250-horse-tranquiliser-drug-ketamine-schizophrenia-research.html#ixzz3A502SVuP
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John was able to find out that ketamine affects the neurotransmitter glutamate and the research was designed to investigate treatment methods for schizophrenia. John's first thought on reading the article was that what these students had done was very dangerous but then he wondered whether the research might actually result in better drugs for treating patients like Kevin.

Groups must be ready to debate either side of the motion "That the FDA should limit future development of anti-psychotic drugs to those targeting dopamine" and on a specified date in November. The debate will be adjudicated by a panel of assessors consisting of a former senior executive of a leading pharmaceutical company and by a current professor of Drug Delivery.

Sometimes a physical object can be a strong trigger for learning. You can touch the different parts of it and see it in three dimensions.

Case Study of an Education Problem using a Physical Object

In a module on learning theories where I was a tutor, another tutor Alison Clancy suggested that we use a plastic model of the human brain as a problem trigger.

Figure 2.17 Problem trigger of a plastic model of the brain

This stimulated students to look at what parts of the brain are associated with different elements of learning and to explore what neuroscience can teach us about learning.

Stop and Reflect

- What different types of media would you like to use to expand your repertoire of ways of presenting problems to students?

Suggestion Seven: Push out the boundaries of what constitutes a "real-life" problem

Two design lecturers encouraged the professional and personal development of their students by giving them the same real- life design brief problem that designers from a London design company were working on (Duggan and Dermody 2005). They then brought the students to London where they did their presentation alongside the employees of the design company. It is interesting the way that they have pushed out the boundaries of what constitutes a "real-life " problem. I would argue that by moving beyond simulated problems in the classroom to problems that are "real-life" that it is possible to develop students potential in ways that combine personal and professional development.

Stop and Reflect

- What are your ideas for pushing out the boundaries of what constitutes "real-life" problems that would work in your contexts?

Suggestion Eight: Combine problem-based learning with action learning

Problem-based learning began by bringing students nearer to professional work by bringing simulated problems into the classroom. But now we can extend the professional action dimension of the problem by designing problems that necessitate students carrying out professional work outside the classroom:

Finally a challenge for all of us as learners in PBL, Barrett challenges us as facilitators to extend our role to that of educators of social

empowerment and as such to go beyond developing responses to simulated problems to carry out action in social contexts.
(Little and Kandlebinder 2001, 8)

A senior youth worker was working with a group of youth workers. He got each person in turn to bring his/her current problem in the form of a picture. Then the group worked on the problem using a problem-based action learning approach, helping the youth worker to plan his/her interventions and to report back and discuss how the planned intervention went. At the end of this process the youth worker did a second drawing of how he/she saw the situation then. Real-life problems that require professional or social action outside the classroom are larger problems that require more time than the smaller problems traditionally used in PBL. The dividend in terms of the development of professionalism is well worth the planning work.

Suggestion Nine: Involve key stakeholders in designing and reviewing problems together with assessing problem outputs

It is possible for a lecturer to design problems on her/his own but in my experience when a mixed group of stakeholders design the problems in small groups the problems are often very engaging, challenging and creative. The stakeholders that participated in problem design workshops I have facilitated included lecturers, post-doc researchers, workplace supervisors, professionals with different specialisms, recent graduates, students, librarians, education developers and education technologists. Students can be particularly gifted at designing problems that are engaging and up-to-date.

A key element in the problem design workshops is the peer-review of problems. When I facilitate the peer-review of the problems I use the following steps

1. Auto positive

I ask the team who designed the problem to give themselves positive feedback e.g. “What are you happy about in the design of this problem?”“ How will the problem facilitate student learning?”

2. Other positive

I then ask others in the workshop to give the team positive feedback and I join in on this discussion

3. Auto developmental

Next I ask the team to give themselves developmental feedback e.g. “How would you like to develop or improve this problem?”

4. Other developmental

Then I ask others to give the team suggestions for developing the problem and I join in on this conversation.

5. Final positive note

I end the review by highlighting the positive elements of the design of the problem.

Stanton and McCaffrey (2010: 47) outline an approach to facilitating a multi-stakeholder problem design workshop with the following suggestions:

- Identify briefs and elements for problems
- Identify and invite contributors
- Construct a preparation pack and send it to participants
- Set the tone
- Provide a keynote address
- Describe the context
- Explain the requirements for designing quality problems in different formats
- Construct small multidisciplinary groups
- Manage the groups
- Seek small group feedback
- Summarise the outcomes and experience with the whole group

Stop and Reflect

- What stakeholders do you plan to involve in your problem-design workshops?
- Why have you included these stakeholders and excluded others?
- How might you involve professionals from profit or non-for profit organisations in assessing your problem outputs?

What about students writing their own problems? On one part-time PBL management course academic staff and professionals from industry designed the first set of problems. In the second semester the students who were all mature students on a continuous professional development programme designed their own problems. I facilitated a writing group for doctoral students using a problem-based learning approach. All the students brought the current dilemma or problem they had with writing their doctoral thesis. We worked as a team on each of these writing problems. Then they did work on their writing and the specific chapter was then peer-reviewed by members of the writing group.

In the research study, Kate who designed problems for her postgraduate marketing programme said that she brought some people in from industry, including a senior executive from one of the biggest sales and marketing agencies in Ireland, and that this person was fascinated by observing students in a tutorial and amazed at the high standard of the end product they produced and the way the students worked. I worked with a culinary arts team who designed a PBL module. For their assessment they had to present their tender application to provide catering facilities for a chain of health clubs (which was a product they developed from working on a problem) to a panel that included a manager of a health club.

Suggestion Ten: Design inter-professional problems

As professionals work in inter-professional teams it is helpful that students have the opportunity to work on problems inter-professionally and consider problems about inter-professional teamwork.

Case Study of a Health Science Interprofessional Problem

In University College Dublin there is a “Collaborative Learning for Health Professionals “ module in Health

Sciences. Students from medicine, nursing, physiotherapy and diagnostic imaging, work together on health science problems. The aim of this module is to “encourage collaboration by educating students from different professions together” (Cusack et al 2012: 31). Problem-based learning has been found to be an effective method for students learning collaborative skills (Cusack et al 2012; L’Ecuyer et al 2015). The problems are about health issues, patient cases, teamwork and understanding the roles of different health professionals in patient care. Here is one of the problems the students worked on.

Figure 2.18 Problem 5

Oh……. I Must Have Grown Up!

Rathmines Community College,
Rathmines,
Dublin 6.

8th November 2015

Dear Aoife,

It was very nice of you to visit us in the school recently. We were delighted to hear that you achieved your goal and gained a place in UCD to study Medicine. We were all aware how hard you worked and it was without doubt a great achievement to succeed in gaining a place. We wish you well in your studies.

When we spoke recently I recall that you mentioned that you had selected a 'Collaborative Learning' module as your elective. I believe that you said that you were working with other students undertaking courses in a variety of programmes including nursing and physiotherapy.

As you know we have a Careers Day for all 5th and 6th Year students in November of each year and there is always a great interest in health related careers. Students always respect information delivered by their peers more so than by those of us who are have been out of the third level education loop for some time. I was wondering would you and your fellow students consider giving a short presentation describing the UCD Health Care Programmes represented by the group and giving the 2nd level students a flavour of how the programmes are similar and how they differ. I would be grateful if your group could explore how these programmes will prepare you for future employment.

I look forward to hearing from you.

Regards,

Peter Smith, BSc, H Dip.

Principal

Suggestion Eleven: Design problems connected to work placements

Many programmes have work placements and problems should be planned to link directly with other curriculum elements, including placements. Problems that are part of a pre-placement course can prepare students for some of the common challenges they may face in the work situation. In addition problems can be designed around issues of being a student on placement, work-based learning and supervision. Students can bring back problems from work placements to be worked on in class.

Suggestion Twelve: Design problems with professional ethics elements

We design multi-faceted problems that reflect the multi-dimensional nature of real-life problems. So as many professional problems have an ethical dimension then designers should be mindful to design problems with ethical elements. These can be mapped across courses to ensure that all the major ethical issues are addressed. Many countries have had major crises stemming from lack of ethical behaviour. PBL is fertile ground for students developing their ethical behaviour as they work through messy problems with many elements including ethical ones.

Suggestion Thirteen: Design problems to enhance empathy and compassionate action

Empathy involves sensing the perspective and feelings of another person, "understanding or reconstruction of another person's emotion" (Lussier and Richard 2007: 640). Developing empathy is key to effective communication in professional and personal life. Empathy is a pre-requisite for but not synonymous with compassion. "Compassion" is defined by the Merriam-Webster dictionary as a "sympathetic consciousness of others' distress together with a desire to relieve it". Compassion goes further than empathy as it includes a desire to relieve suffering. Compassionate action goes further again to involve responsive action.

Compassionate action can be future and globally orientated as well as present and individually or small group orientated. Gilbert (2010:16) stresses that it is also important to remember that:

> Compassion is not just about being reactive to things that have happened but also about 'trying to create' for the future and so problems can be designed about how we might live collectively given the limited resources the earth has.

In health care, empathy and compassion are vital as they improve patient outcomes, patients look for them and this leads to greater satisfaction for professionals (Derksen et al 2013). We need to be mindful to design problems to enhance empathy and compassion for students from all disciplines not just the health sciences. In different forms of professional practice and different aspects of social life it is vital to be able to see and feel a situation from the perspective of the "other" or the "customer" to be able to respond with this understanding, and to enjoy the resultant satisfaction (Barrett and Naughton 2016). Compassionate response has three dimensions emotional, cognitive and action. Salzberg (1995) deliberately uses the words "compassionate response" rather than compassion to highlight the key element of responsive action.

Case Study of a Problem about Compassion from a Nursing Module

A group of nursing lecturers who were working on designing problems for a module on caring, compassion and communication decided to use a sketch on one hand caringly touching another hand as a trigger to explore what compassion in nursing means. Shelly Barrett has drawn a similar drawing as an illustration

Figure 2.19 Hands, Shelly Barrett

Remember to include problems on self-care and self-compassion as well as compassion for others. The following video-clip is used widely as a trigger for work on compassion for others and self-compassion.

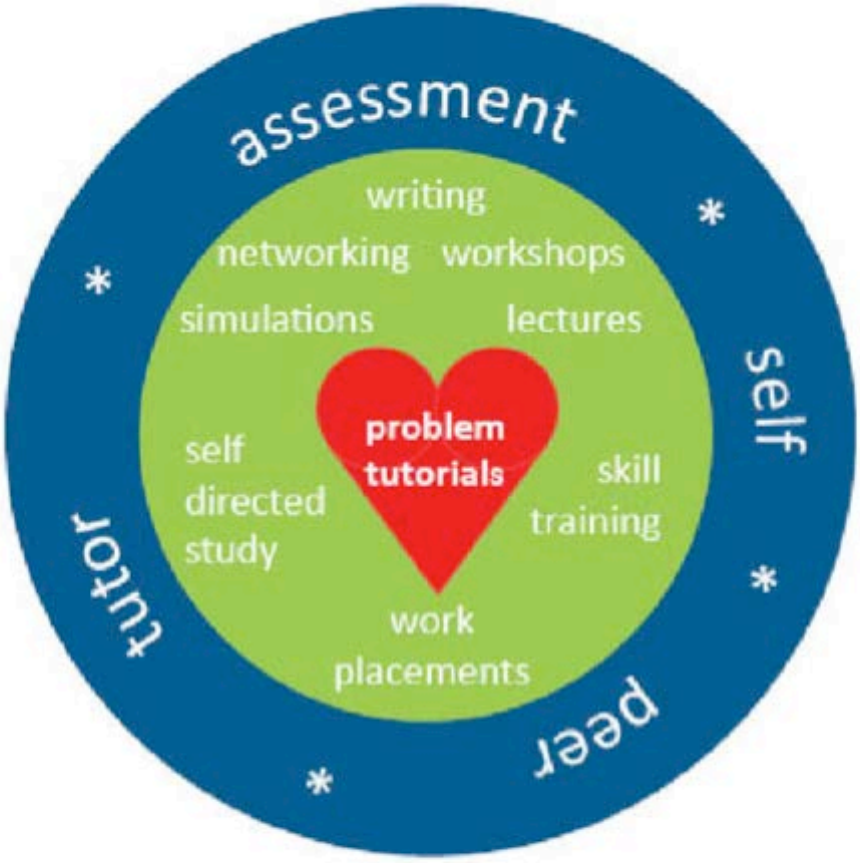
Figure 2.20 Cleveland Clinic Youtube Video on Empathy

Empathy: The Human Connection to Patient Care https://www.youtube.com/watch?v=cDDWvj_q-o8

Suggestion Fourteen: Plan the integration of the problems with the other curriculum inputs of the module/unit.

Some people think in error that a PBL module consists merely of students working in tutorial groups on problems. Rather it is crucial to view PBL as a total approach, where the problems drive the sequencing and content of other curriculum inputs e.g. skills training, lectures, workshops, research seminars, work placements, resource sessions etc. The heart of the PBL curriculum is PBL tutorials where students work on problems in small teams, but this is not the entire curriculum. The problems and the curriculum timetable need to be designed to prompt students to make links between the problems and the other curriculum inputs. Tutors and students can be presented with visualisations that encourage them to see the totality and coherence of the unit and to make connections between the different elements of the unit: the problem, other curriculum inputs and assessments.

Figure 2.21 A Total PBL Unit



Wagner et al (2007) argue that professionalism is also about the acquisition of a new identity in life with all the associated rights and responsibilities. The next section considers the identity development potential of PBL problems.

The Identity Dimension of the Problem as a Provoker of a Liminal Space

In the study, the participants talking about the problem, talked about being in a space between old and new ways of being in the world and old and new teacher identities. The space provided by PBL problems in the module encouraged active learning by the participants, who were interested in the problem as *their p*roblem. They explored their identity and their sense of being, at many levels, including being a PBL student, being a lecturer, being in higher education and being in the wider world.

Participants not only engaged with the problem in terms of knowledge but also in terms of their identities, their sense of being. One team moved from seeing the problem as "their" problem, "about them" to seeing the problem as "our" problem, about "us."

Mary: I just wonder how much of it is about the change in us in our…is it about us or is it about them, I just have this problem. Are we calling this, is it about what we are going to learn or is it about what we are going to try and reorganize for the students. I don't know whether to posit this in terms of what <u>we</u> as a group are going to learn or what we are going to produce.

Noel: In a way we are the students. We are going through the process for the first time.

Identity is about positioning and this positioning happens through language. The Glendalogh team talked about the problem in terms of "about them" versus "about us". Identification is one of the major types of text meaning, in terms of people expressing their "ways of being " in the world (Fairclough,

2003, 27). Pronouns are associated with the dimension of solidarity or social distance in social life (Brown and Gilman 1960). The use of “them” implies greater social distance than the solidarity expressed by “us”. The participants were talking about the problem being about “them” and about “us.”

I think that problem-based learning has been used well for knowledge and professional development. However identity development has not received the same attention and level of discussion. Betty stated that curricula should provide spaces for students to engage with “the inner concept of themselves” and argued that curricula in professional education should also be about self - awareness, self- development, and the management of self. Further, Betty argued that it is important that higher education should focus on enabling students to develop their sense of self; that is, to have the space to become and to know who they are. Being aware of how they present themselves to others in their everyday working life and of what is happening when they are getting on, or not getting on with people are key elements in this process. She argued that students should not just learn specific work processes but should know these work processes in such a way as to be able to adapt them to their personal styles.

Betty: I think you mentioned something that is quite important, it’s that inner concept of themselves. I think that is really, really important in any discipline, in architecture, in design. Where you know the processes you work through, you know how you get on with people, or not. And being able to counter that or to be able to see yourself within that context is very important.

The participants talked about how the debate of professional development and personal development was still being worked through in their practice and had been influenced by their experience of the PBL module. At the participant validation session where the team was presented with the data analysis, Beatrice elaborated:

> I think a lot of the time design courses have been very directive. A lot of the time you would see the hand of the tutor all over the work…I'm sure it happens with writing theses. Having been through that system myself, I don't think it has the interests of the student at heart, it has the interest of the tutor at heart… And you made the point further down that what people are most interested in is themselves and their personal development. And, eh, I think that is true. That's another part of it you actually give it over to the students and let them….

For me, seeing the "hand of the tutor all over the work" at a final year art and design exhibition is obscene and the opposite to the tutor encouraging students to develop their own sense of identity and style as an artist. Beatrice talked about using ill-structured, open-ended PBL problems with her design students in a way that gave them space to become more self-aware and to develop their own style rather than imitating the tutor's style.

Questions of identity are so crucial: Who am I? What do I value and why? How can I express my values and identity at work? What type of a professional and person do I want to be? What styles of working do I prefer? How is the identity of my profession changing? How is my national or international identity important to me? Here are some suggestions for you to choose from for consciously designing problems so that students engage in identity work and for maximizing the potential of problem-based learning for identity development.

Suggestions for designing problems to maximise the identity dimension

Suggestions for designing problems to maximise the identity dimension

15 Write students into the problem so that they identify with the problem
16 Design problems about career development and job seeking
17. Include problems about the identity of new disciplines/therapies/ professions or the changing identity of professions
18 Design problems about issues of national or international identity

Suggestion Fifteen: Write students into the problem so that they identify with the problem

One way of helping students identify with the problem is writing students into the problem in their professional or student role. In the module of the study one of the problems began with “Your professional body…” Other examples of this approach are “You are a third year student on placement and….” “ As a group of consultants you have been asked to… “Your manager has requested that…” ”You are a project team that…” “Your team have chosen a particular approach and style…”

Suggestion Sixteen: Design problems about career development and job seeking

Problems can be designed to give students spaces to explore what type of professional, creative person or team member they want to become and what their individual emerging areas of interest, specialism and style are. Students are concerned about employment and career issues. Problems on these topics can provide them with the space to explore these key issues and to learn from researching them and discussing them with their peers. These can include problems about searching for a job and different job opportunities. They can be embedded in professional practice and other courses rather than left totally to the careers service. Research has indicated that problems about

career interest promote motivation and engagement with the PBL process (Hung 2016).

Suggestion Seventeen: Include problems about the identity of new disciplines/therapies/ professions or the changing identity of professions

Furthermore, problems about the nature of new disciples/ professions/ and the changing identities of specific professions internationally can be designed.

Case Study of a Problem about the Identity of Equestrian Assisted Therapy

Barbara Murphy designed a new module on equestrian assisted therapy at University College Dublin that is an open elective and includes agriculture, physiotherapy and psychology students. As this is a relatively new therapy the first problem was about understanding the nature of equestrian assisted therapy. Equestrian assisted therapy offers innovative, holistic approaches whereby the horse acts as a medium in the support of clients with special therapeutic and learning goals. The students receive the following pictures in a progressive disclosure mode one after the other.

Figure 2.22 Problem 1

What's next….?

Suggestion Eighteen: Design problems about issues of national or international identity

For many people there are links between their professional identities and their national or international identities.

Case Study of a Problem About the Role of the Forests in Finnish National Identity

In Finland the forests are key to national identity. At the Finnish workshop the forestry group decided to write a problem about the history of Finnish forests and society.

Figure 2.23 Abstract of Forest and Society Problem by Eveliina Asikainen, Tampere University of Applied Sciences

The problem begins with a visit to Seitseminen National Park, in Finland. In the heart of the park there is an old forest ranger's cottage, made of logs, furnished and equipped in early 20th century style. The ranger plays the part of a tenant working for the landlord and cultivating his own fields as best he could.

We start the visit by taking the students to the biggest room of the cottage and start a play.One of the teachers plays the forest owner who has started a sawmill an demands greater amount of work and logs. The tenant is concerned about the work should do to get wood to fix the wooden fences etc. His children are around eating porridge with wooden spoons from wooden bowels. The landlord shows his new axe for marking the trees to be cut and marks the trees telling the tenant what to do commanding him to follow.irritated but helpless the ranger follows.

After a little while an artist and a poet enter the cottage asking to stay a while and follow the everyday life in the cottage. They are interested in the simple toys, and all wooden everyday items around. The tenant's wife wonders what all this is about but finds some room when the guests are prepared to pay and they show some food they have brought with them. We play some Sibelian music in the background.

Eveliina explained that in the late 19th and early 20th century there was a national romantic era when artists, composers (including Sibelius) and authors travelled the Finnish countryside and recorded their observations as paintings, music, poems and novels. Some of them also collected the folklore. At the same time it was the beginning of the industrial use of wood. She explained that after this the students begin the brainstorming and setting the learning objectives and that they continue the day in the National Park discussing the local developments and investigating the forest statistics, the changing presence of forest in culture etc.

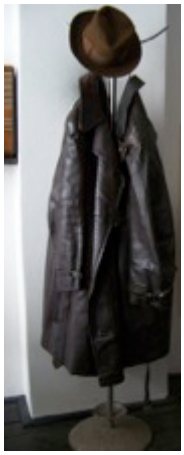
Stop and Reflect

- What are your ideas about which identity issues are key to your student groups and why?
- How will you design new problems to maximise the Identity dimension of problems in your context?

Conclusion

Problems can be very useful as a hook to hang knowledge on and a way of learning knowledge in context. However thinking of *the problem as a provoker of a liminal space* with three dimensions of knowledge, professional action and identity maximes the potential of learning from problems more. It is a concept that can inspire us to design problems focusing on one, two or three dimensions and the interconnections between these dimensions. It makes me think that a web that weaves many strands together is a more effective metaphor for problem design than a hook to hang knowledge on. The web is touched by the sunlight and we hope that students will gain memorable insights from working on the problems we have designed.

Figure 2.24 Problem design metaphors:



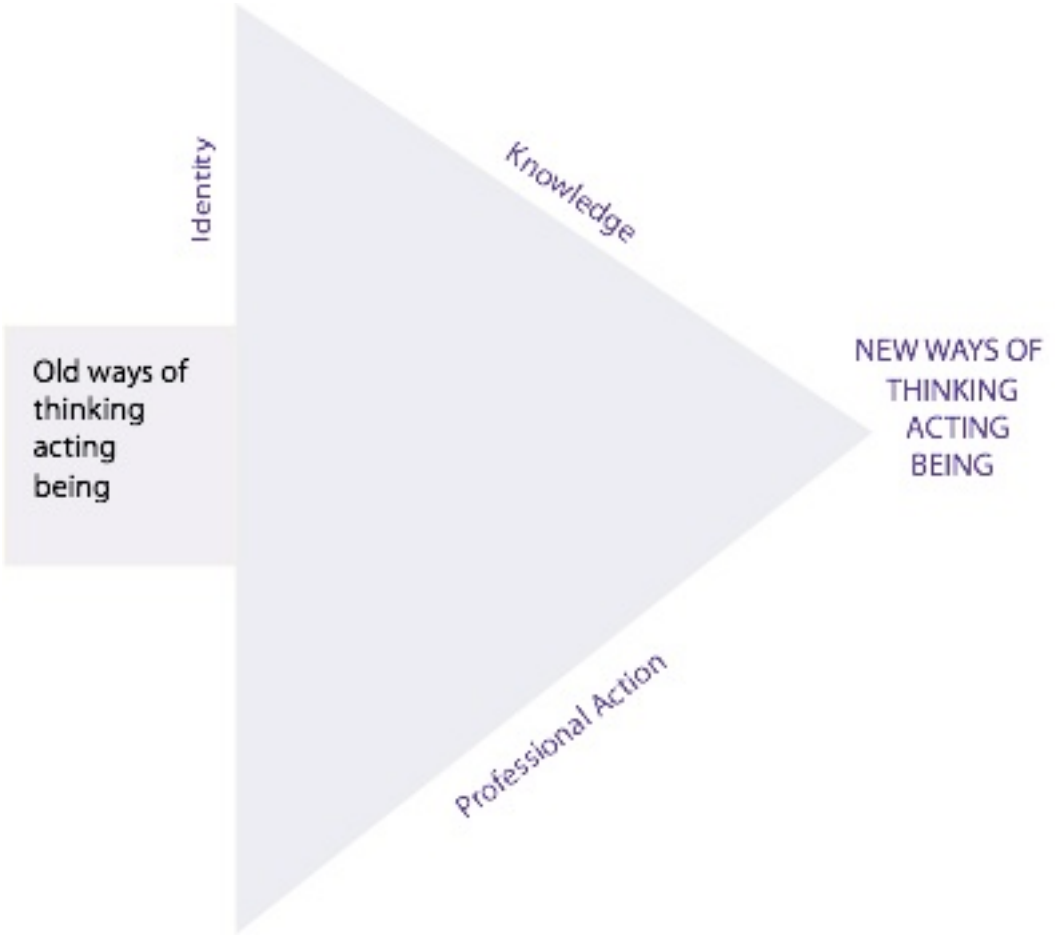
A hook to hang knowledge on or a web to weave personal knowledge of concepts, professional actions and identities ?

Vogna (2012)

Verihel (2005)

A well-designed set of PBL problems can provoke liminal spaces between 1) current levels of knowing and new levels of knowing, 2) habitual forms of professional action and forms of professional action new to the learner and 3) satisfaction with current identities and a desire to explore other possible identities. The illuminative concept of *the problem as a provoker of a liminal s*pace is a three dimensional concept.

Figure 2.25 The Problem as a Provoker of a Liminal Space: A Three Dimensional Concept, Terry Barrett



This chapter goes beyond Barnett and Coate's (2005) model of the engaged curriculum by elaborating practical ways in which problem design can lead to new ways of knowing, acting professionally and being. Conceptualising the problem as a provoker as a liminal space has led to practical suggestions for designing problems. And so I summarise the eighteeneen suggestions for problem design for you to choose from in the following figure.

Figure 2.26 Suggestions for problem design

Dimensions	Suggestions
Knowledge 	1. Design problems around threshold concepts 2. Identify the learning outcomes, key topics and core transferable skills that you wish the problems to address for a given module/unit/programme 3. Design somewhat ill-structured problems 4. Design problems that encourage students to explore the interrelationship of concepts/dimensions/models/theories
Professional action 	5. Design a set of problems with an awareness of the range of problem types 6. Design problems in a range of media 7. Push out the boundaries of what constitutes a “real-life” problem 8. Combine problem-based learning with action learning 9. Involve key stakeholders in designing and reviewing problems together with assessing problem outputs 10. Design interprofessional problems 11. Design problems connected to work placements 12. Design problems with professional ethics element 13. Design problems to enhance empathy and compassionate action 14. Plan the integration of the problems with the other curriculum inputs of the module/unit
Identity 	15. Write students into the problem so that they identify wit the problem 16 Design problems about career development and job seeking 17. Include problems about the identity of new disciplines/therapies/ professions or the changing identity professions 18. Design problems about issues of national or international identity

Further Resources

Here is a list of some resources that you might like to choose from to work with your tutors, students and other stakeholders in designing problems

Sample PBL problems

University of Deleware, Problem-based Learning Clearinghouse

http://www1.udel.edu/pbl/clearinghouse/problems/

Threshold concepts

Threshold Concepts: Undergraduate Teaching, Postgraduate Training and Professional Development: A short introduction and bibliography
This website includes an extensive bibliography of both generic and discipline specific resources on threshold concepts complied by Mick Flanagan
http://www.ee.ucl.ac.uk/~mflanaga/thresholds.html

Empathy and Compassionate Action

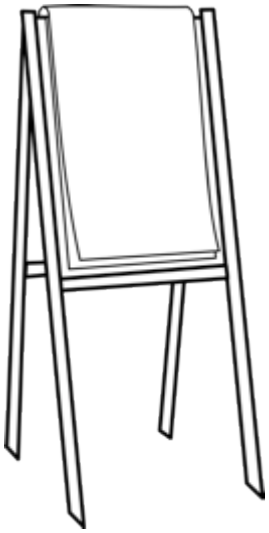
Centre for Compassion and Altruism research and Education – Stanford University
Research papers, videos, wiki and blog
http://ccare.stanford.edu

Empathy and Compassion In Society
Includes video presentations of keynotes from
conferences for professionals in education, health and social care
http://www.compassioninsociety.org

Concept maps

Novak, J. D. and Cañas, A. J. (2008) *The Theory Underlying Concept Maps and How to Construct and Use Them.*Technical Report. Institute for Human and Machine Cognition, Pensacola
http://eprint.ihmc.us/5/2/TheoryUnderlyingConceptMaps.pdf

Action Plan



On your own and with your team think of a specific problem-based learning initiative you are currently designing or re-designing

- How has your thinking about the nature of problems in PBL changed or been enhanced?
- What specific suggestions for problem design do you think would be most appropriate for expanding your students' knowledge, professional action and identity development?
- What are your ideas for adapting these strategies for your contexts?
- What additional suggestions would you suggest? Why?
- What further reading or resource viewing have you been inspired to follow-up?

A PBL Practitioner's Response by Marja-Leena Lahteenmaki

Response to the chapter (and the workshop) by Marja-Leena Lahteenmaki, Principal Lecturer TAMK University of Applied Science, Tampere, Finland

Thank you Terry! You helped us to create problems in new ways using different media. You refreshed our ways of writing more enjoyable and challenging problems as starting points for the learning processes.

We had started to work with threshold concepts already a bit earlier. You gave us encouragement to create more problems focused on them and that way to support students to cross over the liminal spaces. I would also add that it is important to ask students at the end of a module what threshold concepts they have learned and how they have learned them. I do this and find it very useful.

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Chapter Three

Possibilities for promoting student dialogue and learning in tutorials

Introduction

PBL Practitioners' Vignettes

"Terry, let's plan to do some staff training for my PBL tutors for the PBL component of my statistics module with 100 students. They will be working with me as roving tutors in one large active learning room"

Jon Yearsley, Assistant Professor, Biology, University College Dublin

The practice strategies for effective tutoring discussed in that workshop are explored in this chapter. Some of the materials used in this workshop together with the responses of the workshop participants to two of the PBL tutor-training activities are presented.

"Terry, I realised I was cramming for preparing for lecturers. I want the students to engage intensely in their own learning."

Tara Cusack, Associate Professor, Physiotherapy Lecturer, University College Dublin

This chapter discusses the possibilities for students constructing their own knowledge and learning from one another in tutorials. Tara is module co-ordinator for a number of PBL modules. She draws on her experience of PBL leadership and tutoring to write the response at the end of this chapter.

Chapter Overview

This chapter will help you to:

- Think in new ways about how you as a tutor can help students to create knowledge together in PBL tutorials
- Use a new inspiring concept to shape some of your approaches to facilitating PBL tutorials
- Deepen your understanding of the PBL tutorial by making links with Paulo Freire's ideas
- Choose from a range of practical possibilities for promoting dialogic knowing in PBL tutorials
- Adapt these strategies for your specific contexts
- Use questions, triggers and further resources to develop your approach to tutoring
- Compile additional resources such as a PBL process guide to enable your students to become more independent learners.
- Decide on resources about the PBL tutorial to include in tutor and student handbooks

You bring your experiences of learning through dialogue as a student, teacher friend and family member to the reading of this chapter. So begin by tapping into some of this understanding from your prior learning,

Stop and Reflect

Think of a memorable good conversation you had with a group of people where you learnt something new.

- Why was the conversation so memorable?
- What made it a good conversation?
- How did you feel?
- What did you know after the conversation?
- How did you get to know this?
- Who was in control of the conversation?

Problem-based learning Tutorials

Problem-based learning tutorials are the pivotal learning site in PBL. In the first tutorial students are presented with a new problem/trigger. They discuss what they know about the problem, use their prior knowledge and brainstorm their ideas and define the kernel of the problem. A key part of the first tutorial is for students to name what they don't know as learning issues. I encourage students to phrase these learning issues as questions. Some people decide that all the students study all the learning issues decided by the team; this is often in undergraduate programmes. In some other situations, e.g. postgraduate programmes, sometimes all students study the one or two major learning issues as decided by the team, and they divide up the other learning issues. A third option is for all the learning issues defined by the team are divided amongst the students. It is key that the programme/module team have a clear rationale for which approach they are using and that the expectations are made clear to the students.

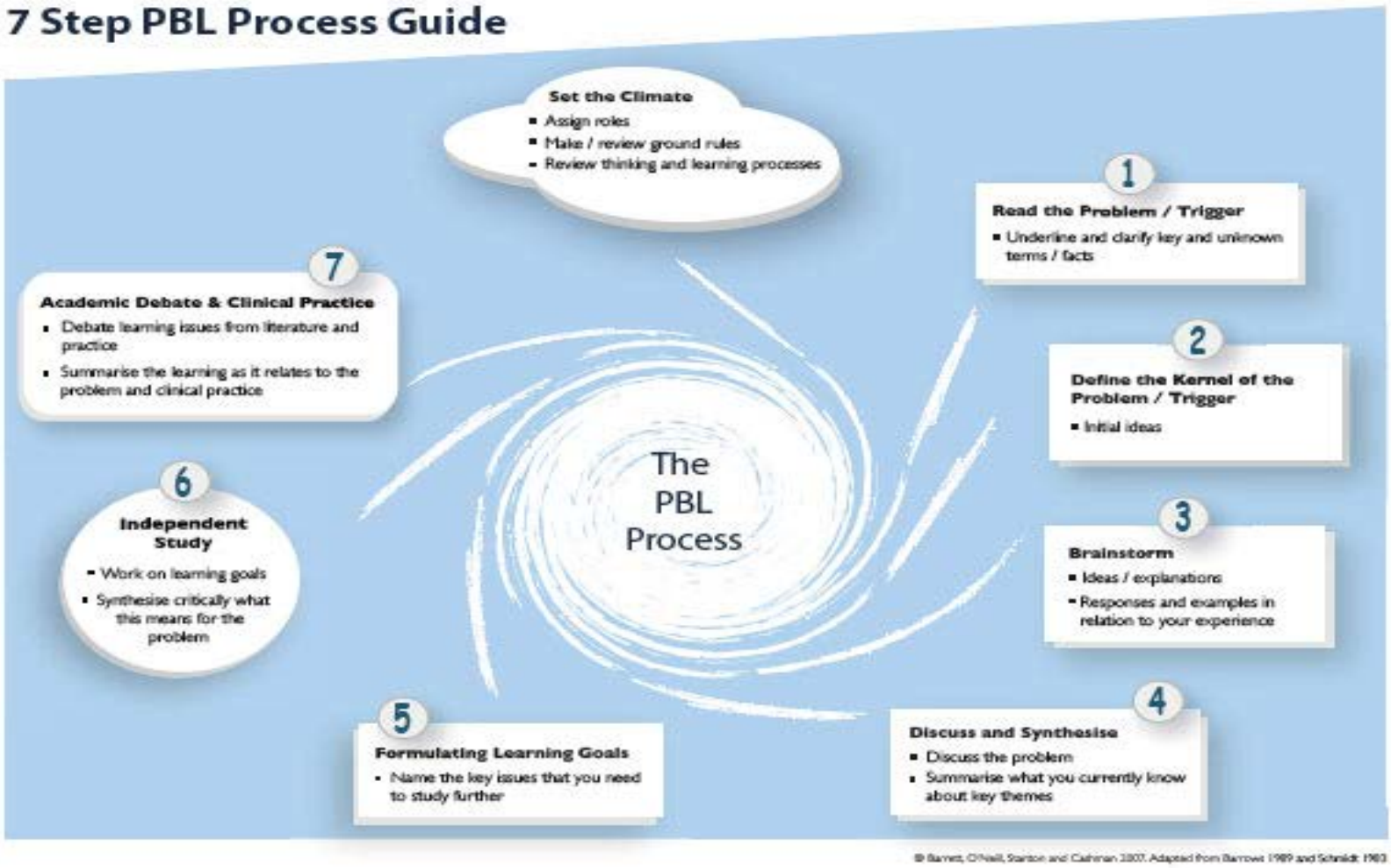
Students then come back to a second tutorial. A useful starting point for the second tutorial is the learning issues phrased as questions. At this tutorial students share what they have learnt from their independent study about the learning issues. They co-construct their knowledge through co-elaboration. The review phase, at the end of the tutorial is important to give time to, so that both the process and the knowledge acquisition can be evaluated. I often phrase one specific question either about knowledge or process to be the focus of the review phase. In PBL there has to be a minimum of two tutorials and one independent study period for each problem. Some modules have two tutorials per problem with other modules having several tutorials on larger problems. In some cases there is one tutor per PBL team, in other cases there is one or more roving tutors roving between two or more groups.

PBL is not simply giving students a problem and just expecting them to get on with it. Rather, there are three key elements that combine to provide an important scaffold for the learning process, namely:

1) The PBL process guide
2) The facilitative role of the tutor and
3) The specific student roles

It is very useful to give the student a process guide that they can use to help them with seeing the steps of working on the problem. This process guide can be guided by the seven-step approach (Schmidt 1993) and adapted to the discipline and context of your students. Here is a process guide Marie Stanton uses for students doing a masters programme in ultrasound.

Figure 3.1 Marie Stanton PBL process guide used in a masters programme in ultrasound



This seven step learning process mirrors the research process. The research-based process of PBL emphasises students experiencing the cycle of research, from defining research questions to evaluating research evidence (Healey and Jenkins 2006). It is therefore a very congruent process for developing evidence-based professional practice. In PBL the reasons why there are specific tutor and student roles is to give the responsibility and the ownership of the learning to the students and to provide a scaffold for deep learning from their research and discussions. The practice of taking on the different roles e.g. chairperson, scribe etc. also builds students capacity for effectively taking on roles in teams in the workplace.

The Role of the PBL Tutor

The PBL tutor works as a facilitator of the PBL process, encouraging all students to talk about the problem, engage in high quality independent study, justify their ideas and arguments and create new knowledge together. It is vital that tutors and students have opportunities to understand and discuss the tutor role and the student roles. I give them the following as handouts.

Figure 3.2 The role of the tutor in PBL (Adapted from Barrett and Moore 2010, 10-11)

The role of the tutor is to:

- Encourage a welcoming, warm and challenging learning climate
- Organise the physical learning environment in a way that is conducive to teamwork
- Facilitate the PBL process so that students move through the various steps
- Ensure that the students (not the tutor) name the learning issues, that is the students' role
- Listen very attentively, actively and mindfully to what students are saying
- Observe the learning and challenges, enjoyment and frustration that are taking place in the team
- Intervene, where appropriate, with process interventions based on this listening and observation
- Expect students to be responsible to complete high quality independent learning and communicate this clearly to them
- Ask questions that encourage critical and creative thinking

- Ask students to provide the evidence for their statements
- Ask students to evaluate the resources that they used
- Challenge students to link theory and practice
- Stimulate debate about major issues
- Facilitate students to reflect on their learning, the development of key skills, and the performance of the team
- Confirm the team as a whole and individuals for particular inputs, strengths, gifts and high quality work
- Give feedback to the team on their performance, acknowledging high-level performance or challenging them to improve performance
- Resist the temptation to give a mini-lecture
- Observe the actions of the teams at a meta-level, seeing where they are in terms of the PBL process, their work on the problem and linked deliverables and timescales and make appropriate process interventions
- Facilitate the review process at the end of the tutorial

Student Roles in PBL Tutorials

In PBL various students take on different roles (in addition to contributing to the team through discussion and independent study) in order to help move the learning process forward. These often include chairperson, scribe, reader, timekeeper and observer.

Figure 3.3 Student roles in the PBL tutorial (Adapted from Barrett and Moore 2010, 10-11)

The role of the chairperson is to

- Encourage the participation of all team members
- Facilitate democratic social relations and democratic decision making, not being the boss nor making decisions
- Facilitate the team to make and work within agreed ground rules
- Stop one person dominating the group and encourage quiet team members to contribute.
- Avoid always talking first and talking at length.
- Encourage discussion of different viewpoints and welcome debate
- Encourage everyone to work on the learning issues and to contribute in ways that maximise prior learning, specific talents and different sources of information
- Use the PBL process guide as a scaffold for the team to work on the problem
- Ensure that someone summarises at the end of a tutorial.
- Check that everyone is clear what learning issues the team has

decided to research and that these are clearly phrased as questions
- Ensure that the team has a clear action plan
- Co-ordinate the team to complete their agreed action plan and the development of any products required for the work on the problem
- Encourage the team to review or add to ground rules as appropriate
- Monitor, summarise and feedback to the team the progress to date and work left to do on the problem

The role of the scribe/recorder is to:

- Record the ideas of the team on the whiteboard so that this information can be used as a shared learning environment
- Record the learning issues that the team decide to work on clearly and phrase these as questions
- Work both verbally and visually on the whiteboard and invite other team members to write on the whiteboard if they want to illustrate points
- Summarise and synthesise the learning from the problem on the whiteboard as all team members contribute to this synthesis.
- Co-ordinate electronic team communications effectively and efficiently in modes agreed by team members
- Make sure that he/she inputs his/her ideas and research and don't just record other students' inputs

The role of the reader is to:

- Read the problem aloud at the start of the tutorial, reading text, visuals etc.
- Re-read the problem again when the chair / team member /or the reader decides that this would be useful
- Encourage the team to read the problem to themselves quietly again before they start the work on their independent study
- Continue to read the problem in the deeper sense of the word by drawing the team's attention to key elements/words/deliverables of the problem

The role of the timekeeper is to:

- Help the team to manage the time in tutorials
- Remind the team at key stages about how much time is left in the tutorial
- Make suggestions to the team about prioritisation and time management

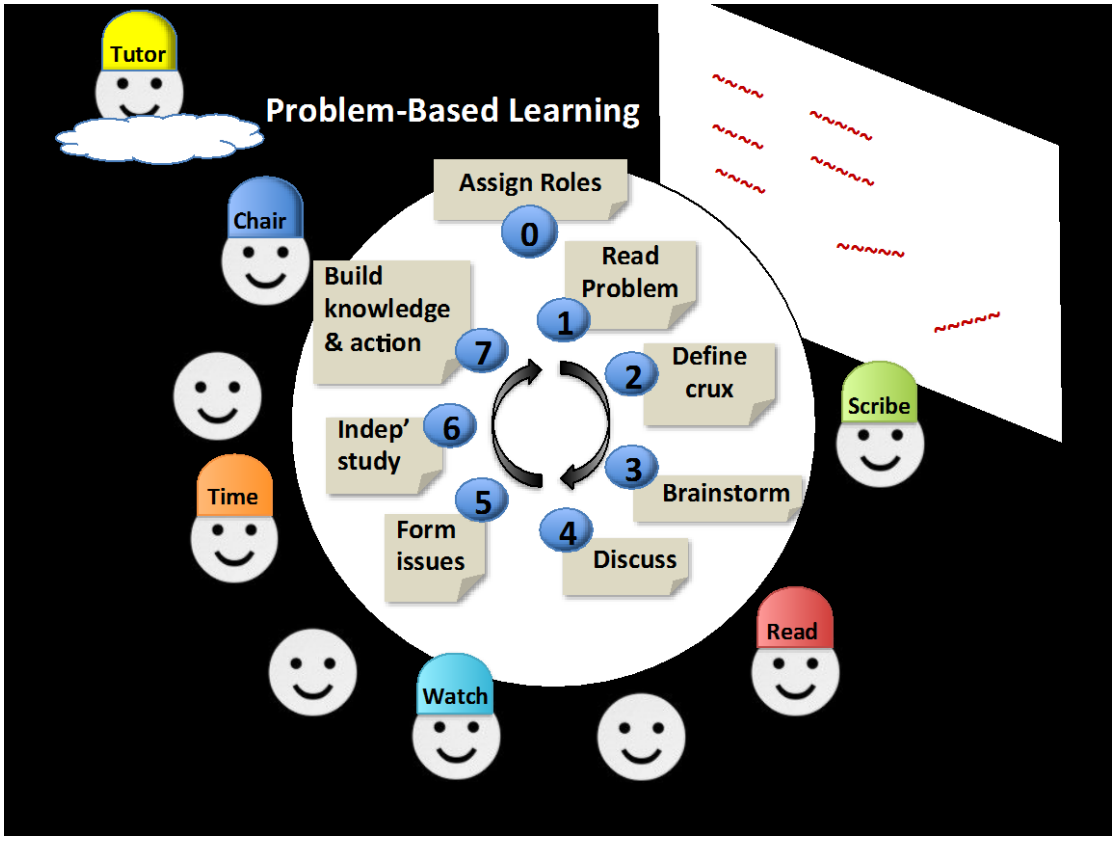
The role of the observer is to:

- Observe the workings of the team in terms of the learning process and team dynamics and the design and completion of outputs
- Feedback these observations to the team in terms of strengths and areas for development
- Make suggestions based on these observations.

These roles are the common student roles used in PBL but are not fixed or exhaustive. Teams may choose to assign other roles, e.g. project co-ordinator, editor, devil's advocate, etc. but if they do so, make sure that the responsibilities of the role are clear. Others choose to give students roles that correspond to different professional roles and/or perspectives. For example, Langford Korin and Wilkerson (2010) outline an approach used in medical education where students have the traditional student roles for the first tutorial until the point where the students are ready to finalise the learning issues. Then in order to see the problem from the perspective of the patient and all members of the healthcare team students take on the following roles: patient, the patient's student physician-presenter, postgraduate trainee-patient educator, attending physician, evidence based consultants and guideline consultant.

It is advisable for students to stay in the same roles for at least one problem so they develop their understanding, practice, follow-through and responsibility for the role. Over time students will develop their abilities to perfom the different roles. Students staying in the same teams for at least one module, helps them to develop effective ways of working together.
Jon Yearsley gave the following visual to the tutors during tutor training and to the students during the induction to the module to illustrate the student roles in PBL tutorials and the role of the roving tutors.

Figure 3.3 Jon Yearsley Key Roles and Steps in the PBL Process with Roving Tutors



The Neuroscience of PBL Tutorials

Understanding three neuroscience concepts namely neuroplasticity, shared attention and mirror neurons provide us with key ideas for understanding how the brain works and how to enhance learning in PBL tutorials. The concept of neuroplasticity points to the factual ability of the " brain and nervous system to adapt and change as a result of training and experience over the course of a learning experience" (O'Connor 2012: 4). As thousands of new neurons are being born each day it is important that tutors challenge and stretch students and encourage them to make connections in their learning (Sadlo 2011). So with repeated engagement in PBL the brain can change itself.

Attention is key to learning. In PBL tutorials the team engage in *shared*

attention with the target being the learning needed to resolve or manage the problem (O'Connor 2012). The discovery of mirror neurons in the brain is crucial to understanding optimising learning in teams. Hence the importance of the PBL tutor modelling active listening, and asking critical questions together with facilitating students making connections in ways that integrate their learning. Students will then mirror some of these behaviours. Mirror neurons enable students to read their fellow team members, a vital skill for teamwork in professional practice (Sadlo 2011).

The illuminative Concept of the PBL Tutorial as a Potential Site for Dialogic Knowing

Before exploring how to facilitate PBL tutorials it is important to explore why we facilitate PBL tutorials, that is to promote deep learning and students engaging in dialogic knowing. I derived the illuminative concept of the *PBL tutorial as a potential site for dialogic knowing* from analysing students conversations in tutorials and from an understanding of Freire's (1972) concept of dialogic knowing. What does dialogic knowing mean? Why is it crucial? How is the PBL tutorial a potential site for dialogic knowing? How can this potentiality be realised?

As PBL tutors it is crucial that you understand what dialogic knowing is and facilitate this happening in tutorials. You will be able to do this because you will have a deep understanding based on research and theoretical perspectives as well as your own practice. You will not just be technically following a few pointers but will understand that you are aiming to foster a dialogue between the students that promotes new learning and this is the rationale underpinning the practical strategies you choose to use.

The Philosophy of Dialogic Knowing in PBL tutorials

Freire's concept of dialogic knowing best captures the nature of learning from one another in a PBL tutorial through working on a common problem or object. Dialogic knowing is the means by which people create and recreate

acts of knowledge together as “dialogue unites subjects together in the cognition of the object that mediates them ” (Freire 1985: 49).
From this perspective dialogue is much more than a technique, it is a position or stance that sees knowledge as not something possesed by the teacher and static but something that is made and remade dynamically by students in tutorials through dialogue. This dialogue can promote learning through the waves and oscillations of the conversations in PBL tutorials.

> What is dialogue in this way of knowing? Precisely this connection, this epistemological relationship, the object to be known in one place links the cognitive subjects leading them to reflect together on the object. …Then instead of transferring the knowledge *statically,* as a *fixed* possession of the teacher, dialogue demands a dynamic proximation towards the object (Shor and Freire 1987:10).

Freire’s elaboration of dialogic knowing provides us with a strong philosophical foundation for the purpose of PBL tutorials. The vital thing is to get students to think and to talk to one another. A key role of the tutor is to get the student dialogue going well.

It is interesting to look at what the word dialogue means in general and in the specific context of PBL tutorials:

> The Greek compound word *dialogos* means ‘conversation between two people, and is associated with the pursuit of knowledge (reason, argument, discourse). It also has a connotation of *difference* (*dia* as ‘apart’): the two or more who partake in dialogue are separate and distinct as individual beings, as speakers and as thinkers, but the conversation brings them together and fashions a unity of process through their joint engagement. Dialogue is an unfolding process, a search or quest for knowledge and understanding…….. (Rule 2004:320).

Rule (2011:930) asserts that “Freire argues that dialogue does not eliminate difference but troubles it, engages it, in an attempt to deepen understanding” For Freire the horizontal relationship of dialogue (rather than vertical relationship of anti-dialogue) is centre stage in education: “Without dialogue there is no communication, and without communication there can be no true education” (Freire 1972: 65). The practical possibilities in this chapter have

arisen from listening to the dialogue of PBL students in tutorials and in understanding Freire's concept of dialogue. These possibilities thus represent an applied philosophy of making dialogic knowing a reality in PBL tutorials.

Three Dimensions of the PBL Tutorial as a Potential Site of Dialogic Knowing

I have three crucial interrelated arguments about dialogic knowing in PBL tutorials. Firstly, dialogic knowing has to be *constructed* discursively in the language of the conversations of the tutorials; it does not happen *automatically* in PBL tutorials. Just because you design a PBL initiative, write problems and put students into small teams with a tutor does not mean *per se* that dialogic knowing will take place. Rather dialogic knowing can be constructed through:

1) A movement towards more democratic social relations
2) The co-construction of knowledge through co-elaboration and
3) The relinquishment of individual control and the embracement of shared control of PBL tutorials and the products produced

Students have to actively make dialogic knowing happen in tutorials and the tutor has a key role in facilitating this.

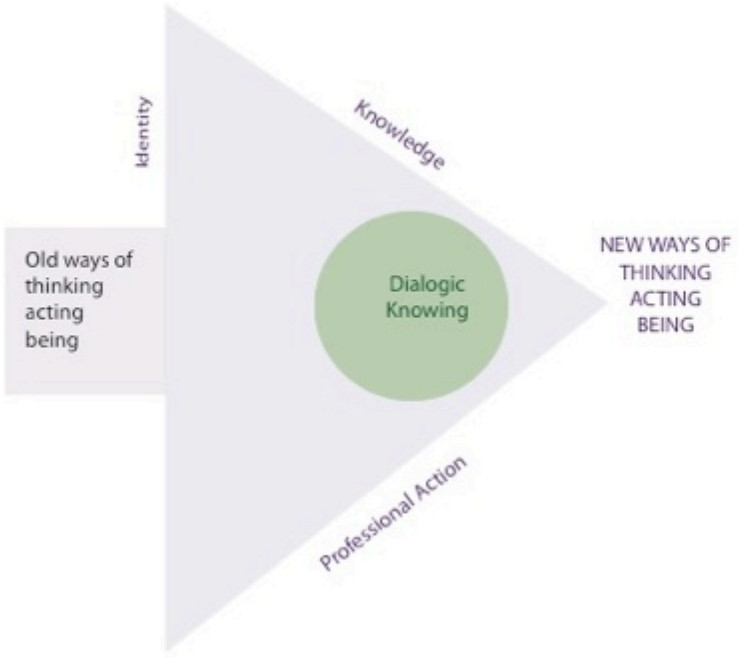
Figure 3.4 The PBL tutorial as a potential site for dialogic knowing
Terry Barrett and Shelly Barrett

The second argument is that understanding the *three dimensions of the PBL tutorial as a potential site for dialogic knowing*, will encourage you as a tutor to use the tutorial site for realising dialogic knowing. Thirdly, combining understandings from how students talked about the PBL tutorial with Freire's concept of dialogic knowing provides inspiring ways of realising the potential of the PBL tutorial for dialogic knowing. These ways of realising dialogic knowing are presented as practical *possibilities* for facilitating PBL tutorials, for you to choose from according to your contexts.

In chapter two the concept of the problem as a provoker of a liminal space was elaborated. The problem provokes betwixt and between spaces between old states and new states. PBL problems provoke liminal spaces between 1)

current levels of knowing and new levels of knowing, 2) habitual forms of professional action and forms of professional action new to the learner and 3) satisfaction with current identities and a desire to explore other possible identities. PBL students move within and beyond the liminal spaces prompted by the problem in different ways. This chapter focuses on one of those ways of learning and growing in a liminal space, that is, students engaging in dialogic knowing in the PBL tutorials. (see figure 3.5) The last chapter focused on the PBL problem, this chapter focuses on the PBL tutorials where students work together on the problem. I have developed my earlier ideas about the PBL tutorial and dialogic knowing (Barrett and Moore 2010) both theoretically and practically by elaborating twenty-one practice strategies.

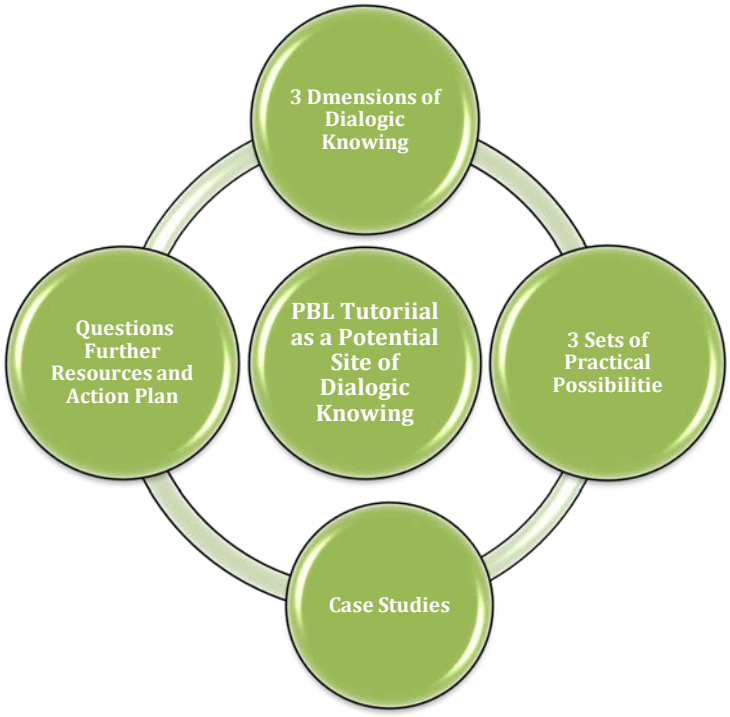
Figure 3.5 Learning in a Liminal Space through Dialogic Knowing in PBL Tutorials



Chapter Structure

This chapter pivots on the idea that dialogic knowing is the key purpose of the PBL tutorial. Firstly, each dimension of this illuminative concept is discussed in turn, in terms of the research on students talking about this dimension (Barrett 2008). The students were lecturers working on problems about problem-based learning.The two teams of students have been given the pseudonyms of the Skelligs team and the Glendalough team and the students were also given pseudonyms. Secondly, a set of practical strategies for developing each dimension in tutorials are presented and discussed with examples. Thirdly, some case studies are explored. Fourthly further resources and questions will also help you to make an action plan for developing your tutoring

Figure 3 .6 Chapter structure



Movement towards more democratic social relations

The first dimension of dialogic knowing is movement towards more democratic social relations. Democratic social relations means that there is a

level of respect, openness, reciprocity and equality that facilitates the students to actively listen to other students' ideas and to freely express their own ideas, so that they can all contribute to the problem. It may seem obvious that democratic social relations is the first necessary step in creating dialogic knowing, but it is less obvious how to maintain these democratic social relations throughout the tutorials of a PBL module. This section begins by looking at how students in the study talked about movement towards more democratic social relations. Then practical strategies for promoting democratic social relations are outlined and illustrated with case studies

Listening to students' talk about movement towards more democratic social relations

The movement towards democratic social relations means a shift toward lower levels of social hierarchy and lower levels of social distance. Frank, the chairperson of the Glendalough team t talked about democratic social relations in terms of:

Em, free expression, collective responsibility.

The Glendalough team talked about the PBL tutorial in terms of movement from a traditional committee meeting genre towards the PBL tutorial genre**.** The following extract is from the opening minutes of an early tutorial of the module and shows a traditional committee meeting genre. It also shows some language that is not part of the traditional committee genre but rather the language of the PBL tutorial. The first tutorial began with a long monologue by the student chairperson, Frank

Frank: If I could say just a few words, I do write speeches and then don't say them but em just to kick us off, the thing that I am very aware of I think, I am very task orientated. I would be very aware of the time scale we have. .... We need to be aware of the group rules and keep

reminding ourselves, try and be honest. ..Em, free expression, collective responsibility that touches on what I said before. Once we make a decision or once we are heading in a direction lets stick with it.... And if someone has a problem with the way we are going just say it to me maybe after a meeting or some other time, if you think there is something radically wrong. A few things that I normally say at these stages for getting the ball rolling is that failure is not an option. Em. we need to produce a product we need to agree what the product is etc. We won't fail, we will do a good job and that is what we are going to do here. Em, what I would like to see at the end of the day is a good product produced. ... And we learn so much from this particular group project, we have another one directly after it and we can learn from all the mistakes we made and all the things we did right and we can try and do it slightly different the next time. Are you happy enough with that? That is all I got to say. I won't speak again unless I have to. But anyway, em, just on the agenda then we are going to do the minutes but its suggested, again this was just thrown out just to get you thinking and a few people came back to me which is great. *...(Monologue of 1096 words in total.)*

In the excerpt presented, my interpretation is that there are two genres in action, the traditional committee meeting genre and the PBL tutorial genre in as illustrated in the following figure.

Figure 3. 7 Traditional Committee Meeting Genres versus PBL Tutorial Genre

Traditional Committee Genre	**PBL Tutorial Genre**
'You are just going to have to trust me as chairman to make the right decisions.'	'we just have to trust each other'
'trust my judgement'	**'**And all that we can do then is to choose and trust your judgement'
'and if someone has a problem with the way we are going just say it to me after a meeting or some other time, if you think there is something radically wrong'	'Em free expression, collective responsibility'

Em, we need to produce a product, we need to agree what the product is etc.' 'Em, what I would like to see at the end of the day is a good product'	'Its getting there and making the best of it we can learn so much from this group project, we have another one directly after it and we can learn from all the mistakes we made and all the things we did right and we can try and do it slightly different the next time.'

Frank, in his talk, was inviting in the genre of the traditional committee meeting, a genre he was familiar with to the genre of the PBL tutorial, which he was unfamiliar with. In this excerpt, there are actions and interactions associated with a traditional committee meeting, these include the chairman's address, discussion about an "agenda" and "minutes" being read, and a discussion about a "product" being produced. In this same excerpt, there is also talk about "learning" in the PBL tutorials from the work on one "group project" to inform ways of working on the next group project and this interaction is associated with a PBL tutorial. We can see the hybridity in the text, where there is both the talk of the traditional committee meeting genre and the talk of the PBL tutorial genre in one short extract

In the following tutorials the students' language of traditional committee meetings (e.g. 'agenda' and 'minutes') was transformed through the following tutorials into a language of the PBL tutorial (e.g. 'action-plan' and 'whiteboard'). The traditional committee meeting was viewed as emphasising "product", whereas, the PBL tutorial was seen as giving importance to "process "and "product". The PBL tutorial mode was seen as being more democratic "with everybody sharing"

Sue:	One of the different things that I found about it was the PBL process was group, and there were group decisions and the group action plan. And with the agenda it was maybe one person's agenda and what was going to happen and some of the items on it may have become unimportant overnight and didn't need to be discussed, but we were very much saying in the group we must follow this agenda and then eventually the realization came in, instead of the agenda lets follow last week's action plan and take up from there and use that as a starting point to the following week. So again it was just bringing the group in rather than <u>one</u> person being the hierarchy and leading it and everybody sharing together.

In the students' talk in the tutorials there is evidence that they moved from a traditional committee meeting with one person's agenda and a strong hierarchy to a common action plan with democratic social relations. Democratic social relations are the basis of effective PBL tutorials. The next section discusses practical strategies for fostering democracy.

Possibilities for facilitating movement towards more democratic social relations

These practical possibilities are suggestions for tutors to choose from for facilitating movement towards democratic social relations:

Possibilities for facilitating movement towards more democratic social relations

1.Give attention to the physical learning environment
2.Give time to students to make and review their own ground rules
3.Speak little so the focus is on students' talk
4.Encourage everyone to participate and use student roles effectively
5.Encourage students to use the whiteboard as a shared learning environment
6.Listen to the words the students use to see where they are in the movement towards democratic social relations

Possibility One: Give attention to the physical learning environment

The physical environment effects the learning environment. As well as students being able to sit around a table together it is vital that they have a whiteboard (or other surface) that they can all see as a shared learning environment. This can be an electronic whiteboard, an ordinary whiteboard or a flipchart. A cheap approach is to bluetack a few pages of flipchart paper on a wall so this can reflect the work of the team. Giving attention to the physical environment is a key part of the tutor's role in providing a welcoming learning environment. Where the entire programme or most of it is PBL it may be

possible for each team to have a “home” room. Tutors and students can make efforts to make the learning environment physically conducive to team learning.

Possibility Two: Give time to students to make and review their own ground rules

In order to foster democratic working relationships the tutor can encourage the team to make their own ground rules, that is the rules about how they will work as an effective learning team. The tutor should not make the ground rules. Students can draw on their previous experiences of being in sports teams, learning groups etc. to make the ground rules. At the first meeting it is a good idea to give sufficient time to this task so that students have the opportunity to discuss what ground rules they need as a team and to agree these. The tutor can encourage them to make ground rules about the major areas that effect the tutorial including ground rules about behaviour in the tutorials, independent study work and sharing independent study resources electronically. Students often make rules about: timekeeping, mobile phones, listening and respecting others, everyone participating, the effort expected for independent study, attendance, circulating information etc., For example, if they have not made any ground rules about independent study the tutor can ask “What ground rules about independent study and sharing the resources from independent study do you want to make?” Students or tutors can encourage the team to review or add to their ground rules as the need arises. The tutor, chair or other students can use the ground rules to encourage better engagement, attendance or independent study if issues arise.

Possibility Three: Speak little so the focus is on students’ talk

In order to realise the potential of the tutorial as a place where dialogic knowing can really take place it is vital that students talking to one another is the centre of gravity for learning, rather than tutors’ talk. Tutors should learn to keep quiet and “zip it” initially in the tutorial so that the conversation can gather momentum from students’ talk. Tutors need to resist the temptation to give a mini-lecture. Their role in the tutorial is *not to teach content* but to facilitate students learning and doing the work of brainstorming ideas,

reasoning through the problem and marshalling evidence for their arguments. This does not mean that they do not use their expertise but they use it in ways that enable them to listen to the students, monitor their learning, ask challenging questions, encourage students to: make effective connections, marshal evidence for their arguments and summarise and review their learning. Nor does this mean that tutors do not talk in tutorials, a misconception some people have. Rather tutors should let students start the talking and intervene later with *process* rather than *content* interventions to facilitate students creating knowledge together. For example a tutor can ask a question to get students to think more deeply about the problem.
Savery (2015: 9-10) captures the challenge well of moving from knowledge transmitter to facilitator of learning:

> The challenge of any instructor when trying to adopt a PBL approach is to make the transition as knowledge provider to tutor as manager and facilitator of learning.

Possibility Four: Encourage everyone to participate and use the student roles effectively

It is important if there is to be real democracy in the team that everyone contributes to the learning. Sometimes there is a very domineering student or a very shy student. The tutor should intervene early if the student chair or others have not dealt with the issue of a domineering student. Interventions I have used include saying something like “Paul we have heard your ideas about the problem and now it is important to hear from other people who have not had the chance to express their ideas. Mary what are your ideas about the problem?”

The tutor’s effective use of body language and eye contact is very important. Once when students all looked to me, I turned my body and my eye contact to the chair and encouraged the chair to start a conversation on the emerging issues. One way of encouraging everyone including shy students is to give everyone five minutes of silence to write down their ideas and then to do a round asking each student to give one idea. The tutor can choose wisely which student to start with and thereby when the domineering or shy students will take their turn.

The student roles help people to participate. Different students taking on the various roles e.g. chairperson, scribe, reader, timekeeper and observer gives them a specific job to do. The role of the chairperson is to see that the work on the problem is progressed and that everyone is involved. The role of the scribe is to record the main ideas on the whiteboard/flipchart and to manage the communications of the team. The role of the reader is not only to read the problem aloud at the start of the tutorials but also to draw students' attention to key elements of the problem. The timekeeper needs to remind people of the time so that they complete the essential work of each tutorial. The observer's role is to observe how the team have been working and to feedback to the team the strengths of the teamwork and suggestions for further development. The tutor can actively encourage students to perform their roles effectively e.g. "There are many good ideas being expressed, Joe as scribe would you like to capture them on the whiteboard?" or " Mary as chair would you encourage everyone to give their ideas about the problem?" All students should actively participate in the discussion and those with specific roles do this in additional ways to their general participation in the tutorials and independent study. I have found it useful to encourage the team to keep the same roles for all the work on the first problem and then get different students to take on the various roles for subsequent problems. This encourages students to be active in their role, knowing that they have to stay in this role until the completion of the problem. Sometimes I have encouraged an over-talkative student to take on the role of scribe or observer or a less vociferous student to take on the role of chairperson. I have also sometimes set aside specific time in the review phase for us all to give the chairperson feedback on how they have performed in the role. The tutor can also feedback at the end of the tutorial to the team on her/his observations of the team dynamics and how students have performed their roles or ask the team what they are going to do about encouraging everyone to participate.

Possibility Five: Encourage students to use the whiteboard as a shared learning environment

In traditional teaching it is the teacher who writes of the board and controls the ideas and words that are focused on. In PBL tutorials it is important that tutors

encourage students to use the whiteboard as a shared learning environment by writing and drawing their ideas, words and communal work on the problem. Even though one person in the team is the named scribe this should not stop anyone else in the team going to the board and writing or drawing to express their ideas or to build on or connect with the ideas of others. It is not a question of one person acting as a secretary and taking notes that others cannot see; rather the scribe is dynamically constructing a record of the group's ideas and work on the problem. This means that this is constructed and edited together and belongs to the team as a summary of their democratic work. The following photograph shows two students in a PBL team I facilitated working together to make sure the whiteboard reflects the work of the whole team.

Figure 3.6 Two students working together to make sure the whiteboard reflects the work of the whole team

The students should write the learning issues, the questions they have decided to research further on the whiteboard. It is important that the team decide this democratically after the process of identifying issues, agreeing,

disagreeing, drafting, erasing, and redrafting questions. The tutor should never articulate, decide or write the learning issues. A crucial part of learning is defining the problem and naming the research questions and this is the students' work and vital first steps to deep learning. These learning issues phrased as questions and written on the whiteboard can be a good starting point for the next tutorial. This can engender more democratic discussions than a traditional paper agenda and a secretary taking notes that only he/she can see. All students can receive copies of the whiteboard as a record of their team learning and development. This can be done in many ways including a student taking a photograph of their whiteboard with their smartphones/ipads and circulating this.

Possibility Six: Listen to the words the students use to see where they are in the movement towards democratic social relations

Are your students talking in terms of "I" and "my" or we" and "our"? Are you seeing a change in their language during the tutorial or over a course of a few weeks? Sometimes it is useful to give this as feedback to the team on this in order to notice effective movement or to encourage more democracy.
If there is a problem with the level of democracy the tutor may decide to pro-actively use one or more of the first five possibilities.

The first dimension of dialogic knowing, namely, movement towards more democratic social relations provides a firm foundation for the second dimension, namely, the co-construction of knowledge through co-elaboration, which I will now discuss.

The co-construction of knowledge through co-elaboration

The second dimension of dialogic knowing is the co-construction of knowledge through co-elaboration. In PBL tutorials, it is not a case of individuals just elaborating their knowledge by making links between their own prior knowledge and the current problem, rather it is a question of students co-elaborating together, with one person's elaboration of prior knowledge building on another person's elaboration**.** Schmidt (1993:428) views the "elaboration on prior knowledge through small group discussion" both before and after new knowledge has been acquired as a cognitive effect of PBL on student learning. In PBL tutorials students can construct knowledge that is new to them together by elaborating on and building on one another's' prior knowledge and independent study. Freire emphasises that, in the final analysis, knowing is a social event. For Freire, knowledge is viewed in terms of "our" knowledge rather than "my" knowledge, knowing is "…not strictly a 'I think' but a 'we think': "It is not the 'I' think that constitutes the 'we' think' but rather the 'we think' that makes it possible for me to think" (Freire, 1985: 99-100). This is what I mean by the co-construction of knowledge through co-elaboration, which is at the heart of dialogic knowing. What a better place to start learning about this co-construction of knowledge through co-elaboration than by listening to students doing this in the naturally occurring talk in tutorials. Firstly, this section will begin by considering what we can learn from analysing how students talked about this in tutorials. Secondly, specific practical possibilities for fostering the co-construction of knowledge will be discussed with examples.

Listening to students' talk about the co-construction of knowledge through co-elaboration

The PBL students in the study (Barrett 2008) talked about building their knowledge together ("group knowledge") through

elaborating their own “ideas”, listening to new ideas from other students, linking what one student said to what other students said and “editing” their work together. This co-construction of knowledge through co-elaboration contrasts with an individualistic view of knowledge creation and Philip, from the Skelligs team, distinguished between the two perspectives as follows:

> Well, my opinion of the idea of the PBL working in groups, if I was working independently I couldn’t have been as creative as the group has been. And the number of ideas that were thrown around and developed by the group is very, very, I think it creates a whole new dynamic.

This co-construction of knowledge meant that there was a greater “number of ideas” being considered by the team compared to when someone works individually to construct knowledge. Philip said that this co-construction of knowledge was more “creative” as many ideas were “being thrown around” and were bouncing off one another. The PBL students in the study made use of ideas and prior knowledge on various topics to exploit the potential of PBL tutorials for co-elaboration and co-construction of new knowledge. In Philip’s words, the group discussions in the PBL tutorials created “ a whole new dynamic.” compared to “working independently”.

The Skelligs team decided to do a shadow acting presentation. This was in response to the “Help” problem about giving a presentation to Heads of School about their experience of the PBL process. After the shadow acting presentation, the tutors and the students from the other team asked the Skelligs team questions arising from the presentation.

Ann: Could I ask you, you were saying that individually there was a sense in which you couldn't maybe produce the final product up to the standard that you would require yourselves? I am just wondering in relation to PBL what are your reflections around that?....

Betty: I think what that question is more addressing is control as opposed to the standard. As an individual you have control over the start and finish of a product whereas you need to give this up as this is group knowledge and it's a group process, you don't have control over it, what the finished piece is. That is different, it's different, ……. …..

Michael: But I think the group gives a value to this, it's almost like an editing process. like when you get an idea you can go off on a tangent and develop it yourself, so you are in a situation where you hand up a thesis to the tutor, they mark it, correct it, it becomes very, very closed system almost. And often you get a tutor who likes what your approach is, this is brilliant, maybe the research isn't that great. But then maybe you get a tutor who hates what you are doing and then you can get a worse mark or you get a roasting over it because he doesn't like what you are saying or she doesn't like what you are saying and doesn't like your research methods. Whereas in a group like this you can feel, like sometimes you put in something and its rubbish and the group will tell you pretty quickly. You feel okay, that idea didn't work, or that was a crazy idea and then you think about that, and then maybe that is a new good idea, so it helps if a lot of people are thinking the same way, it validates your idea better. I think that is the strength of the group work.

These students talked about giving up individual control for a sense of shared control and " group knowledge" in the way that they co-construct their knowledge together in the PBL tutorials. They talked about the PBL tutorial being like an "editing process", where the group, rather than the individual, decides which ideas to run with and which not to pursue. Through the co-elaboration of ideas, the PBL students as a group validated some ideas as the most appropriate to develop to work on the problem and to further their knowledge.

Kelson and Distlehors (2000:176) summarise the reasons why work on PBL problems in tutorials can foster this type of co-construction of knowledge through co-elaboration

> Put simply for most of us acting individually, problem complexity triggers a tendency to come to simplistic resolutions out of our present state of ignorance. The more novice the problem-solver, the greater the tendency. The collaborative problem-solving group, however provides the ideal situation for remedying this, while developing expertise in problem-solving through the interaction between reasoning and attuning to problem affordances.
>
> Individuals bring varying expertise to the group. They see different facets of a complex problem and bring unique needs for completeness and tolerance of ambiguity. A group of such individuals, committed to a common goal - the problem's optimal resolution - can collectively enlighten each other regarding multiple perspectives, complex affordances, and reasonable versus reckless uncertainty.

The focus of the PBL tutorial was students working together on a problem "where there is no simple correct answer but multiple reasonable interpretations or solution paths which can be argued for" and discussion on a PBL problem in tutorials can promote dialogic practices (O'Connor and Michaels 2007, 285).

These students characterised the individual research project in terms of 'my knowledge and control' and the PBL tutorial in terms of 'our knowledge and control.' Genres vary in terms of purpose and social interaction. The students were saying that, in an individual research project, the purpose is to produce a product that shows individual ideas, research and learning. This was contrasted with the purpose of the tutorial which is to produce a group product that reflected the group's ideas, research and learning to co-construct knowledge together. In terms of social interaction, the individual research project was characterised, as a "closed system" with the only interaction mentioned as that occurring between the student and the supervisor. In regard to the social interaction of the PBL tutorial, the students talked about it in wider social terms, for example, "sharing ideas", "shared ownership", "group knowledge", and "group process". They talked about the individual research project as a "closed" form of interaction between the supervisor and the student and contrasted this genre with the more open interaction of the PBL tutorial where various students co-elaborate their ideas to produce

"group knowledge". Dialogue is the means by which these students together created and recreated new knowledge. The establishment of democratic social relations encourages dialogic knowing, as participants can move beyond their current level of knowledge by making a new form of "our knowledge" together. In order to do this, they must have respect and reverence for the words of others and for their own words.

Freire's understanding of dialogue

This conversation can be understood more deeply by returning to Freire's understanding of dialogue. Freire built his understanding of dialogue on the foundation of Buber's (1964) understanding of the "I-Thou" relationship. For Freire, dialogue goes beyond being an epistemological position of how knowledge is viewed, to being a particular ontological stance of what it means to be human. Dialogue from this Freirian perspective is at the centre of the process of being authentic human beings who are subjects not objects in the world (Freire 1972). Human beings as subjects name their word and their world. In PBL tutorials students name their words and listen to others doing so. This dialogic process is underpinned by values of "mutual respect, humility, trust, faith, hope, love and critical thinking" (Rule 2009, 929).

I agree that the particular and unique contribution of Freire to the conceptualisation of dialogic knowing:

> is not only the central place it is afforded within critical pedagogy, but more importantly because of the extent to which it is considered to be a creative and aesthetic act. In speaking, challenging and overcoming the word, Freire like Buber, argues that one is defining and redefining the relationship between oneself and the world. This is the tension between "being and not being" … or being and being more human
> (Curzon-Hobson 2002:189).

Freire views dialogic knowing as a creative process of becoming more human and of developing a sense of personal identity. It is so important for students to have the opportunity to work in small group tutorials and for their higher education experience not to consist only of very large group lectures. They

need a place where their word can be heard, where they can listen and learn from other students and where they can develop and be nurtured as social human beings. Freire's concept of dialogic knowing is underpinned by Vygotsky's (2002) concepts of thought-language and proximal development. Vygotsky's understanding of the interfunctional relationship between thought and language is key to understanding co-elaboration and co-construction in dialogic knowing:

> Word meaning is a phenomenon of thought only in so far as thought is embodied in speech, and of speech only in so far as speech is connected with thought and illuminated by it. It is a phenomenon of verbal thought, or meaningful speech-a union of word and thought (Vygotsky 2002: 212).

Through socially constructing new knowledge together in thought-language, PBL students can move from their current zone of development (ZCD), where they can acquire new knowledge unaided, to a wider zone where they can acquire greater knowledge through their discussions with others in PBL tutorials. Vygotsky said the Zone of Proximal Development (ZPD) is the:

> distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky 1978. 86).

Let us now look at practical strategies for cultivating dialogic knowing in tutorials

Possibilities for promoting the co-construction of knowledge

I suggest three sets of practical pointers for promoting the co-construction of knowledge namely 1) setting the learning climate 2) asking questions and 3) staff and student induction. The first set is a range of possibilities we have for setting up an environment conducive to team learning.

Possibilities for promoting co-construction of knowledge through co-elaboration - Setting the Learning Climate

7. Convey the high standards of information literacy expected
8.Encourage students to share their learning from their independent study
9.Encourage students to share their new learning from the research of their independent study electronically to free up the tutorial for discussion
10. Facilitate students to listen actively and mindfully with respect
11. Prompt students to name and summarise their new learning

Each of the these possibilities will be discussed in turn.

Possibility Seven: Convey the high standards of information literacy expected

The quality of the dialogue in the tutorials is dependent on the quality of the independent study that the students complete, cognitively process and share with their peers. At the induction and during the module the tutor should be clear about the high standard of information literacy expected and what is acceptable and not acceptable in this regard. Naming the learning issues as research questions is an important part of information literacy. The tutor should encourage these to be written as precise questions rather than vague topics. The tutor should *never name the learning issues*. This is the work of the students and vital for developing their critical thinking and information literacy skills. Sessions on information sourcing and evaluation led by you and/or a librarian are key. The tutor however has an important role in monitoring and encouraging the on-going development of information literacy in tutorials. Sometimes in the review phase the tutor can ask each student to evaluate his or her current information literacy skills used on the problem.

Tutors can give feedback at the review phase whether the information literacy is up to the expected standard or not.

Possibility Eight: Encourage students to share their learning from their independent study

For the second or subsequent tutorials on a problem, a useful starting point is for the scribe to put up the learning issues (phrased as questions) that were decided on in the previous tutorial and to use these as triggers for the conversation. If there is an initial silence, this can be constructive as students are gathering their thoughts and the tutor should be comfortable with a little silence and not rush in to rescue the students. We learn new things by making connections between our prior learning and our new learning (Ausbel 2000) so it is vital to access this prior learning and to link this with new learning. A tutor can encourage the team to explore how their new learning from their independent study relates to their prior learning. Students can learn so much from the shared reading and the discussion of the shared reading.

Possibility Nine: Encourage students to share their new learning from the research of their independent study electronically to free up the tutorial for discussion

It is crucial that the precious tutorial time is not used up with people reading out big chunks of text from papers. Tutors should encourage students to share their research and other documents electronically using dropbox or whatever the team decides to use. It is the scribe's job to set up and co-ordinate this. This frees up the tutorial time to discuss *what the research means in terms of working on the problem.* A student can say for example "I read x paper which I put in dropbox. The key point of the paper was Y and therefore I think in relation to our problem we should consider/do Z" In a visual I designed for the PBL process for a PBL module in the independent study phase I wrote "*Synthesise what this means for the problem critically"* In

the co-constructing knowledge and professional action phase I wrote *“Summarise the learning as it relates to the problem and professional practice”*

The focus of the tutorial should be students talking to and learning from one another. The following photograph is of a student sharing her learning from her research and two other students listening attentively, in a tutorial I facilitated.

Figure 3.9 A student talking about her research from her independent study with other students listening attentively.

Possibility Ten: Facilitate students to listen actively and mindfully with respect

Tutors need to establish an atmosphere that encourages students to give their full attention to the dialogue in the tutorial, to be mindful and to actively listen. Tutors can encourage students to turn their mobiles off or on silent

(whatever the ground rule is on this). They can facilitate students to show respect for their fellow students by listening to them and showing that they have listened to them. They can encourage students to build on one another's ideas. The tutor can model this mindful, respectful listening. I often take five minutes of quiet time to myself calming my mind and centering myself before a tutorial, so I can be as fully present as possible.

At the end of the tutorial, or during the tutorial, the tutor can comment on what they noticed about students listening (or not listening), talking and learning. At the review phase the tutor can sometimes ask the students to name one new thing they learnt from listening to another student and the tutor can do this also. As tutors listen attentively to the language students are using, and mindfully watch the body language of students, they can monitor where the students are in terms of the co-construction of knowledge and intervene appropriately to advance this further.

Possibility Eleven: Prompt students to name and summarise their new learning

Reviewing learning aids knowledge acquisition and learning to learn skills. The tutor can ask one student to summarise the new knowledge constructed during the tutorial. Or a tutor can ask each person in turn to name the main new thing they learnt during the tutorial and how they learned it. The tutor can ask a student to summarise the main learning during the tutorial.

The second set of possibilities for promoting the co-construction of knowledge focuses on the types of questions the tutor can ask to prompt co-elaboration.

Possibilities for promoting co-construction of knowledge through co-elaboration – Asking Questions

12. Ask the big questions
13. Ask questions to facilitate co-construction of the *depth* of knowledge
14. Ask questions to facilitate co-construction of the *breadth* of knowledge
15. Ask questions to facilitate co-construction of the *application* of knowledge
16. Ask students to make visualisations of their team's knowledge on a topic

Possibility Twelve: Ask the big questions

Tutors asking appropriate questions can facilitate the co-construction of knowledge through co-elaboration. By asking specific questions the tutor is modelling effective ways of constructing knowledge. In this way problem-based learning is a form of cognitive apprenticeship (Hmelo-Silver 2004, 2009). The questions can operate as prompts for students to elaborate their knowledge from their prior learning and independent study.

Sometimes if students are stuck or are getting bogged down in detail it can be helpful for the tutor to ask some of the big questions like: What is the purpose of Y? What do you know about the client/customer/audience? Why are you proposing Z? What outcomes are you aiming for? Why do you think that? So what?

Possibility Thirteen: Ask questions to facilitate co-construction of the *depth* of knowledge

Sometimes when I am facilitating tutor-training people ask about sample questions to ask. A tutor can model the types of questions that are helpful, or students themselves start by asking very insightful questions. Problem-based

learning aims to promote deep learning where students have a robust and personal understanding of the topics.

Figure 3.10 Sample questions to promote the depth of knowledge

What is the kernel of the problem?
How do you define the problem? Why?
How will you phrase your learning issues as questions?
Why do you argue for x?
Why would you use that procedure/approach/technique?
What is your research evidence for X?
What are the counterarguments for X?
Why do you think that is a good argument?
Why did you choose those particular sources?
What are the claims in that research paper?
What are the crucial points of the paper?
And what do these points mean for working on the problem?
What are the advantages and disadvantages of Y?
What are the most important issues here?
What are your main arguments?
What are the main arguments for and against this?
So what?
What are the links between your arguments?
How has your understanding of this key concept developed from your research and from working together in the tutorial?
What new things do you now know about Z?
How did you learn them?

What readings would you most recommend to your peers on this topic and why?

What more have you learnt about problem-solving from working on this problem?

Stop and Reflect

These are only sample questions, not a definitive list and would need to be adapted to and added to for different situations. What other questions would you suggest to promote depth of knowledge?

Possibility Fourteen: Ask questions to facilitate co-construction of the *breadth* of knowledge

In problem-based learning students study a problem in context. This provides many opportunities to broaden their knowledge making connections and using networks.

Figure 3.11 Sample questions to promote breadth of learning

What are the important social, ethical, cultural and political issues to consider in relation to this problem?

How do all these factors interconnect?

Whose voices do you hear in the problem statement? Whose voices do you not hear in the problem statement?

What professional or other networks would be useful to you in researching

this further?

What understandings would interprofessional viewpoints bring to the problem?

How is this problem dealt with in other countries?

What other areas of literature do you need to explore to get a broader viewpoint?

What are the main debates about this topic in the literature?

Who are the key theorists/researchers/leaders in this area?

How has your understanding of the problem broadened from the discussions in the tutorials?

Will you represent a synthesis of what you have learned together about the problem visually on the whiteboard?

Stop and Reflect

These are only some suggestions. What other questions would you suggest to promote breadth of knowledge**?**

Possibility Fifteen: Ask questions to facilitate co-construction of the *application* of knowledge

One of the aims of PBL is to facilitate students to be able to transfer their knowledge and apply it to different situations**.**

Figure 3.12 Sample questions to promote application of knowledge

What is the most crucial thing to do and why?

How exactly would you do that in practice?

If you and your team could only do three things, what would they be and why?

How do you think all the stakeholders feel?

What are all of the ethical issues involved in this situation?

What is the appropriate empathetic response to this situation?

What would be a more cost effective/ environmentally effective/ inclusive way of working?

How have you extended your repertoire of professional interventions from working on this problem?

How would you use what you have learned in different situations/ future placements/ work settings?

What specific skills do you need to develop further to work with these kinds of problems?

How is your professional practice developing?

Stop and Reflect

Many questions about applying knowledge are profession/discipline specific.

What other questions would you suggest to promote application of knowledge?

Strategy Sixteen: Ask students to make visualisations of their team's knowledge on a topic

Many of us learn well through using visualisations. In PBL, "visualizations become early models of understanding both the problem space and the solution space" (Segelstrom and Holmlid 2009: 7), Visualisations can take different formats including drawings, concept maps and photographs. They can be powerful means of critical and creative thinking and a clear synthesis of learning. Tutors should encourage students to work visually as well as textually on the whiteboard. In the tutorial the tutor can challenge students with a question like: "Can you draw a concept map to illustrate the knowledge you are developing from working on this problem?" This can encourage them to work on a collaborative concept map. Tutors can also encourage students to work with visual metaphors as an aid to learning. When students are giving presentations on their work on the problem they can sometimes be given the freedom to work in any media to synthesise their learning.

The third set of possibilities for promoting dialogic knowing in PBL tutorials focus on tutor training and student induction.

Possibilities for promoting co-construction of knowledge through co-elaboration – Organising tutor training and student induction

17.Organise initial and advanced tutor training initiatives
18. Adapt strategies for roving tutors
19.Organise student induction

Possibility Seventeen: Organise initial and advanced tutor training initiatives

Tutor training is a key success factor for problem-based learning initiatives (Savin-Baden and Major 2004). Initial tutor training needs to start with understanding what problem-based learning is and the philosophy that underpins it. It needs to give space to exploring the purposes of PBL generally and the tutorial in particular. New tutors need to be introduced to the stages of the PBL process and to the PBL tutor and student roles. Tutors watching DVD clips of the PBL tutorial in action can be very helpful in this regard (see the further resources section). Exploring the concept of *the tutorial as a potential site for dialogic knowing* can be illuminative and inspiring for tutors. Tutor training should not stop after an initial training session. After tutors have been trained in PBL as an education approach and in tutoring skills it is very helpful

> for the tutors to meet, discuss and reflect, both formally and informally. The existence of such Communities of Practice seem to be of great importance in order to enhance and continuously inspire the tutoring in PBL groups (Lyberg-Ahlander, Lundskog and Hanssonl 2014:24-25).

I argue that one of the best ways of training PBL tutors is for them to experience the PBL tutorial as a student first before experiencing it as a tutor. I always include this important element in any PBL staff development initiatives I facilitate. Below is a photo of a team of lectures from different disciplines undertaking a module on problem-based learning in higher education that I facilitated experiencing PBL tutorials as students.

Figure 3.10 Lecturers experiencing a problem-based learning tutorial as PBL students during a PBL staff development module

After experiencing PBL as students first, then staff can experience PBL as tutors (facilitators) as part of their training. Salinitri et al (2015: 76) make this link well in describing an early part of a PBL tutoring programme:

> The facilitator trainees are the learners during the training, but their role as facilitators and the key skills required to achieve the goals of facilitation should be modelled and emphasised by experienced facilitators...

I co-facilitated a tutor-training workshop with Jon Yearsley for a group of tutors who were preparing to facilitate PBL tutorials for a statistics module for science students. What they learned about the PBL process and the role of the tutor from having experienced a PBL tutorial as students was recorded on flipcharts.

Fig 3.11 Jon Yearsley's PBL science tutors responses about what they learned about *the PBL process* from just having experienced a tutorial as students

What have you learned about the PBL process?

- Good to get different ideas since members have different backgrounds
- Roles help everyone to get involved
- Gets you interested, like a puzzle, makes you curious
- You have to think broadly and from a different perspective
- Got into it, created a "buzz"
- Time constraint drives the engagement
- Group more productive than individual

Fig 3.12 Jon Yearsley's PBL science tutors responses about what they learned about *the role of the PBL tutor* from just having experienced a tutorial as students

What did you learn about the role of the tutor?

- Ask probing questions
- Remind group to look at process guide

- Useful to recap on roles
- Clarify the assessment
- Some tutors find it hard not to talk too much
- Tutor should not 1) give their own ideas or 2) define the learning issues
- Try "think-pair-share" or round robin to get all to contribute

I co-facilitated a tutor-training workshop with Naomi McAreavey for tutors who were working on an English literature module for 500 first years in small teams. We gave them the experience of being a student or a roving tutor as the reality was they would be working as a roving tutor with more than one team in the room. For one session in the workshop we gave the participants specific roles written on cards e.g. "You are a very interested conscientious student", "You are a domineering student, who talks a lot ", "You are a very shy student", "You are a very sociable student who helps the group to gel", "You are a student who has done no independent study", "You are a student who does not like group work". Hitchcock and Anderson (1997) recommend using role-playing of different dysfunctional group scenarios for tutor training. Participants then debriefed about what they learned about the PBL tutorial and the role of the tutor from their experience of just having been a PBL student or tutor in a tutorial. We had very rich discussions about the role of the tutor. This is what was recorded on the flipchart about what they learned from these lived experiences about the role of the tutor. We circulated this to all tutors afterwards.

Figure 3.13 Naomi McAreavey What did you learn about the *role of the tutor*?

What did you learn about the role of the tutor?

- Asking facilitative questions is important
- Confirm good work, challenge to do more

- Timekkeeper and time management is important
- Remind students not all work is done in the tutorial and get them to summarise the focus of their independent study
- Remind students that groupwork is intensive
- Tutor should sit with students at table when roving as a tutor rather than standing
- Tutors should be approachable
- It is difficult not to focus a lot on the content and to think of also focusing on the process
- Open questions
- Throw issues back to group
- Difficult to decide how much time to spend with different groups

Another informative approach is to get some PBL students to share their experiences of PBL with the tutor-training group and to highlight what tutor behaviours they consider enhance or inhibit learning. A panel of first year students were invited to come as the experts on the student experience of PBL and to take questions from all the lectures in a school that had decided to expand the PBL initiative beyond first year.

Participants taking turns being the tutor and this being video-recorded can also be a very powerful experience. They can get feedback from an education developer and other participants on their tutoring. I facilitate that the feedback starts with the tutor giving auto positive feedback and then others including myself give positive feedback. Then I ask the tutor to give her/himself developmental feedback i.e. what they would like to improve about their tutoring. Lastly, others including myself give the tutor developmental feedback. The sequence of giving the feedback is important in terms of confirming tutor strengths and the tutor being open to hearing and working

with developmental feedback. Often when a new PBL initiative starts, time and energy is invested in tutor training. However as new tutors come on board it is important to organise further training for both the old and the new tutors (Azer et al 2013). For experienced tutors I have asked them to each bring a DVD of themselves as a PBL tutor and we discuss each video in turn (including mine) to develop together our understanding of becoming a better PBL tutor.

I have found critical incident work very helpful in tutor training. The critical incidents include: a very domineering student, shy students, a bullying student, very poor independent study completed and the review phase at the end of the tutorial is done very superficially. Watching DVD clips of the incidents is followed by discussing the strategies tutors would use to deal with these situations. (see the further resources section for DVDs of critical incidents).

Once tutors have some experience of PBL, they can do peer observation of teaching of one another. The model of peer observation of teaching I use is where the tutor is in control and chooses who observes her/him, what the focus of the observation is and how the observation will be recorded. This model involves a pre-meeting to discuss these issues, an observation meeting and a post-observation meeting to give feedback and make an action plan (McMahon, Barrett and O'Neill 2007). Another tutor training strategy that has been useful is people discussing key research papers on PBL tutoring and papers on the philosophical, psychological and neuroscientific dimensions of PBL as well as evaluation studies. Tutors researching their PBL initiatives and presenting these at conferences is effective for networking nationally and internationally and re-energisin**g** tutors.

Possibility Eighteen: Adapt strategies for roving tutors

The pointers elaborated here can be adapted to situations where there is a roving tutor. In addition to interventions with different teams, he/she/they can listen to how the teams are progressing and take time at the start or end of

the session to highlight some key relevant pointers to the larger group. This topping and tailing of the session with the larger group is very important in facilitating the smaller teams to continue to learn to work more effectively together, In large group situations the co-ordinating lecturer can meet regularly with tutors to discuss facilitation of the process, emerging issues and to brief tutors on the problems.

Possibility Nineteen: Organise student induction

The time spent on student induction is a very worthwhile investment and a key success factor for PBL initiatives. They need to understand what PBL is and why PBL is being used for the course. Having a visual of the PBL process guide used by the course in question is very useful. In addition to discussing this in detail students are encouraged to bring this one page visual to tutorials and to use it to help them work on the problem. It is key to give an overview of the different student roles and the role of the tutor and to allow sufficient time for discussion on these roles. Seeing students working with these roles on video is very helpful (see further resources section). Students enjoy seeing videos of PBL students in different countries and this helps to reinforce the idea that PBL is now well established across disciplines and across the globe. Some of the same key areas mentioned for tutor-training need to be covered in student induction except from the students' point of view. For example, when I am doing critical incident work with students I ask them the question " What can you do as students when this happens in your team?" It is very useful to get other experienced PBL students to talk about the experiences of being PBL students and to take questions from students starting PBL. Sometimes we design different fun and games for students to understand the importance of teamwork and information literacy as well as giving them a small problem to work on to learn the PBL process.

Having discussed the co-construction of knowledge though co-elaboration, let us now look at the third dimension of realising the PBL tutorial as a site for dialogic knowing, namely, movement towards shared control.

Movement towards shared control

This section begins by listening to PBL students talk about issues of control (Barrett 2008). It then elaborates some practical pointers for movement towards more shared control. I argue that unless there is some degree of shared control then the potential for the PBL tutorial being a site of dialogic knowing will not be fully realised. A third dimension of the PBL tutorial as a potential site for dialogic knowing is shared control.

Listening to students talk about shared control

A student contrasted this shared control with individual control:

> Betty: As an individual you have control over the start and finish of a product whereas you need to give this up as this is group knowledge and it's a group process, you don't have control over it, what the finished product is. That is different, it's different.

If there are democratic social relations and co-construction of knowledge through co-elaboration then it is possible for some degree of shared control to follow. Without some degree of shared control there is no real dialogic knowing. Shared control was seen by some participants negatively, as having to give up control while preferring to be in control. Shared control was seen positively by some participants as a sharing of ideas and a sharing of ownership.

> *Philip:* I feel the whole process is very messy and a lot of time was wasted at our group meetings. I would much prefer to be in control of a learning and discussion or decision making myself.
>
> *Maura:* No, I don't really agree, I enjoyed the whole process of discussion and sharing of ideas, workload and presentation. I feel a form of shared ownership in the solution of the problem.

Participants of the Skelligs team discussed the issue of shared control at the participant validation session where the findings of the research were presented back to the participants. Having experienced this lack of individual control as enhancing their learning as students, they were as tutors consequently more open to giving more control to their students. At the participant validation session when I fedback my findings to the team Betty, who teaches design added her further insights (Barrett 2008). She discussed Freire's concept of dialogue and highlighted the fact that "context, students and tutors are all variables and that is why dialogue and conversation are important. They are not static. That is why we are saying we don't have control." She continued to elaborate:

> We have lack of control. We really don't know what the end product is, we are less afraid. That is difficult for designers not having control. We are helping colleagues not to be afraid and concerned about not being in control.

Possibilities for promoting movement towards shared control

What are practical ways of promoting shared control in PBL tutorials?

Possibilities for promoting movement towards shared control

20.Students reviewing their teamwork as a whole, individual contributions and power and control issues

21.Tutors discussing issues of power and control in tutor training

Possibility Twenty: Students reviewing their teamwork as a whole, individual contributions and power and control issues

One strategy is to ask the observer to give feedback on his/her observations of how he/she saw the team working in the particular tutorial in question and generally and to name some strengths of the team and some suggestions for ways forward in relation to participation, decision making and control. Another strategy is for the tutor in the review phase to ask each member of the team to name one thing they have contributed to the team so far and an additional new thing they will contribute in the future, in terms of participation and shared control. When substantial issues of power and control emerge and are not being discussed or dealt with by the team, the tutor can hold a mirror up to the team by summarising his/her observations to the team asking them how they are going to deal with it.

Possibility Twenty-One: **Tutors discussing issues of power and control in tutor training**

Another key to tutor training is to discuss issues of power and control. When participants have experienced PBL as students and tutors and we are discussing what they have learned for this experience the issues of power and control always come up. Having just had the experience of being in a tutorial is fertile ground for discussing these issues as they relate to tutor beliefs, behaviours and attitudes.

Another strategy is to give quotations about power and control from lecturers who have experienced PBL as students and who have implemented PBL with their own students as triggers for discussion. I also ask experienced tutors to talk about these issues to new tutors. A quotation from Freire about dialogic knowing can trigger discussion about power, control and democracy in higher education.

New tutors need opportunities to understand the educational values underpinning PBL and the congruence or dissonance this has with his or her own beliefs about teaching and learning. Williams and Paltridge (2016:5) argue that it is important that new tutors:

> are provided with professional development opportunities to help them reflect upon and question their beliefs, and understand what it means to facilitate learning rather than transmit knowledge,

Research has indicated that there can sometimes be discrepancies between PBL tutors' espoused beliefs and their actual behaviour in tutorials (Assen et al 2016). Two of the key factors in whether the espoused beliefs translate into tutor behaviour are " the confidence teachers have in the self –directed capabilities of students and the self-confidence of teachers regarding their own facilitation skills (Assen et al 2016:12).

Conclusion

Sometimes the tutorial can seem like mixed weather as students are forming and storming as they build their teams. There are bright times of ideas and new knowledge created and dull times where things seem to drag. There are times of thundering conflict or domineering students. Sometimes there are flashes of real insight. The concept of *the PBL tutorial as a potential site for dialogic knowing* makes me think also of the metaphor of a building under construction where workers together are creating a building with different members of the team taking on different roles in a project that involves much hard work.

Figure 3.14 PBL tutorial metaphors

(Black 2007)

Mixed weather or new building under construction ?

(Joliffe 2011)

The essential skills of dialogic knowing: listening, expressing ideas, reading other team members, questioning, making connections with different perspectives, giving and receiving feedback, brainstorming, finding and evaluating information, synthesising knowledge, making arguments, debating issues and presenting research are not just vital for professional life but also for personal life and active citizenship. The following figure summarises the practical possibilities from which to choose when aiming to develop dialogic knowing in PBL tutorials.

Figure 3.15 Practical Possibilities for developing dialogic knowing in PBL tutorials

Dimensions	Possibilities
Democratic Social Relations 	1. Give attention to the physical learning environment 2. Give time to students to make and review their own ground rules 3. Speak little so the focus is on students' talk 4. Encourage everyone to participate and use student roles effectively 5. Encourage students to use the whiteboard as a shared learning environment 6. Listen to the words the students use to see where they are in the movement towards democratic social relations and to facilitate them to move towards more democracy

Co-Construction of Knowledge  **Setting the Learning Climate** **7-11** **Asking Questions** **12-16** **Organising Tutor Training and Student Induction** **17-19**	7. Convey the high standards of information literacy expected 8. Encourage students to share their learning from their independent study 9. Encourage students to share their new learning from the research of their independent study electronically to free up the tutorial for discussion 10. Facilitate students to listen actively and mindfully with respect 11. Prompt students to name and summarising their new learning 12. Ask the big questions 13. Ask questions to facilitate co-construction of the *depth* of knowledge 14. Ask questions to facilitate co-construction of the *breadth* of knowledge 15. Ask questions to facilitate co-construction of the *application* of knowledge 16. Ask students to make visualisations of their team's knowledge on a 17. Organise initial and advanced tutor training initiatives 18. Adapt strategies for roving tutors and tutorless groups 19. Organise student induction
Shared Control 	20.Students reviewing their teamwork as a whole, individual contributions and power and control issues 21.Tutors discussing issues of power and control in tutor training

Further Resources

Here is a list of some resources that you might like to choose from to work with your tutors and students on deepening their understanding of promoting dialogue and learning in PBL tutorials

.

PBL tutorials in practice

Problem-based Learning at Stenden University

https://www.youtube.com/watch?v=-5omNEmWicU

PBL at Maastricht University

https://www.youtube.com/watch?v=lZS2MbxBGCM

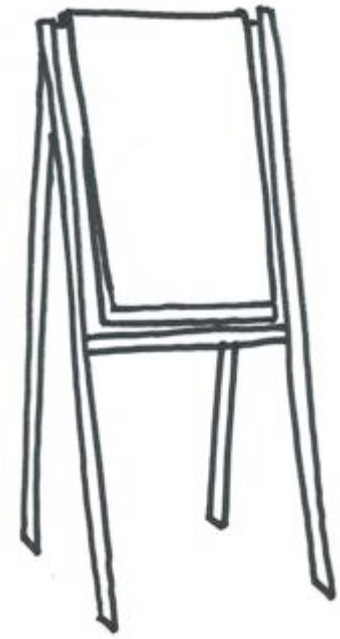
FH Wein, University of Applied Sciences, Austria

http://www.youtube.com/watch?v=gE04TbxQWS8

DVD clips of critical incidents in PBL tutorials
Critical incidents in PBL tutorials
Facilitate, the Irish national problem-based learning network
(freely available online for use in tutor training and student induction)
www.facilitate.ie

Reflect and Plan

On your own and with your team think of a specific problem-based learning initiative you are currently designing or re-designing



- What specific possibilities for facilitating dialogic knowing do you think would be most appropriate for your context?
- What are your ideas for adapting these strategies for your context?
- What additional possibilities do you see for facilitating dialogic knowing?
- What resources about the PBL tutorial do you want to make available to your students and tutors?
- How will you develop PBL tutor training?
- What further reading or resource viewing have you been inspired to follow-up?

A PBL Practitioner Response by Tara Cusack

Response to the chapter by Tara Cusack, Associate Professor, Physiotherapy, University College Dublin

I have been a lecturer in physiotherapy for many years and have experience of delivering teaching across a range of professional areas, through a range of different teaching methods. A number of years ago an experienced clinical colleague came into my office having delivered three hours of lectures and said, “this

lecturing really is a waste of time, there must be a better way". I thought about what she had said for some time and reflected on how I had just spent several weeks "cramming" rheumatology in order to deliver a series of lectures for physiotherapy students…when in fact I had completed my PhD in rheumatology…I began to question why I was feverishly researching the latest publications and learning resources, when in fact it wasn't me who needed to be sourcing and studying the latest publications, it was the students. I needed to find a way to make this happen….for me PBL was that way!

I have now extended my PBL practice to modules which include professional practice education within physiotherapy and an inter-professional learning module which includes student from across the health science disciplines (medicine, physiotherapy, nursing and diagnostic imaging). Within the physiotherapy curriculum we have developed a spine of PBL modules, which are positioned in each year of the programme. These modules are designed to help students to link theory and practice. Student feedback has shown that they really value the opportunity to work together, to bring what they know to the table and feel that it is valued. Now when I induct students into the PBL process, I say to them that we know they have not come to us as a "blank canvas", and what we want them to do now, is to share what they already know with their colleagues, and to then identify within their PBL group what else they need to learn to respond to the problem.

Terry has worked for many years with PBL practitioners "at the coalface" like me. She has heard and experienced the issues, which commonly arise for PBL practitioners (how do I get the group to…. talk; contribute; complete their work; share), and has helped us to navigate our way through these issues ultimately improving the PBL experience for both our students and ourselves. When preparing new PBL facilitators for my modules we now work together to introduce facilitators to the roles presented in this chapter, we then give them an opportunity to practice the roles as PBL group participants. The participants follow the PBL process guide presented in this chapter. Each member of the group can secretly be given a persona, which they adopt during the practice tutorial offering an added dimension for all participants. This is fun, while also offering Terry and I an opportunity to provide feedback before they have to do it for real.

While this chapter develops a new understanding of the theory underpinning the PBL tutorial it also has valuable "roll up your sleeves and get down to it" possibilities for enhancing the tutorial. The first of these possibilities, "give attention to the physical environment" is to me, essential as it immediately signals to students, in this place you will be doing something different, here you will be learning in a different way. I think the atmosphere in a PBL tutorial should be different, students should feel comfortable to contribute, to discuss, to disagree, and to question this chapter presents possibilities for enabling this process.

I think one of the most important roles of a facilitator is simply asking the key questions, in this chapter Terry presents lots of examples of questions to

promote depth, breadth and application of learning. These levels of learning are particularly important for students in a professional programme as you are continually seeking to encourage students to bridge the practice theory divide, and to think critically about how their learning will inform their practice. The key to successful PBL is good organization, everyone (students and facilitators) needs to know and understand his or her role within the PBL process. Preparation should be complete in advance of the first PBL tutorial, module outcomes should be outlined, problems designed, students inducted and facilitators trained so that once the module commences it runs seamlessly. This chapter offers many and varied possibilities for enabling successful PBL.

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Chapter Four

Strategies for Encouraging Flow, Creativity and Mindfulness in the PBL Process

Introduction

PBL Practitioner's Vignette

"Every time I'd been teetering on the edge of despair as we've neared the end of another difficult PBL process, I'd been pulled from the brink by the quality – and creativity – of the work produced by many of the groups, reassuring me of its value at the eleventh hour, and leading me to commit to PBL for another year. And even during the process I'd been in classes where the air has buzzed with learner excitement".

Naomi McAreavey. Lecturer in English Literature, School of English, Drama and Film, University College Dublin.

Naomi provides a case study of a problem she and her team designed in order to foster students' understanding of Renaissance poetry and develop their creativity. She also draws on her considerable experience of using problem-based learning with English literature students to write the response at the end of this chapter. She gives her perspective on developing flow, creativity and mindfulness in the PBL process.

Naomi coordinates PBL modules in English literature and has been struck by the creativity and quality of the work of her students. I have found watching my own PBL students experiencing the creative process of flow very inspiring. Many of us are interested in increasing our repertoire of strategies for facilitating creativity in PBL. We need new ways of thinking about creativity in PBL that will inspire our practice. This chapter is about an inspiring concept and related practice strategies for encouraging creativity, flow and mindfulness in the PBL process.

Chapter Overview

This chapter will help you to:

- Think in new ways about how you as a tutor can encourage creativity, flow and mindfulness in the PBL process
- Use a new illuminative concept to inspire your approaches to facilitating the PBL process
- Apply and adapt practice strategies for stimulating creative experiences of flow to your PBL initiatives
- Learn from case studies of the PBL process as experiences of flow
- Use questions, triggers and further resources for cultivating your students' creative experiences of flow and in your PBL initiatives

Creativity, Flow and Mindfulness

What is creativity? Creativity is a process of using the imagination to produce new or original ideas or products that are of value or useful (NACCCE 1999, Robinson 2001, Jackson 2006). The three Ps of creativity are considered to be: the *process* of production, the milieu called the *press* and the characteristics of the creative *person* (Knipper, Richards and Abraham 2012, Gallagher 2015). This chapter focuses on the *process* dimension of creativity. It looks at how we can purposively design and facilitate the PBL process in ways that stimulate students to experience creative experiences of flow. It explores creativity in terms of a *process* of producing something *new* to the *learners,* not necessarily something that is original in the world. I consider that

the following definition of creativity resonates with the potential of the PBL process:

> Creativity involves first imagining something (to cause to come into existence) and then doing something with this imagination (creating something that is new and useful to you). It is a very personal act and it gives you a sense of satisfaction and achievement when you've done it (Jackson 2002: 1).

Creativity begins with imagination and is cultivated by openness to possibilities and wonder:

> Where the imagination is alive, possibility is awake because imagination is the great friend of possibility. Possibilities are always more interesting than facts (O'Donohue 2015: 36-37).

Creativity is a frequent rather than a rare occurrence, is often a *collaborative* group process rather than an individualistic solo act and is *process* and a product (McWilliams and Dawson 2008). Problem-based learning has the potential to be a collaborative creative process where the team and individuals experience flow. What is flow? Flow is:

> being completely involved in an activity for its own sake. The ego falls away. Time flies. Every action, movement, and thought follows inevitably from the previous one, like playing jazz. Your whole being is involved, and you're using your skills to the utmost (Csikszentmahalyi 1996: 1).

The intentional self-regulation of attention is mindfulness, which helps us to experience flow. Mindfulness has been defined as "paying attention in a particular way, on purpose, in the present and non-judgementally (Kabat-Zinn, 1994:4). Csikszentmahalyi (1991) named focusing attention as one of the key enhancing elements for flow. Dhiman (2012: 34) discusses the relationship between mindfulness and flow and highlights:

> Both of these experiences, namely mindfulness as a cognitive state and being in a state of flow, are characterized by energized engagement with the activity at hand with all of one's mind and attention,

Mindfulness can be developed with regular practice: "And like a muscle, it grows best when working with a certain amount of resistance to challenge it

and thereby help it to become stronger” (Kabat-Zinn 2013: xxxiii)

We have all had experiences of flow in our lives where we were engaged in optimal performance and one action or thought just flowed naturally to the next, like the flow of a beautiful river. You may have experienced flow in many different aspects of your life e.g. work, teaching, writing, sports, politics, social life, politics and the creative arts.

Figure 4.1 Flow, where one action or thought flows naturally to the next, like the flow of a beautiful river. Photograph Tedder (2010)

You bring your many experiences of flow and creativity to the reading of this chapter.

Stop and Reflect

Think of a specific time when you experienced the state of flow

- What did it feel like?
- What challenge were you working on?
- What was the level of difficulty of the challenge?
- What skills, knowledge and creativities did you develop?
- When in your life do you think you were most creative?
- Would you like your students to experience flow more often in the problem-based learning process?
- How do you encourage your students to be creative?

The Illuminative Concept of the PBL process as Finding and Being in Flow

This concept has two parts: the non-flow states involved in finding flow and the flow state of being in flow (Csikszentmihalyi, 1997). Flow is a state of optimal performance where a high level of challenge is matched by high levels of skills **(**Csikszentmihalyi, 1997). Often on the way towards flow people experience non-flow states where there is a mismatch between the level of challenge experienced and the level of skills possessed. Flow occurs in the delicate zone between the anxiety of confusion and the un-interest of boredom (Csikszentmihalyi, 1997). I represent the anxiety of confusion by a

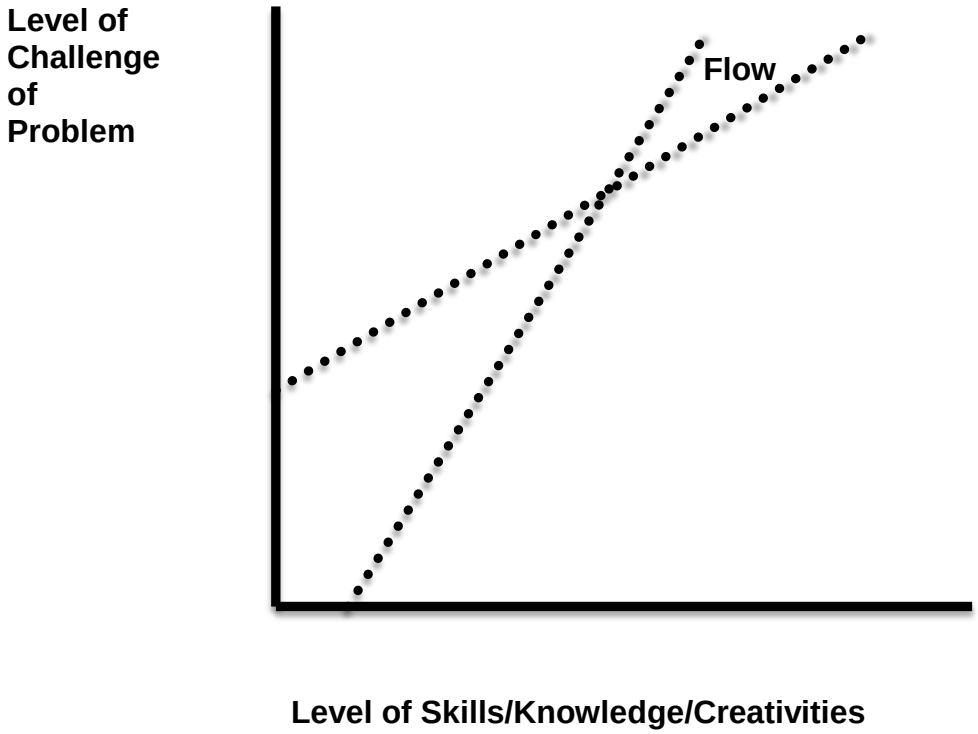
jagged, up and down erratic line. A low flat line represents the boredom of un-interest. Flow is located in the zone between the two. I visualise my understanding of the concept of the PBL process as finding and being in flow in the following figure.

Figure 4.2 Finding and Being in Flow Terry Barrett and Shelly Barrett

The PBL process includes being presented with a problem, PBL tutorials, independent study to work on learning issues, preparing presentations of work on the problem and giving presentations of work on the problem. I argue that well designed problem-based learning presents students with a problem that is above their average level of challenge and difficulty. In the PBL process students are then stimulated to develop new skills, knowledge and creativities in order to rise to the challenge of working towards a resolution of this problem. This stretches them to work hard, to perform at their best, to develop their creativities and to enjoy their achievements, that is to experience flow. In

other words, high challenge problems can be a stimulus for flow and creativity.

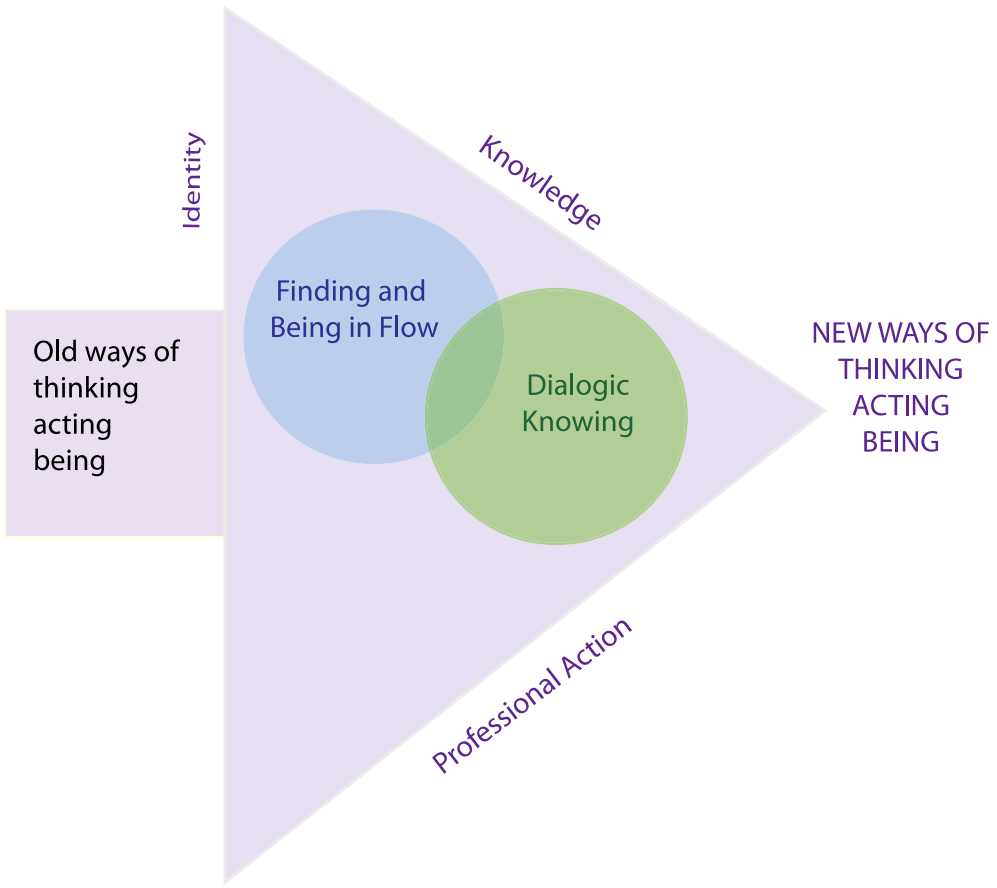
Figure 4.3 High Level of Challenge of Problems Stimulates Learning and Flow (Adapted from Csikszentmihalyi 1997: 31)



However in the full length of the PBL process for a module/course there are also times of boredom and anxiety.

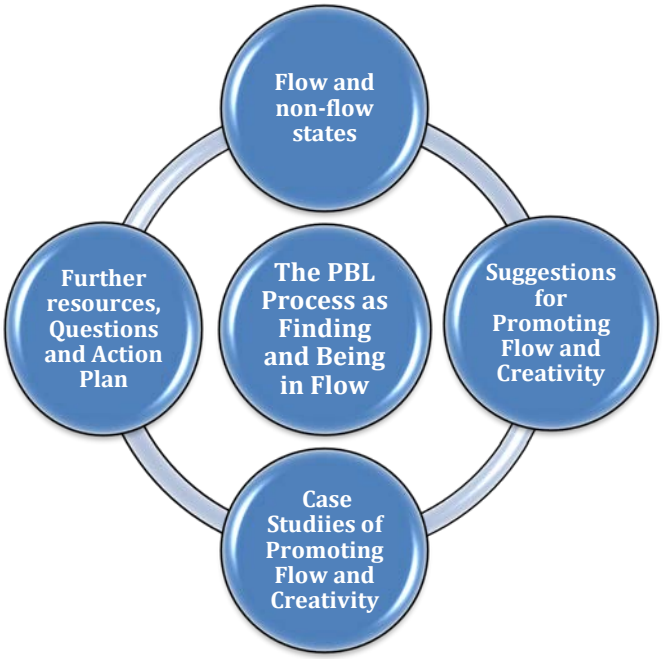
In chapter two the concept of the problem as a provoker of a liminal space was elaborated. The problem provokes betwixt and between spaces between old states and new states. PBL problems provoke liminal spaces between 1) current levels of knowing and new levels of knowing, 2) habitual forms of professional action and forms of professional action new to the learner and 3) satisfaction with current identities and a desire to explore other possible identities. PBL students move within and beyond the liminal spaces prompted by the problem in three different ways. This chapter focuses on one of those ways of learning and growing in a liminal space, that is, students developing their creativity through finding and being in flow in the PBL process.

Figure 4.4 Students learning in a liminal space through finding and being in flow



Chapter Structure

Figure 4.5 Chapter structure



One of the most direct ways of finding out about students' experience of the PBL process is to listen to their naturally occurring talk in tutorials. Firstly, this chapter begins by analysing how the students' talked about being in flow and being creative (Barrett 2008). The students were lecturers working on problems about problem-based learning. I gave the pseudonyms of Skelligs and Glendalough to the two PBL teams and pseudonyms to the students. This chapter then discusses the non-flow states that students also experienced on the way to flow. This included being confused and lost, and being not interested and bored. The analysis of extracts from student dialogue illustrates how the inspiring concept of the PBL process as finding and being in flow was derived from listening to PBL students. These extracts also bring to light understandings of the enhancers and inhibitors of creative flow experiences. Csikszentmahlyi (1999) encourages us to analyse groups rather than individuals in our efforts to understand the processes that foster creativity and to this end I analysed the naturally occurring talk during the PBL tutorials (Barrett 2008).

Secondly, specific practice strategies for encouraging flow, creativity and mindfulness that you can adapt for your own context are elaborated. Thirdly, as part of this discussion I present case study examples of promoting flow, creativity and mindfulness. Fourthly, further resources and questions will be provided to assist you in developing an action plan for enhancing the creativity and mindfulness of your PBL students. Since presenting my earlier ideas about the PBL process as finding and being in flow (Barrett 2010), I have further developed my conceptual understanding of this concept, the relationship between flow, creativity and mindfulness and most importantly have elaborated eleven practice strategies for encouraging flow, creativity and mindfulness with your PBL students.

Listening to students' talk about being in flow and being creative

In the following quotation Hanora, from the Skelligs team, was talking about the impression she would like to leave with Heads of School from their presentation on their experience of being PBL students. This presentation was the result of them working on a problem about designing and giving a presentation about their experience of the PBL process. The presentation would be to Heads of School attending a PBL staff development workshop. The team had decided to do a shadow-acting presentation with actors behind a sheet acting out scenes from a series of tutorials. There were two narrators, one telling the story week by week and introducing the scenes and the second narrator related the scenes to the literature on PBL. There were also thought bubbles beamed on to the sheet. Hanora talked about being in a state of

creative flow when given a challenging problem that was “different “ and “scary” and facing this challenge. As the challenge was considered high, it triggered the development of new skills through “doing something completely different”. It is noteworthy that Hanora’s statement is at the end of the module, the team did not experience flow at the start of the module but rather flow was found through working together on the challenges of the problems.

> Hanora: I think as well for the Heads of Schools to see that education can have such freedom. I said this before, I just think, I have not seen it before, we had great freedom here to move furniture *(laughter)* and you know set up props, and do something completely different that challenged us, which we wouldn’t have had, well particularly in my background, maybe people with a media background, we wouldn’t have had this lovely creativity… But I would love to think the thoughts we have left with them is that wow! you know, those students had an opportunity to be creative and part of that then is your own personal development and we are actually challenged by doing something scary and we faced it and did it.

It is important to review the elements of the PBL process that Hanora named as being part of this flow state. For example, she talked about having “freedom” and being able to define some of the parameters of learning by changing the norms of the classroom through “moving furniture” and “props”. Hanora mentioned being “challenged” twice and used two verbs to show that they rose to the challenge: “we faced it and we did it”. She talked about the creative dimension of flow twice: “lovely creativity” and “the opportunity to be creative”. In addition, she also talked about “the personal development” aspect of flow and eloquently described her team’s experience of being in flow, from having worked on a challenge that was perceived as difficult and “scary” and having developed new skills to meet this challenge. For Hanora, the elements of the process of “creativity” included freedom to choose the media to work in, learning to use new media and taking the risk of doing something “scary.”

Csikszentmahlyi (1997) explains that we experience flow when we are presented with a challenge that is at a little higher level of difficulty than our usual challenges. This level of difficulty can feel a bit “ scary” and challenging initially but as we increase our skills and knowledge to meet this level of

challenge we experience optimal performance and flow. The generation of ideas was central to this creative process of flow. An essential part of creativity is getting lots of ideas out there. In the Skelligs team, Joan talked about the PBL process as a process of being in flow, where one idea triggers other ideas:

> Joan:I suppose I kind of found, I find it a very imaginative way of working. And I find it quite intuitive. I think it's one of the methodologies I should actually stop reading and maybe feeling like we have to get it right, and there is a right way of doing it. And I like the way you can just keep going, you can just keep saying maybe, maybe this or maybe that. And work out some ideas. So I find it very imaginative and quite different to other ways of writing curricula or even thinking about what we have to produce.

Joan referred to flow as an enjoyable, likable process that she wanted to continue doing. She also talked about the creative dimensions of flow using the word "imaginative" twice. This flow had a productive element to it yet was a different way of thinking about what had to be produced. Noel, from the Glendalough team, talked about how the process was:

> Noel: messy initially but that makes the end product far superior.

The messiness of the process did not mean the production of an inferior product because of this messiness, rather this initial messiness was essential to the production of a superior product. The Glendalough team talked about how in their case flow was a team rather than an individual experience. They spoke about how the flow of optimal performance to produce a creative product, involved all group members contributing and not having one person in charge:

> *Noel:* It's amazing what people deliver. If one person was in charge all the creativity wouldn't emerge. Through the group process everyone finds their feet and it is all part of the whole.

Noel highlighted the idea that, in a team, setting the democratic nature of the team contributes to optimal and "amazing" performance.

In summary, the students talked about experiencing flow and creativity by facing a challenging problem and engaging in the hard work of playing with different ideas, working freely in different media and employing a form of teamwork that valued all members' contributions. They talked about **'**doing something completely different' and 'creative' when faced with a 'scary' and 'different' challenge in the PBL process. In the flow state a high level of challenge is matched with a high level of skills, knowledge and creativities and there is a feeling of using one's capabilities to the maximum, both individually and as a team.

> People seem to concentrate best when the demands on them are greater than usual. If there is too little demand on them, people are bored. If there is too much for them to handle, they get anxious. Flow occurs in that delicate zone between boredom and anxiety (In Csikszentmilhalyi 1986 as cited in Goleman 1996: 91-92).

This level of challenge is a trigger for the mindful engagement of focused attention. A high level of mindfulness is required to achieve flow and high-level outcomes. Having listened to these students experience of creative flow, it is time to pause and think of your reflections on your own students' experiences of creative flow.

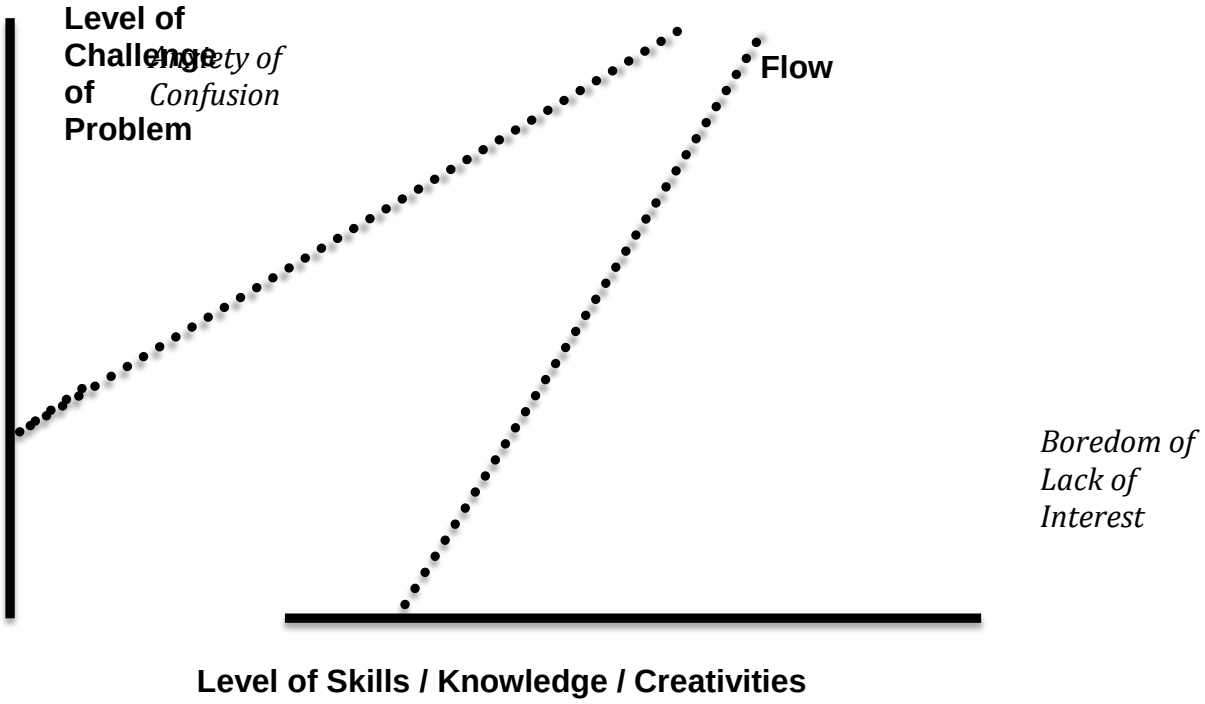
Stop and Reflect

- Does some of this resonate with the experience of your students engaging in problem/project -based learning or other forms of learning?
- What memories or stories stand out for you about your students' creativity?

Listening to students' talk about finding flow

The "finding" part of the concept of finding and being in flow involves students experiencing lack of flow states as part of the journey towards flow. The students talked about two non- flow states, namely, the anxiety of being confused and lost and the boredom of lack of interest. These are represented visually and then discussed in turn.

Figure 4.6 The non-flow states of the anxiety of confusion and the boredom of lack of interest and the flow state in the PBL process (Adapted from Csikszentmihalyi 1997: 31)



Students' talk about the PBL process being confusing and being lost

Both teams of students talked about the anxiety of confusion they experienced in the PBL process. The Glendalough team talked about this

state in terms of two discourses: the not O.K confusion discourse and the O.K. confusion discourse while the Skelligs team talked about the PBL process being “confusing” and “messy". Some students in the Glendalough team viewed confusion in the PBL process as positive, while others viewed this confusion negatively.

Mary: Will I reread the problem, just to kind of get ourselves focused on what we have to do or?
Frank: Is that necessary?
Julie: I think we have gone from here to there. And we need to see what the
Mary: It’s about discussion, and exchanging ideas and understanding and I don’t know how we could do that at the speed we are going at, but I know there is the timetable so I am waiting to be enlightened on that (*speaking quickly*)
Frank: I agree with that.

Mary: (*speaking quickly and in anxious tone*)

I just think it is a mad timetable. I don’t see how we can get to the end of it. But I am kind of hiding that, I am thinking you must be slow.
Noel: One of the big things is we organize prior knowledge, what do we know about it, I suppose to some extent what do we know about this interview with human resource management and then to, eh, to identify the areas that we know nothing about.
Julie: PBL (*laughing*) (*others laughing*)
Sue: I’m lost at this.
Julie: I’m lost as well.
Mary: But it’s creative to be lost. Hurray! I’m delighted we are lost.
Kate: We now believe that we don’t know that, we don’t know how. (*laughter*)
Mary: We are creatively lost.
Mary: But also this thing, it’s about jump into the thing. Sure we have jumped into it. So we are a bit stuck.

In this dialogue, the students were struggling to understand and implement the PBL process. The confusion was due to the challenge of working on a problem (using the PBL process) that was too high in comparison to their low level of PBL process skills. For many students, the mismatch between the level of the challenge and the skills led to an anxious state of confusion. Some of the students viewed that they were in a confused state that was part of a creative process. The discourses can be seen in the two contrasting sets of

vocabulary, which provide different ways of interpreting and representing the confusion experienced.

Figure 4.7 O.K. Confusion Discourse of the PBL Process versus Not O.K. Confusion Discourse of the PBL Process

O.K. Confusion Discourse of the PBL Process	Not O.K. Confusion Discourse of the PBL Process
One of the big things is we organize prior knowledge, what do we know about it, and then to identify what we know nothing about.	To have the PBL process. One thing that frightens me. I think the whole stuff, … where do you start if you have a whole course like this to take.
Hurray! I'm delighted we are lost. We are creatively lost. But also this thing, it's about jump into the thing. Sure we have jumped into it. So we are a bit stuck.	I don't see how we can get to the end of it. But they will know what to do.

However, there was not a divide into two clear-cut, fixed, polarized positions. In the last extract, Mary started to talk in terms of not O.K. confusion in relation to the PBL process, saying: "I don't see how we can get to the end of it." Later, in the same extract, she represented the confusion of the PBL process in positive terms saying: "But it's creative to be lost. Hurray! I'm delighted we are lost." I see these two discourses as points on a spectrum along which individual team members and the team as a whole moved along, going forwards and backwards, sometimes with small movements and sometimes with larger leaps and jumps, rather than remaining in polarized positions. These two competing ways of representing the confusion of the PBL process were discussed at length at different stages of the PBL process.

I link the confusion talked about by the PBL students to finding flow. Let us now look at what is involved in the transition from confusion to flow. The edge of chaos is a term used by O'Connor (1998: 198) for the place where there is

a balance between too much chaos and too much order. The edge of chaos was the site where new knowledge was generated by the teams, where learning took place and where a new sustainable way of working together as a team was redefined and creativity blossomed. From my analysis of how students talked about the PBL process, I have adapted O'Connor's (1999) model specifically for the PBL process.

Figure 4.8 The Edge of Chaos as the Site of Learning in the Problem-based learning process (adapted from O'Connor (1999: 201, 203) and Applied Specifically to the PBL Process)

Chaos	***Edge of Chaos/ Flow***	**Order**
Frustration and anxiety Confusion and messiness Inability to concentrate	*Knowledge* Creativity *Learning* Mindfulness	Habit /Rigidity Boredom Obsessional Behaviour
No rules for PBL process No use of whiteboards as shared learning environments No specific roles Free for all	*Sustainable way of working as a PBL team* *Communication bearing in mind agreed ground rules for the team that are reviewed and using a PBL process guide as a scaffold* *Team decides how to Use Whiteboard and Adapt and/or Add PBL roles*	Too many rules Fixed and limited headings for boards Fixed and rigid roles
Freedom from and freedom to do things	*Freedom to do things within own agreed ground rules*	Lack of freedom

It is at the edge of chaos where flow is possible. The edge of chaos is located between chaos and order, for the PBL process, this can mean that if the PBL teams communicate in ways that bear in mind the ground rules that they have made themselves and that they can review, change and add to, and if they use a PBL process guide as a scaffold (rather than as a straightjacket) they may find sustainable ways of working as a team that will foster the growth of new knowledge, learning, levels of mindfulness and creativity at the edge of chaos.

Kleimen locates the edge of chaos as a place far from high levels of certainty and agreement but before a complete chaotic state. His notion of the edge of chaos is as a place "where creativity is most potent" and as a "zone of optimal operation" (2011: 62.6). His representation of the edge of chaos as between stasis and chaos is inspiring for those of us trying to design complex PBL problems and encourage divergent thinking and healthy disagreement that can lead to developing students' creativity.

As well as talking about the anxiety of confusion, the students from both teams also talked about the non-flow state of the boredom of lack of interest

Listening to Students' talk about being not interested and bored

In the Glendalough team, a student talked about how, at times, nothing appears to get done in the PBL process:

> *Michael:* You often think when you get going on the problem initially, you wonder what you are doing, you spent the whole morning and nothing seemed to be done.

Similarly, a member of the Skellig team talked about times of boredom and lack of interest:

> *Philip:* … but very frustrating at times too, you turn off, I sort of listened and thought what are they on about again *(laughter*) I would lose it for a while then I would come back in, you know, I am not interested in that side of it or whatever it is.

Both of these remarks were made when the students were reviewing their experience of the PBL process after their work on the first problem. Strong *et al.* (2003: 24) assert that: "Boredom…occasionally haunts almost any sustained act of learning." In this PBL module students were given opportunities to become more aware of, to reflect on and to articulate their experiences of learning. Some of the students talked about the boredom they experienced. Therefore, non-flow states (and flow states) got noticed, and elaborated by students and analysed and interpreted by me as a researcher.

A state of boredom means that the challenge is too low in relation to skills level, according to Csikszentmihalyi (1991). Students in higher education do not like to be bored. Philips (1993), a psychoanalyst, views boredom as having two sides. On the one hand, boredom is a form of depression, psychoanalytically understood as anger turned inwards. On the other hand, boredom is viewed as a longing for that which will transform the self, making the learning process and life meaningful. According to Buzan (2001), one of the benefits of boredom can be the development of creativity, as the reactions to boredom, such as daydreaming and doodling, may enable people to make creative links in their minds that they may not have otherwise made.

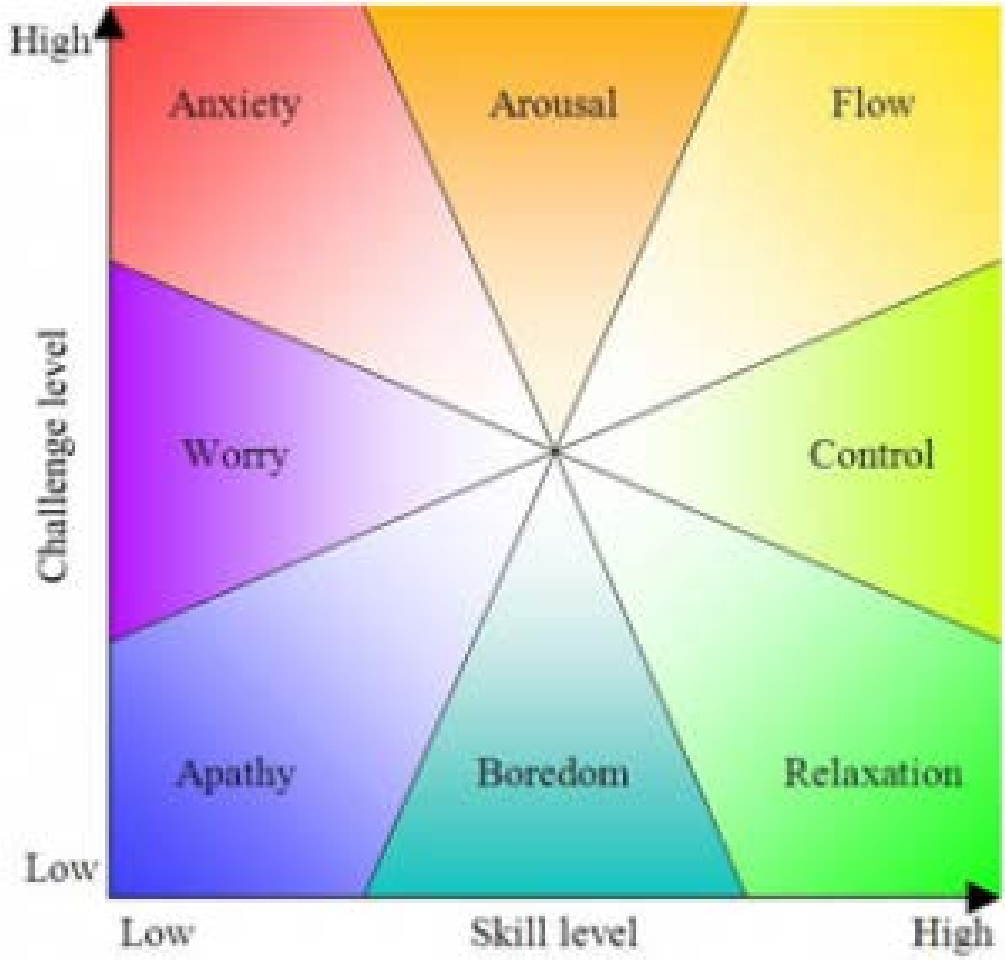
Stop and Reflect

- What has been your own students' experience of confusion?
- What kind of language do they use to describe this confusion?
- What do you think about boredom in learning?
- How do you feel about your students having the freedom to learn and create at the edge of chaos?

The PBL process as finding and being in flow: An inspiring concept for PBL practitioners

I have found understanding the PBL process as finding and being in flow inspiring in terms of both how I think about and facilitate the PBL process. The concept of finding and being in flow, is my way of making sense of these students' talk about the PBL process. The PBL process did not involve a neat transition from a to b but rather a messy transition of finding flow. For example, students talked about the anxiety of confusion in the PBL process before they talked about experiencing flow. This illuminative concept of finding and being in flow has two dimensions; finding flow and being in flow. On the way to flow, finding flow involves experiencing lack of flow states. These lack of flow states occur where there are low levels of challenge and/or skills/knowledge and creativities or where there is a mismatch between the challenge level of the problem and the current level of skills/ knowledge and creativities to meet the challenge. Csikszentmihalyi's (1986) idea of flow is that it occurs in the delicate zone between anxiety and boredom. I argue that finding flow involves experiencing lack of flow states in the PBL process and that these lack of flow states are a necessary prerequisite to achieving flow states. These lack of flow states were part of students' talk about the PBL process in this study. They are all part of the colourful journey towards creativity.

Figure 4.9 Mental state in terms of challenge level and skill level, according to Csikszentmihalyi's flow model (Wikipedia)



Practice strategies for stimulating flow creativity and mindfulness

Flow cannot be ordered to happen in the PBL process. The following strategies are specific ways of enticing in, or welcoming, flow and creativity into the PBL process and you can adapt these to your contexts. They are strategies about problem and curriculum design, facilitation of the PBL

process, developing mindfulness and student induction and staff development.

Strategy One: Design problems with a high level of challenge

Problem designers need to design problems that are sufficiently challenging that they provoke and stretch students to develop higher levels of knowledge, skills and creativities than their current levels, and then experience the optimal performance state of flow. Sometimes we don't raise the bar high enough when we are designing problems and students can become bored. And sometimes we design problems that are challenging in ways that catapult students into new areas of learning and growth. The problem needs also to be designed as challenging in the sense of it being ill-structured and large enough to stimulate student teams to define the problem, pursue paths and resolutions in different ways afforded by the nature of the problem space (Gallagher 2015).

Naomi McAreavey and her team gave her undergraduate English literature students the following problem with a high level of challenge

Case Study of an English Literature Problem with a High Level of Challenge

PBL problem: Introduction to Renaissance Poetry by Naomi McAreavey, Danielle Clarke and Jane Grogan

Renaissance Literature students have been asked to produce an anthology of Renaissance poems as a ‘taster’ for introducing first year undergraduates to the study of early modern verse. This anthology can be on any theme, but it must be in some way ‘representative’ of Renaissance poetry. It should also cultivate the students’ interest in the Renaissance.

In groups of around five, you should prepare an anthology of 10-15 Renaissance poems, all freshly edited, with at least five edited from poems in (an) early modern book(s). The anthology must represent at least three poets from the period, and each poem should be no longer than 30 lines (you may include excerpts from longer works). As a group you should agree an editorial policy (basically, how you present the poems to your readers), and apply it to each of the poems in your collection.

In preparing your anthology, you should choose a theme, then select suitable poems and arrange them appropriately. But you must provide a justification of your choices in the essay that will preface the anthology. In doing so, your aim is to educate first year students about Renaissance verse while also illuminating the specific poems you have chosen.

Designing problems with a high level of challenge can extend to designing assessments that deliberately foster choice and creativity (Servant et al 2015).

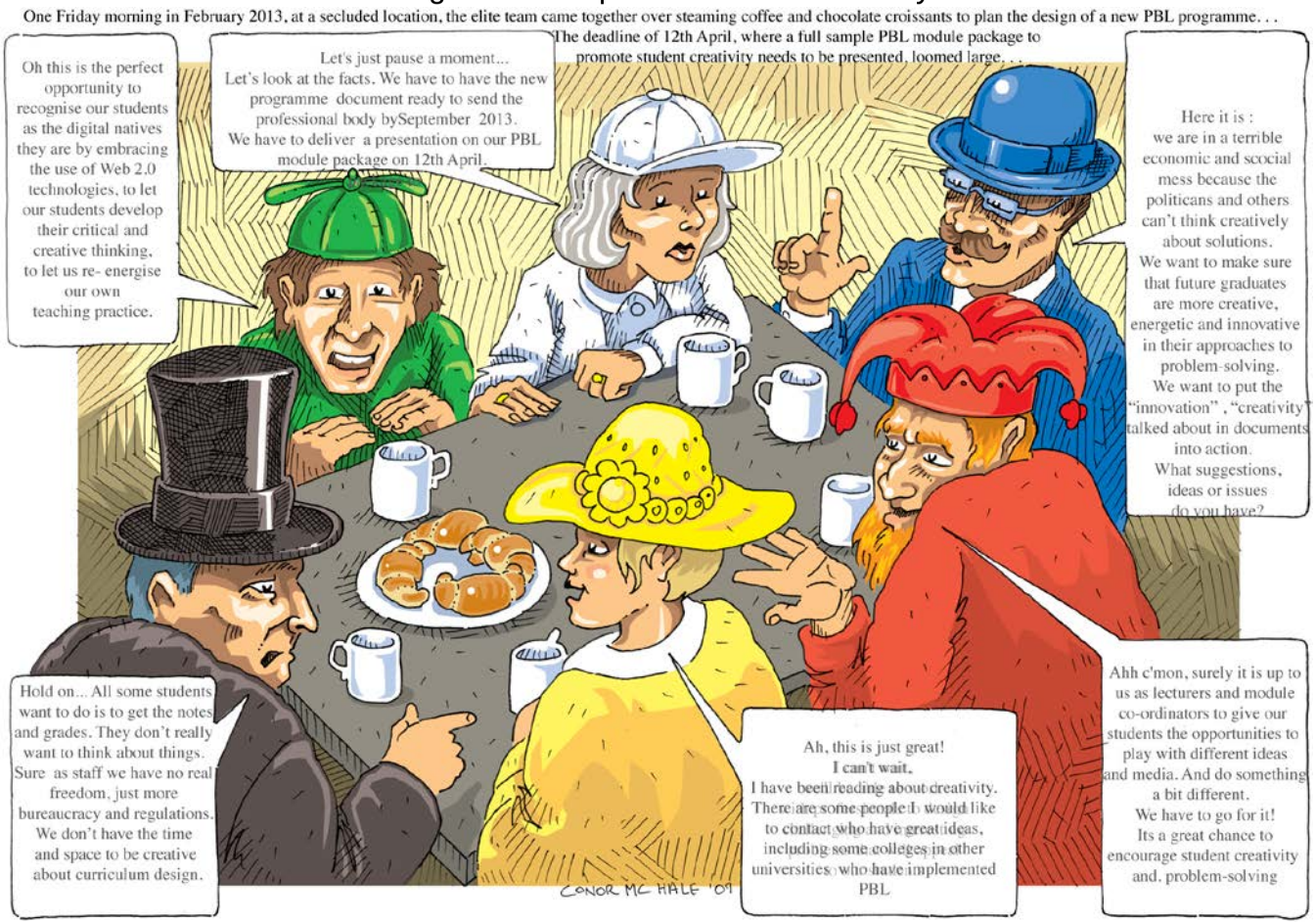
Strategy Two: Design problems about flow and creativity

A direct way of getting students to work on ideas and practices that encourage flow and creativity is to design a problem about creativity or innovation in particular professional work.

Case Study of a problem about creativity and flow given to lecturers undertaking a module on problem-based learning in higher education

When I was coordinating a module on problem-based learning for lecturers, I worked with colleagues and a cartoonist to design a problem about developing students' creativity using PBL. It is inspired by DeBono's (1999) six thinking hats approach to creative thinking. It is best read starting with the blue hat and then reading anti-clockwise.

Figure 4.10 A problem about creativity



Stop and Reflect

- What ideas do you have about designing problems about creative flow processes in your profession/discipline/interprofessional/ contexts?
- Which creative colleagues or artists would you like to work with in designing these problems?

Strategy Three: Turn the curriculum upside down and use the PBL process in tutorials rather than lectures as the centre of gravity for the module/unit.

I worked with a group of lecturers who were re-designing two English literature modules into problem-based learning modules. When they asked me my advice on implementing PBL with 500 first year students with existing resources, I suggested that they turn the curriculum on its head and make the small group tutorials the centre of gravity for the learning rather than the large lecture. They designed problems for the students to work in small groups in the tutorials. They already had a tutorial for 24 students so they divided these students into small groups and worked as roving tutors. I drew their attention to the advice from Kolmos (2002) that in a PBL curriculum you need to re-constitute the purpose of the lecture to fit in with the PBL process and the

problems the students were working on and they did this and designed "landscape`' lectures in ways that suited their context (Clarke *et al:* 2009).

Strategy Four: Work in different media to encourage Creativity

Problems can be designed in a variety of media and students can be given the freedom to work on the problems using different media to stimulate creative thinking. For example, the line *"You are free to work in any media"* can be added as a last sentence to the problem that is presented to the students. Alternatively a problem can demand students to work in particular media only e.g. visual media, in order to stretch their learning and creativities.

Case Study of a Physiotherapy problem that involved students working in video media

I was facilitating a problem design workshop for a physiotherapy undergraduate programme. We had lecturers, recent graduates, doctoral students and physiotherapists from different clinical settings. One group designed a series of problems around physiotherapy students teaching patients to use various mobility aids: crutches, wheelchairs, hoists etc. The had planned to give each student group a different scenario of a particular patient needing to be taught how to use a specific mobility aid. When the group presented their idea I asked graduates who had recently been students, to comment on whether they thought this initial problem design was interesting and challenging or a boring teachers exercise. They said they thought other students would find this a boring problem. I asked them how could they use the kernel of the problem and transform it into an interesting and dynamic problem. They suggested that they would add to the problem scenario by stating that the student group had been asked to produce a training DVD demonstrating a physiotherapist teaching a specific type of mobility aid to a patient in a particular social context and that

this DVD would then be put up on the web as a resource for all students in the school. This both raised the level of challenge of the problem and developed students' creativities in addition to their knowledge and skills. The students subsequently learnt much from the problems that they enjoyed working on, and produced very high quality DVDs.

Robinson (2001: 111) reminds us of three vital elements of creativity that are very relevant to the PBL process, namely:

- the importance of the medium
- the need to be in control of the medium
- the need for critical judgement

The interplay of ideas with different media is at the core of creativity and so we need to encourage our students to work in different media as they explore ideas towards resolving the problem.

Strategy Five: Understanding the edge of chaos as a site for flow and creativity

Finding flow in the PBL process is one way for students to develop knowledge, innovation capacity and creativity. Staff and students can be introduced to the concepts of finding and being in flow and the concept of learning at the edge of chaos.

Students experienced in PBL can play an important role in discussing their experiences of the PBL process to both staff and students. For example, I was working with a school that were expanding their use of PBL beyond first year. As part of the staff development programme I asked a panel of students to come and be experts on the student experience of the PBL process. I put them at the top of the room as the experts on the students' experience of the PBL process. The staff of the school then asked them about their experiences of the PBL process and the students talked about: enjoying it at times, being confused at times, how they learnt new knowledge, being confident to ask other students to explain things, making new friends, their

experience of the student roles, etc.

Strategy Six: Be fully present and mindful and facilitate mindful learning.

It is important that tutors encourage students to give full attention to what is being said, written, drawn or shown in the tutorials. Students listening to one another without preconceived ways forward, is key to developing group flow in PBL. Tutors can play an active role in encouraging students to really listen to one another:

> Group flow is more likely to emerge when everyone is fully engaged, what improvisers call “deep listening” in which members of the group don’t plan ahead what they’re going to say, but their statements are genuinely unplanned responses to what they hear. Innovation is blocked when one or of the participants already has a preconceived idea of how to reach the goal (Sawyer 2007: 46).

Tutors can give their full attention to the students’ talk in the tutorials and encourage students to be confident that they can work on the problem, as they encourage students to move towards creatively discovering new solutions. For example, on one occasion when I was a PBL tutor, I was in the middle of the stressful process of selling one house and buying another. I took a few minutes to centre and focus myself before the tutorial. Then I gave my full attention to the students for the duration of the tutorial, actively listening to them, watching their body language and being aware of what was happening in the learning process. Tutors can encourage students to practise mindfulness during the tutorial by listening attentively to one another, being fully present, having “an emphasis on moment-to-moment awareness” (Wright, Sadlo and Stew 2011: 140). In short, we would do well to heed the advice of Gaffney (2011: 271) that one of the key components of flow is” You are concentrating fully on what you are doing at the moment ”. The tutor has a key role in setting the climate of the tutorial as one of attentiveness, listening and being aware of what is happening in the tutorial moment by moment.

The tutor can facilitate mindful learning at the start of the tutorial by getting the students to read the problem mindfully. Barbezat and Bush (2014) provide

guidance and case studies of this approach. There are different versions of the practice of mindfully reading a text. All involve reading the text more than once, times of silence after each reading, attention to individual words as well as the text as a whole and sharing individual responses to the text and learning from the different perspectives.

Tutors can facilitate mindful learning in the middle of the tutorial by giving students feedback on what they have observed and noticed in the tutorial as a way of encouraging students to give this attention. Tutors can foster an appreciation of different perspectives by encouraging debate with a mindful appreciation of switching attention to different viewpoints. The “conditional” approach recommended by Langer and Piper (1987) can help to further learning. This involves an open-minded approach and tutors asking “ could be” “may be” questions (Langer and Piper 1987). For example I have asked PBL students: “What could that look like?”; “What may be the outcome of that?”

Tutors can facilitate mindful learning at the end of the tutorial by getting students to do an exercise in mindful writing at the end of the tutorial. These spaces can provide students an opportunity to connect what they are learning to their inner experiences, thoughts emotions and insights. One form of mindful writing is freewriting (Elbow 1998). In freewriting students write in full sentences, in silence, for a fixed amount of time using a writing prompt. The idea of freewriting is to let the writing flow from one word to the next, and not to go back to edit or correct. For example I have given my PBL students the following writing prompts: “ The new things I have learnt from working on this problem are…….”; “From the other students in the tutorial I have learnt…….”; “After the tutorial I want to …….”

For more information on mindfulness, including short mindfulness practices tutors and students can do to help in being fully present, see the further resources section at the end of this chapter.

Stop and Reflect

- What strategies will you use to develop the mindfulness of your students?

Strategy Seven: Encourage students to engage in divergent thinking first and then convergent thinking

In terms of the discovery of solutions to problems tutors can encourage students to engage in *divergent thinking* through brainstorming lots of ideas towards a solution before engaging in the more *convergent thinking* of judging these ideas. Specific techniques to facilitate brainstorming can be used. For example sometimes as a PBL tutor I give people five minutes in real silence to think about their individual ideas in relation to the problem and to jot them down on post-its. As Webster –Wright (2013: 562 my emphasis) points out: "When we allow *the mind to settle*, unusual and creative thoughts can arise to surprise us. " Then the chair can co-ordinate the ideas being posted on the whiteboard, the discussion of the ideas and the process of clustering them.

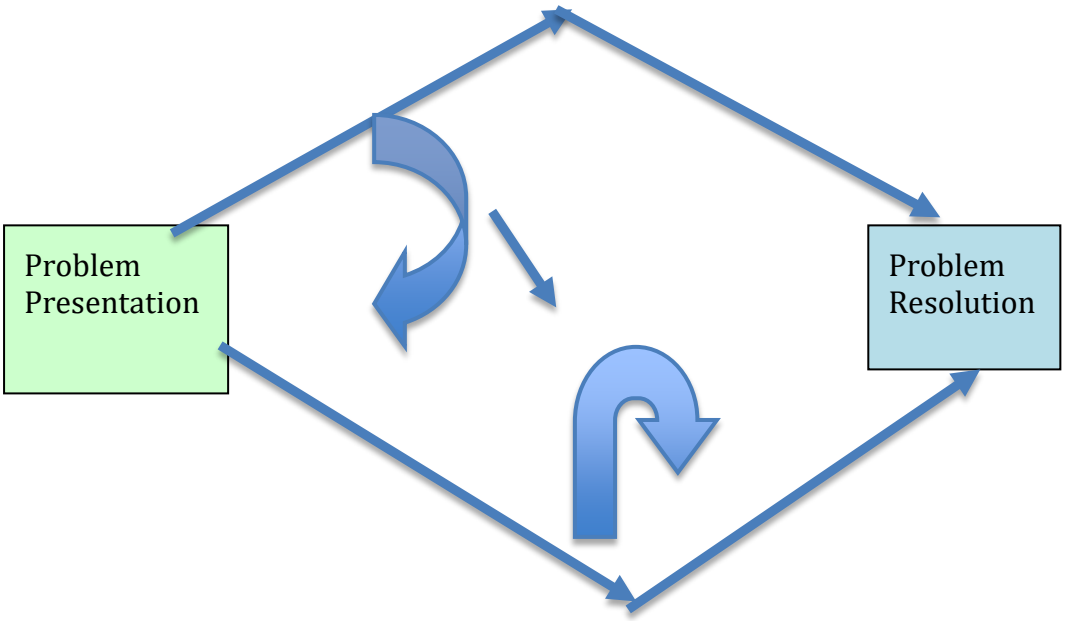
Another approach to encouraging a range of individual and divergent ideas is to use a talking stick that is passed around the group and only the person with the stick talks about their ideas and then passes it on. Getting people to work visually on the whiteboard and to work with metaphors are other ways of

helping people to play with divergent ideas. The students can then later engage in the convergent thinking of sorting through the ideas, evaluating and judging them, making decisions about what idea(s) to pursue and designing an action plan. The tutor can encourage students to engage in free divergent thinking first and not to foreclose this process too early. It is not effective for creative thinking to rush forward taking a short cut to the decision making of convergent thinking, or to let superficial groupthink kill creativity:

> With the right balance of divergent and convergent processes, one might be on the route to higher creativity-a goal sought and valued by a great many people (Knipper, Richards and Abraham 2012: 170).

The tutor can also encourage students to build on the ideas of one another, bounce ideas off one another, play with combining ideas etc. I have found both as a tutor and as an education developer training PBL tutors, that I have both stressed the importance of divergent thinking and introduced people to practical ways of doing divergent thinking.

Figure 4.11 Divergent Thinking First…Then Convergent Thinking



It is worth teaching or reminding people about the fundamental rules of brainstorming i.e.

1. Don't criticise or discount other participants' ideas verbally or non-verbally. The point of brainstorming is to get ideas out and recorded.
2. Blue-sky, wild and freethinking are to be actively encouraged. These ideas can be evaluated later.
3. The quantity of ideas is important so ensure that everyone contributes some ideas.
4. Bouncing-off other participants' ideas, piggybacking on what someone else said and combining ideas are to be encouraged (Osborn 1963, Isaksen and Gaulin 2005).

It will not be very creative if the students end up working on the lowest common denominator in terms of ideas. Rather, it is a question of giving sufficient time and energy to the divergent thinking phase so that the work on resolving the problem is based on a combination of a range of diverse ideas.

Strategy Eight: Use ground rules and the PBL process guide as scaffolds not straightjackets

Two inhibiting conditions of flow are "anomie" and "alienation" (Csikszentmihalyi 1991). He defines anomie in terms of no rules and elaborates that " when it is no longer clear what is permitted and what is not, …behaviour becomes erratic and meaningless" (Csikszentmihalyi 1991: 86). So in PBL participants can experience what they perceive as too much freedom as negative. Alienation is seen in terms of the polar opposite of too many rules where "people are constrained by the social system to work in ways that go against their goals. " (Csikszentmihalyi 1991:86). I consider that the learning space provided by PBL needs not to be constrained by too many rules and procedures, and yet provide some scaffolding for learning. Tutors can encourage students to make their own ground rules for working effectively as a team and adding or changing these ground rules flexibly as needed. The following are some sample ground rules.

Figure 4.12 Sample Ground rules

Ground rules

Start on time
Coffee available before tutorial for those who want
Respect one another
Let chairperson know if you have to be absent or late
Listen to one another, all ideas welcome initially, decisions later
Make sure everyone gets a chance to speak
No interrupting
Mobiles off or on silent
Be open to using different types of resources
Everyone does homework

Similarly, students can be encouraged to use the common PBL student roles used in the PBL process of: chairperson, scribe, reader and observer but also to add to these roles creatively as they see fit. For example one PBL group I was facilitating first added the role "photographer" and gave this to a person with photography skills and then "manager of photographer" to another person when they decided the first person was very good artistically but needed managing!

Parallel with the ground rules and roles, the PBL process visual guide can be used as a gentle scaffold not an inflexible set of steps and rules. If students get stuck or confused the tutor can make a suggestion like: "Perhaps if you look at the PBL process guide you can decide how to move forward".

Strategy Nine: Embed creative thinking tools into the PBL process

Students can be introduced to a variety of creative thinking tools by the tutor and also introduce one another to tools they have found useful. For example students can be introduced to DeBono's six thinking hats (1999). They can learn the advantage of doing one type of thinking at a time and using six different types of thinking. They can use the white hat of information to think about what are the facts of the problem, what information do they have already, what new information do they need and what would be the best sources of information. They can use the red hat of feelings to consider how

the people in the problem feel about the problem. The yellow hat of bright ideas can help them to think of different ideas for tackling the problem. The green hat of benefits can help them look at the benefits and strengths of different ways forward. However, it is also important to look at the limits of different ideas and the black hat of caution can help a team look at the pitfalls or dangers of some potential ways forward and take a devil's advocate perspective.

Other students may want to focus on integrating discipline related creative thinking tools into the PBL process. For example engineering students may learn much from integrating TRIZ creative thinking approaches into the PBL process (Savransky 2000). Tutors can introduce students to the SCAMPER technique developed by Eberle (1971). This will give them a framework for substituting, combining, adopting, adapting, modifying, re-purposing, eliminating and rearranging the multiple ideas that emerge from the brainstorm. Jackson and Buining (2010) detail specific approaches to enriching problem-based learning through design thinking. Baille (2006) provides a toolbox of further strategies for fostering creative skills. Awang and Ramly (2008: 22) when writing about the use of creative skills in PBL suggest that:

> Creative skills must be practiced until the thought patterns in our minds become comfortable with these creative lateral-thinking techniques. We can create these creative grooves in our mind so these techniques will be utilized.

Strategy Ten: Embed high-level information literacy development into the PBL process

Flow occurs when there is a match of high-level skills/knowledge and creativities and high-level challenge. In problem-based learning one of the crucial skills to develop is advanced information literacy skills. These key skills are needed in solving problems in education and professional settings. It is therefore vital that the development of information literacy skills is done in a planned, iterative and systematic way. When I was facilitating a PBL module as part of a Graduate Diploma in University Teaching and Learning I worked

with a librarian to plan this. After the teams had identified the learning issues for their first problem the librarian facilitated an information skills training session in a computer lab based on these learning issues that they had phrased as questions.

The PBL tutor needs to communicate the high level of information literacy expected. In the PBL tutorial, tutors have key roles in developing information literacy by the questions they ask and the feedback they give (Dodd et al 2010).

Strategy Eleven: Adapt the PBL process guide to the nature of the discipline or profession

The PBL process guide can also be adapted to the language and methods used in particular professions or disciplines as one way of matching the challenge of the problem with the challenges and processes in professional life. These process guides can be represented visually in compelling designs.

Conclusion

I hope that you find the concept of *the PBL process as finding and being in flow i*nspires you to do further work in cultivating your students' creativity. Here is a summary of some practical strategies to choose from and adapt to your context.

Figure 4.13 Strategies for Encouraging Flow and Creativity in the PBL Process

1. Design problems with a high level of challenge
2. Design problems about flow and creativity
3. Turn the curriculum upside down and use the PBL process in tutorials rather than lectures as the centre of gravity for the module/unit
4. Work in different media to encourage creativity
5. Understand the edge of chaos as a site for flow and creativity
6. Be fully present and mindful and facilitate mindful learning
7. Encourage students to engage in divergent thinking first and then convergent thinking
8. Use ground rules and the PBL process guide as scaffolds not straightjackets
9. Embed creative thinking tools into the PBL process
10. Embed high-level information literacy development into the PBL process
11. Adapt the PBL process guide to the nature of the discipline or profession

I think that the following poem, which contributed to my understanding of flow, captures the fluency aspect of flow very succinctly; there is a natural unfolding of personal potential as an individual performs at her/his particular optimal level.

Fluent

I would love to live
Like a river flows
Carried by the surprise
Of its own unfolding

(O'Donohue 2000:30**).**

Figure 4.14 Terry Barrett Scottish River

A key component of achieving flow is mindfulness, a purposeful attention. James (1890:424, my emphasis)) highlighted that one of the key purposes of education is to train the wandering mind to focus attention:

> And the faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will. No one is *compos sui* if he have it not. **An education which should improve this faculty would be *the* education *par excellence***. But it is easier to define this ideal than to give practical directions for bringing it about. The only general pedagogic maxim bearing on attention is that the more interest the child has in advance in the subject, the better he will attend. Induct him therefore in such a way as to knit each new thing on to some acquisition already there; and if possible awaken curiosity, so that the new thing shall seem to come as an answer, or part of an answer, to a question pre-existing in his mind.

Problem-based learning can be deliberately used to cultivate mindfulness. Problem-based learning provides a problem for students to focus their attention on. It also stimulates students to define the questions they are curious about in relation to the problem. PBL can be consciously used to

develop students' mindfulness and mindful approaches to learning including mindful reading, writing and listening.

It is vital to develop student creativity for personal, economic and social reasons (Jackson *et al* 2006). On a personal level increased creative capacity leads to: effectiveness and enjoyment as learners/workers, satisfaction and happiness as people and new possibilities and imaginings as architects of our futures. Rather than thinking of creativity as something that a small group of geniuses do during special times, Richards (2010) writes of "everyday creativity" and thinks of creativity in terms of creative outcomes of originality and meaningfulness occurring in a wide range of everyday activities. Creativity thus conceived is a democratic rather than an elite process where "Everyday creativity is indeed our birthright as human beings" (Knipper, Richards and Abraham 2012: 73). The positive outcomes of creativity for physical health, wellbeing and resilience are well documented (Richards 2010).

At the economic level, in our global technological knowledge economy "we must produce students who can manipulate, transform and create new knowledge" (Caridad Garcia-Cepero 2008: 295). Creative skills are essential for students to develop to be able to work for companies that aim to compete successfully in global markets. At the social level creativity is needed for students to play their role in addressing social problems such as poverty and environmental issues. Creativity should have an ethical dimension and creative groups can contribute much to improving society. I agree with Mrnaveric that creativity should not be reduced only to "a particular model of engagement-western individualism, fed by the market economy-which colors ambient values to a strong degree" Mrnaveric 2011: 21).

In universities more work needs to be done in "connecting 'creative capital and university pedagogy" in order to make creativity the "centrepiece" of higher education (Williams and Dawson 2008: 633). There is much written in university strategic plans about championing creativity and innovation. However new managerialism practices in higher education " run counter to the

known conditions under which creativity flourishes" namely " risk-taking, collaborative exploration and autonomy (MacLaren 2012: 159). Beyond individual academics working to teach creatively and facilitate the development of the creativity of their students

> higher education institutions need to make a concerted effort to make creative practice legitimate and foster novel approaches to supporting creativity by establishing an organizational culture that enables dialogue and collaboration between creative individuals, within and beyond the traditional boundaries (Deverell and Moore (2014: 164)

Using the PBL process as a way of encouraging flow and creativity in students is one approach to doing this. Students can be encouraged to "choose creativity" as part of the problem-based learning process

> both in terms of the process of generating ideas, and in terms of making the decision to utilize creativity as a natural part of the problem-solving repertoire (Smith and Smith 2010).

Students experiencing flow in the PBL process and learning to transfer the conditions for flow to their work and social life is important because as Nistor (2011:42**)** asserts:

> experts in the field believe there is a significant link between experiencing flow and positive emotions, skills development, high performance and acquiring meaning and significance in life (Csikszentmahalyi and Csikszentmahalyi, 1988, Csikszentmahalyi, 1990, Asakawa, 2004, 2010).

Further resources

Here is a list of some resources that you might like to choose from to inspire yourself, your colleagues and/or your students to understand and cultivate creativity, flow and mindfulness.

Online resources on creativity

Problem-based Learning in Higher Education (2015) Vol 3, No 1
Special Issue PBL and Creative Processes
https://journals.aau.dk/index.php/pbl/issue/view/120

Creativity, Fulfilment and Flow: Mihaly Csikszentmihalyi on Ted.com
http://blog.ted.com/2008/10/23/creativity_fulf/

Edward de Bono Six Thinking Hats (1 of 6)
http://www.youtube.com/watch?v=3Mtc_CBTIeI

Ken Robinson says schools kill creativity (Ted Talk)
https://www.ted.com/talks/lang/en/ken_robinson_says_schools_kill_creativity.html

John Cleese on Creativity
http://www.youtube.com/watch?v=VShmtsLhkQg

Resources on Design Thinking

IDEO- Design Thinking firm
http://www.ideo.com/about/

Design Thinking Movie
http://designthinkingmovie.com/

Crash course in Design Thinking d.school Stanford University
http://dschool.stanford.edu/dgift/

Creative Thinking Tools

deBono Critical and Creative Thinking for Schools
http://www.debonoforschools.com/asp/six_hats.asp

Resources on Mindfulness

The Association for Contemplative Mind in Higher Education
http://www.contemplativemind.org/programs/acmhe
This association transforms higher education by supporting and encouraging the use of contemplative/introspection practices and perspectives to create active learning and research environments that look deeply into experiences and meaning for all in service of a more just and compassionate society. Produces the Journal of Contemplative Inquiry.

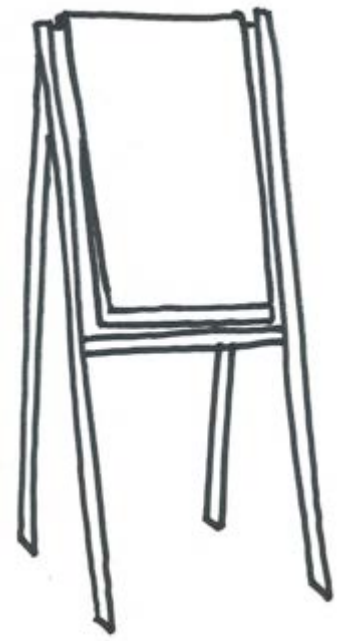
The Oxford Mindfulness Centre
This Centre teaches and researches mindfulness. It has useful resources and workshops
http://oxfordmindfulness.org/

The Mindfulness Association
Mindfulness resources, courses and conferences
http://www.mindfulnessassociation.net/

The Free Mindfulness Project
Free downloadable mindfulness resources and meditations
http://www.freemindfulness.org/download

Reflect and Plan

On your own or better still with your team, think of a specific problem-based learning initiative you are currently facilitating or one you plan to start in the future.



- What ideas or words in this chapter did you find the most inspiring? Why?
- What specific strategies do you think would be most appropriate in encouraging flow and creativity in your students?
- How might you adapt these strategies for your context?
- How can you raise the bar in terms of the level of challenge of the problems you design?
- How can you facilitate mindful learning?
- How would you represent your new ideas visually?
- What further reading or resource viewing have you been stimulated to pursue?

A PBL Practitioner's Response by Naomi McAreavey

Response to the chapter by Naomi McAreavey. Lecturer in English Literature, School of English, Drama and Film, University College Dublin.

I have a love/hate relationship with PBL. It's a lot of work. It's stressful. Some students hate it and complain through the whole process. Some colleagues hate it and worry that it's lowering standards. It involves a huge amount of planning and organization. And it often seems like we have to defend PBL more rigorously than other teaching methods because of its continued novelty in subjects like English. I have been involved in PBL teaching for six years, and every year, a few weeks into the process, I vow that I'm done with PBL. That's it: it's just not worth the effort. It's too stressful.

Then something clicks – for the students, and for me. The work comes in, and it's good. More than that, it's inspired. It's not like any other work that the students have produced. It's imaginative. They're proud of it. And they're reasonably assured of its quality because they've worked on it together. There's a buzz through the corridors, among students and tutors alike. We got there in the end!

Through several different PBL 'problems' in English, I have seen groups of students produce a staggering range of materials for assessment – beautiful anthologies of erotic poetry of the Renaissance; staged scenes from Shakespeare's plays recorded on DVD; detailed plans for an imaginary Midsummer Night's Dream festival; interactive websites on Elizabethan drama; even Shakespearean 'Top Trumps'! The freedom to work in a range of media has inspired students to create original materials, and they have had enormous fun in the process. But it's not frivolous. The license to be experimental in the production of work for assessment doesn't distract students from the academic subject. Rather, it brings them closer to it. What lies behind the assessment product created by groups of students at the end of the PBL process are weeks of independent reading in relevant academic fields, and the development and refinement of ideas through sharing and collaborating with peers. The work submitted for assessment is merely a way of demonstrating their learning, and this flexibility fosters the students' enthusiasm, excitement, and pleasure in learning. In short, it motivates and inspires them to achieve.

But this freedom is also disorientating for many students who expect to learn directly through their lecturers, and anticipate producing standard essays for assessment. These pedagogical methods continue to dominate the teaching and assessment of English and other Arts and Humanities subjects, and the relative unfamiliarity of PBL methods by comparison can make students very apprehensive, especially in the early stages of the PBL process. In order to help students overcome their concerns by themselves and find 'flow', we need to ensure that the PBL problem is well designed and the process

appropriately scaffolded, as Terry forcefully argues. And through the experience of 'flow', wonderfully described in this chapter, students can become genuinely creative.

Much of what Terry says about encouraging flow and creativity in PBL resonates with my teaching experience. Our second year students, for example, learn about Renaissance poetry by producing an anthology of Renaissance verse for first years. This is a highly challenging problem (Terry's strategy one) because they have to learn a lot about Renaissance poetry before they can select their poems, then they have to make the verse accessible to students experiencing the poems for the first time (as they are). The problem therefore involves broad and deep learning. It is also a creative project (strategy two) because they are required to produce a brand new anthology, and in so doing they are emulating one aspect of the professional work of many English Literature scholars (strategy eleven). Students are given freedom regarding the form of the anthology (strategy four), with some groups choosing to produce an online anthology; others supplementing their anthology with a CD on which the poems are read aloud; while those groups who present their anthology in the more traditional book format still experiment with the use of supporting images as well as the presentation and arrangement of the poems. One of our key objectives is to develop the students' information literacy (strategy ten), and in collaboration with the library we train the students to use two key databases, the Oxford English Dictionary and Early English Books Online, which they use to transcribe and edit the poems in their anthologies. This training takes place in the lecture, but in fact we use the PBL tutorials as the key site of learning (strategy three), timetabling the lectures after the tutorials, and ensuring that the lectures explicitly build upon the work taking place in the tutorials. Overall, the students produce very good work, and although they often still talk about the difficulty of the PBL process, they are usually proud of the work they produce in the end. They certainly demonstrate a deeper understanding of the language and contexts of Renaissance poetry: and that, of course, is our primary aim.

The PBL initiatives in English were developed with Terry's guidance, and their success is a testament to the efficacy of her approach. But in this chapter she has provided me with some fascinating new ideas for the further development and refinement of my (PBL) teaching. I'm particularly intrigued by the possibility of adopting some mindfulness techniques in the classroom. Being fully present and aware, moment by moment, listening attentively, and without prejudice, is something that we should encourage in our students and aspire to in ourselves. It will ultimately make us all better learners. And this is what I like so much about the PBL model: as well as encouraging creativity in our students, it also helps us to become more experimental, innovative and creative teachers.

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Chapter Five

Enhancers of Hard Fun in PBL

Introduction

PBL Practitioners' Vignettes

"I want the students to think for themselves"

Jane Ostrander, Ph.D., Director, Experiential Learning Center, Truckee Meadows Community College, Reno, Nevada, U.S.A

Jane in her response to this chapter discusses her students developing thinking skills, courage, creativity and career self-efficacy through the hard fun of PBL.

"Students were highly engaged and much more interested in the topic (toxicology) compared to the traditional delivery format. They welcomed the freedom and opportunity for creativity- something they don't often experience in a science degree. Overall grades improved in addition to students developing many softer skills such as group work, writing and communication skills. Increasing social interaction and creating a more inclusive environment for international and mature students was another goal achieved."

Carmel Hensey, Ph.D., Senior Lecturer,School of Biomolecular and Biomedical Science, University College Dublin.

Carmel provides a case study of a PBL problem that was both hard work and fun.

Problem-based learning (PBL) is hard work for students. PBL involves a high level of activity on their part and engagement in new levels of critical and creative thinking. The focus of this chapter is the potential of *learning in PBL to be hard and fun at the same time*. Practice strategies that enhance this hard fun are presented.

Chapter overview

This chapter will help you to:

- Think in new ways about learning in PBL
- Adapt the concept of hard fun to your own contexts
- Apply and adapt practical enhancers for facilitating hard fun in your PBL initiatives
- Get ideas from case studies of learning as hard fun
- Design PBL compatible assessments
- Widen your repertoire of assessment methods
- Use questions, triggers and further resources for developing hard fun in your PBL initiatives

One of the important resources we have for facilitating hard fun for our students is our understanding of our own experiences of hard fun. To tap into these experiences, take a moment to stop and reflect on your experiences of hard fun. You might like to use these questions as writing prompts. You can use it as a freewriting exercise. Write in full sentences, keep the writing flowing, don't edit it, let a stream of writing emerge. Please write for 10 minutes.

Stop and Reflect

Think of a specific event/task that was hard and fun at the same time

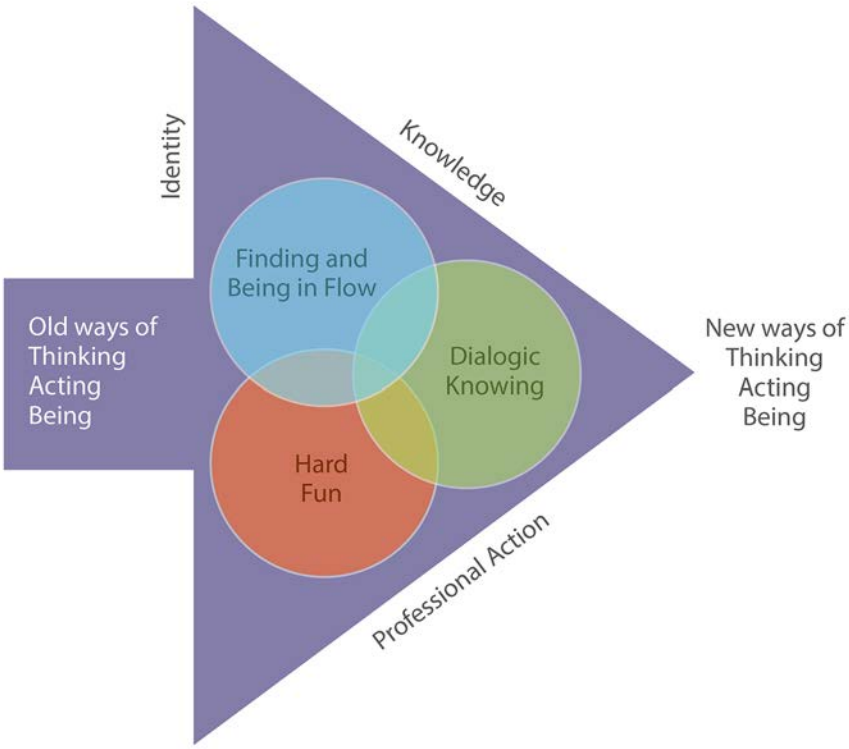
- What was the event/task?
- What did it feel like?
- What made it hard?
- What made it fun?
- What made it hard fun?
- What did you achieve?
- How do you currently encourage your students to experience learning as hard fun?
- Would you like your students to experience hard fun more often in the problem-based learning process?

The illuminative Concept of Hard Fun

What is hard fun? The concept of learning as hard fun, following Papert (1996), encapsulates the idea that emerged from the research study (Barrett 2008), that is, that learning was both “hard” and “fun” at the same time. For Papert (1996), the meaning of this concept is that learning is fun *because* it is hard. I use the concept in a more limited sense, that learning is simultaneously fun *and* hard. In this research study, while PBL was fun, enjoyable and creative for the PBL students at the same time it was hard, challenging and stretching for them.

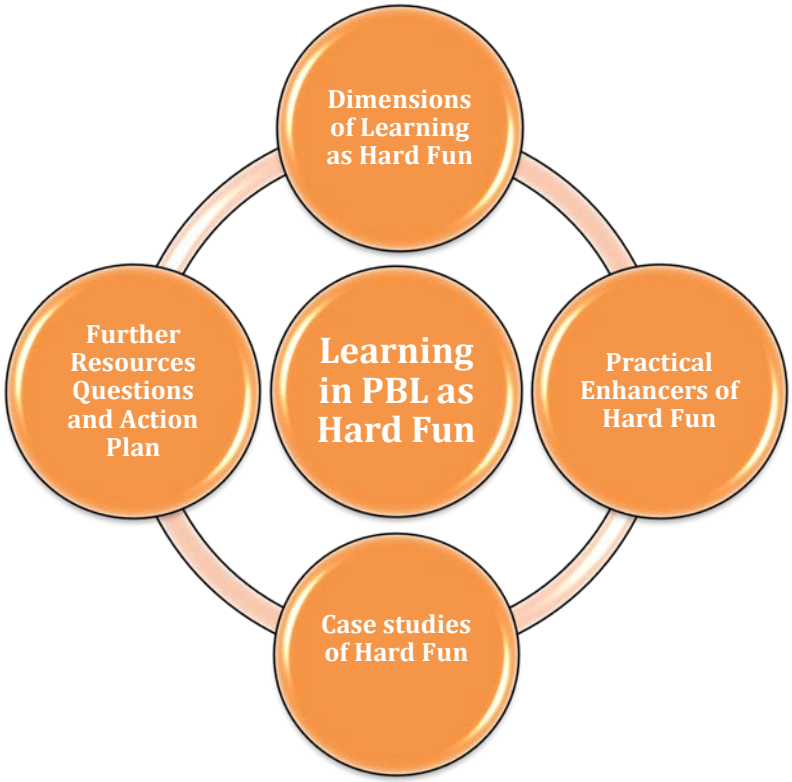
In chapter two the concept of the problem as a provoker of a liminal space was elaborated. The problem provokes betwixt and between spaces, between old states and new states. PBL problems provoke liminal spaces between 1) current levels of knowing and new levels of knowing, 2) habitual forms of professional action and forms of professional action new to the learner and 3) satisfaction with current identities and a desire to explore other possible identities. PBL students move within and beyond the liminal spaces prompted by the problem in different ways. This chapter focuses on one of those ways of learning and growing in a liminal space, that is, students experiencing learning as hard fun.

Figure 5.1 Students learning in a liminal space through experiencing hard fun



Firstly, this chapter will begin by analysing the different dimensions of how the students talked about learning as hard fun (Barrett 2008). The students were lecturers working on problems about problem-based learning. Extracts from the dialogue of the Skelligs team and the Glendalough team will be discussed. The teams and the students were given pseudonyms. Secondly, specific practical enhancers for facilitating learning as hard fun that you can adapt for your own context will be elaborated. Thirdly, as part of this discussion case study examples of PBL provoking learning as hard fun are presented. Fourthly, further resources and questions will be provided to assist you in developing your action plan for promoting learning as hard fun.

Figure 5.2 Chapter Five overview



Since an earlier presentation about learning in PBL as hard fun (Barrett 2009) I have further developed my understanding of hard fun conceptually and I have elaborated nine practical enhancers for facilitating hard fun.

Students' talk about learning as hard fun

I illustrate my view of learning in PBL as hard fun by an extract from the dialogue where some students were talking about their learning from their work on the "Help!" problem (Barrett 2008). This "Help!" problem required the teams to create a presentation to Heads of School about the PBL process.

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. Your presentation is on the second day and is for two hours. You are free to work in any media.

The Skelligs team gave a shadow acting presentation in response to this problem. In the following extract, the students were talking about their ways of learning and the impression that they would like to leave with the Heads of School. It was part of a discussion following their presentation. It is very striking to hear PBL students talking about their learning as hard fun. Listen to their words.

Hanora: ….. And working it through, tackling it and breaking it down into units (*hand moves up and down and across from left to right*) and addressing them. And as Heads of Schools they are wanting to have something unique in comparison to other schools. Maybe that is what they want, they want something unique. Em I would love to leave them with the fact that we were so creative, and the amount students, we put it all together without anybody's help, no lecturers.
Maura: It was such an enjoyable experience as well. It was actually fun.

Hanora talked about problem-based learning involving breaking the problem down into units, working on these units and then synthesising the learning themselves without help. She was talking about the learning being active hard work and it is noteworthy that she said "no lecturers". Although these PBL students were lecturers she was clearly talking about their role as problem-based learners "who put it all together without anybody's help." Maura talked about the learning being "fun", but at the same time, involving hard work, which she qualified with the word "actually." The word "actually" has three meanings all of which I interpret are implied in this context. The first meaning of actually is factually and Maura was saying that learning was in fact fun. The second meaning of the word "actually" is surprisingly; Maura was saying that surprisingly, and in opposition to some expectations she had, that the learning in PBL was "fun". The third meaning of actually is to add emphasis. Maura adds emphasis to the sentence by placing the word "actually" before fun. The learning experience was "enjoyable" and hard at the same time. The conception of learning in terms of hard fun is based on the language-in-use, the tone of the students' voices and the students' repeated expressions of learning in PBL as "fun" and "hard" in the course of this module.

In the concept of hard fun the two elements of hard and fun are complementary halves that make up a mutual whole. The Yin-Yang sculpture is an effective visual metaphor for this.

Figure 5.3 Yin-Yang Sculpture, Photograph by A. Hert of Yin-Yang Brunnen von Otto Wesendonck Bronze Sculptor, Wikimedia Commons

Reninger (2013) summarises the meaning of this ancient Chinese symbol.

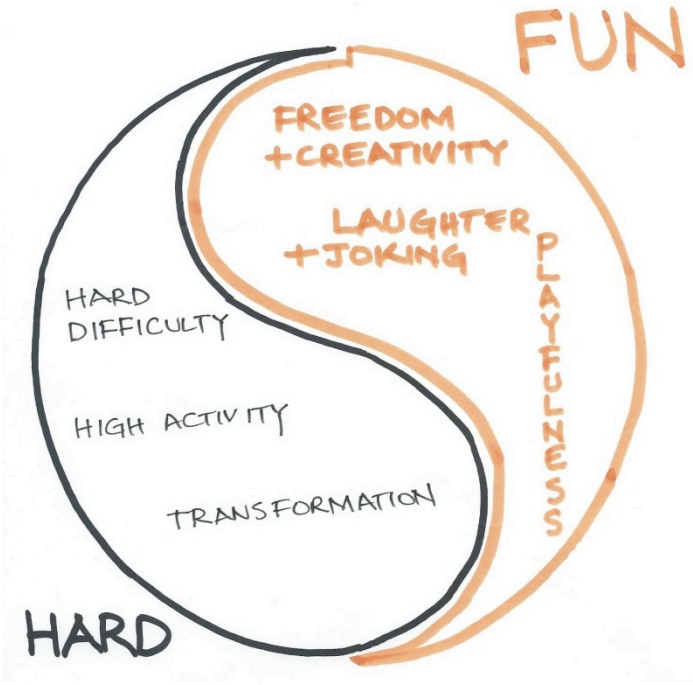
> The curves and circles of the Yin-Yang symbol imply a kaleidoscope-like movement. This implied movement represents the ways in which Yin and Yang are mutually-arising, interdependent, and continuously transforming, one into the other. One could not exist without the other, for each contains the essence of the other.

The Yin-Yang sculpture, as a metaphor draws our attention to how apparently opposite and separate elements i.e hard and fun, are in fact interdependent and interconnected.

The map of the concept of hard fun

A discourse analysis of the dialogue revealed there were three complementary dimensions of the fun: laughter and joking, freedom and creativity and playfulness. The students' talk also revealed that the hardness of learning had three dimensions: high activity, hard difficulty and the transformation of changing beliefs and values. The following figure is a map of the concept of hard fun and an advanced organiser for the discourse analysis of this chapter.

Figure 5.4 The Map of the Concept of Hard Fun: The Dimensions of Fun and Hardness



The Fun of Hard Fun

The three dimensions of fun, namely laughter, and joking, freedom and creativity, and playfulness will be discussed in turn. Extracts from the students' dialogue from the research study illustrate the dimensions.

Fun as Laughter and Joking

Laughter can serve many functions including expressions of nervousness, release of tension and joking with others. An important part of fun is laughter and joking. In the student talk, there was much laughter that expressed joking with fellow students and "craic" (the word Irish people use for an explosive, energetic boisterous type of fun).

One of the problems the students were given was entitled "Help!" which involved students preparing a presentation about the PBL process for Heads of School. The following extract is from a poem that the Glendalough team wrote as part of their presentation for the "Help!" problem, Julie was joking about herself and her learning and everyone was enjoying the laughter.

Julie: (*Stands up to read verse*)
I used to believe with all my might and height *(laughter*) [she is short!]
I could shelter students from the mess of real life
and then I learned some more. *(laughter*)
(*Tears up written verse and sits down*)

At the participant validation session Julie, from the Glendalough team, said that PBL was "fun", "relaxed" and that "you could slag people off". "Slag" is an Irish slang expression meaning to joke with someone about her/himself.

Fun as Freedom and Creativity

Freedom and creativity was the second dimension of fun that the students talked about. The Skelligs team talked about the assessment of learning in terms of "Assessment of learning: Terrifying lack of freedom versus enjoyable freedom". The students talked about freedom, creativity and laughter in presenting their learning through shadow acting, which they also described as a lot of hard work. They chose to do the entire presentation for the "Help!" problem through shadowacting. As noted in the previous chapter, the students had four characters behind the screen and the fifth character was a

person holding a puppet. In addition, there were two narrators. One narrator told the story of the PBL team as it progressed from scene to scene while the other linked what was happening in the shadow acting to PBL theory and research. This shadow acting was a genre that was new to some of them and this change in genre was reflective of a change in the way they were interacting with one another in an assessment of learning space. After the presentation, there was a discussion about why they had decided to take this particular approach to the problem and presentation. The following is an extract from that presentation:

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.
Beatrice: And Hanora is now running away with the circus *(laughter*)….

The students talked about the freedom and creativity that was part of their learning experience in PBL. The stretching of "the boundaries" was two-sided; it gave the students the freedom to be "creative" but also made some students "quite nervous." Freedom is a prerequisite of creativity; both factors are essential elements of fun.

Jackson (2006:3) argues that the problem of developing students' creativity in higher education is:

> a sense of dissatisfaction with a higher education world that seems, at best, to take creativity for granted, rather than a world that celebrates the contribution creativity makes to academic achievement and personal well-being.

Problem-based learning has the potential of providing learning spaces where creativity for academic and personal development can be socially constructed, confirmed and celebrated together in PBL tutorials. Hanora, who was a lecturer in nursing, was responsible for the props and stage design and

enjoyed exploring her creativity so much that Beatrice joked about her "running away with the circus."

Teaching in higher education is about facilitating student learning. It is also a performance that requires that attention be given to scene setting and props. The word "creativity" is often repeated in the strategic plans of universities and other higher education institutions. The key argument for treating:

> creativity in students learning more seriously is that creativity lies at the heart of learning and performing in any subject-based context and the highest level of both are often the most creative acts of all. Our problem then becomes one of co-creating this understanding within different disciplinary academic communities (Jackson, 2006: 3-4).

The students in the Skelligs team contrasted their experience of assessment of learning in PBL as enjoyable freedom, with some previous experiences of assessment of learning that were characterised as terrifying and lacking in freedom:

Maura: How many times do you have the opportunity to be assessed and actually enjoy it, without being terrified….(*laughing)……*
Ann: You mean you were not terrified? *(laughter)*
Hanora: The screen helped, you know if you don't like acting or anything like that, you are totally hidden away, there was an element of protection and security as well.

Freedom as defined in the following analysis incorporates inner and outer dimensions:

> In the first place the freedom that I am talking about is essentially an inner element, something that exists in the living person quite aside from any of the outward choices of alternatives that we often think of as constituting freedom…The second point in defining this experience of freedom is that it exists not as a contradiction of the picture of the psychological universe as a sequence of cause and effect, but as a complement to such a universe. Freedom rightly understood is a fulfilment by the person of the ordered sequence of her life. The free person moves out voluntarily, freely responsibly to play her significant part in the world whose determined opportunities move through her spontaneous choices and will (Rogers and Freiberg 1994:30).

The students experienced " freedom" in both dimensions; an inner existential freedom, and an outward expression of freedom, as choices between alternatives. Problem-based learning has the potential to create a space which offers significant levels of freedom to learn, a free zone where students can brainstorm their ideas, reason through the problem, determine their own learning issues and action plans in the context of multiple alternatives. Problem-based learning can provide two of the key ways of building this freedom, as outlined by Rogers and Freiberg (1994), namely, the building of problems perceived as real and providing resources for learning for the students.

This freedom to learn space was one in which the students had real possibilities to move beyond their current levels of learning, creativity and professional practice and provided the fertile ground for stretching "the boundaries" as one student put it. Harland (2003:268) highlighted the fruits of the freedom that PBL can offer, as he described PBL experiences in zoology:

> …the freedom we gave students to work within this environment sustained new levels of energy, excitement and commitment. Barnett describes an educational ideal of 'critical being'… with learners engaged in critical thought, self-reflection and action. To achieve this, learners must invest something of themselves in this engagement and this investment appeared to be sustained throughout the PBL curriculum.

Part of the freedom that Harland's students experienced stemmed from the fact that they were given complete freedom to work in any media they wanted. In my study, I witnessed this experience at the end of the module where the students talked about this freedom in positive terms. However, at earlier stages of the module, the students talked about the freedom in negative terms, for example, they sometimes spoke of the freedom of the PBL process in terms of confusion that was not O.K., which is documented in the previous chapter.

At the participant validation session, where students were presented with the my analysis, Maura talked about the freedom they experienced as "liberating". Betty made links between this theme of freedom and Stake's (2002) keynote

paper entitled “The Unbearable Lightness of Education ”. She explained that this paper was an analogy with “The Unbearable Lightness of Being ”[Kandura 1984]. She said: “Do we want our students to be heavy with the curriculum we have set or light with their own curriculum, own agenda. This links with words like freedom and enjoyment.” Betty then referred to how Stake talked about the lightness of how his granddaughter, who was three, learned. I joined in the conversation making links between Stake’s description and Brendan Kennelly’s (1990) *Poem from a three- year old.* I talked about how in Kennelly’s poem, the three year old is learning through asking a series of questions, in a creative, playful way. The little girl comes down to the kitchen with her father and sees a vase of flowers withering. Here is the poem:

Poem from a three -year old
By Brendan Kennelly

And will the flowers die?
And will the people die?
And every day do you grow old, do I
Grow old, no I’m not old, do
Flowers grow old, do
Flowers grow old?
Old things-do you throw them out?
Do you throw old people out?
And how you know a flower that’s old?
The petals fall from flowers,
And do the petals fall from people too?
Every day more petals fall until the
Floor where I would like to play I
Want to play is covered with old
Flowers and people all the same
Together lying there with the petals fallen
On the dirty floor I want to play
The floor you come and sweep
With the huge broom
The dirt you sweep, what happens that,
What happens all the dirt you sweep
From flowers and people,what
Happens all that dirt? Is all the
Dirt what’s left of flowers and
People, all the dirt there in a
Heap under the huge broom that
Sweeps everything away?

Why you work so hard, why brush
And sweep to make a heap of dirt?
And who will bring new flowers?
And who will bring new people? Who will
Bring new petals to put in the water
Where no petals fall on to the
Floor where I would like to
Play? Who will bring new flowers
That will not hang their heads
The tired old people wanting sleep?
Who will bring new flowers that
Do not split and shrivel every
Day? And if we have new flowers,
Will we have new people too to
Keep the flowers alive and give
Them water?
And will the new young flowers die?

And will the new young people die?
And why?

How can we bring some of the lightness, fun, curiosity, questioning and sense of playfulness of the three year old back into learning in higher education through problem-based learning? This is the crucial question.

Fun as Playfulness

Playfulness was the third dimension of fun. The Glendalough team played with the image and the metaphor of tearing up old, useless ideas. At the start of their presentation they did this in relation to the “Help!” problem, they showed a video clip from *Dead Poet’s Society,* where the teacher was encouraging the students to tear some nonsensical pages about literacy criticism out of their textbooks, and following his instructions one student did so, and then the others did likewise. The video clip showed the student that was the first to tear out these pages.

Figure 5.5. Clip from Dead Poet's Society: Student Tearing out Pages of Textbook (Weir, P. (1989) *Dead Poets Society*. [Film])

The students played with the idea of tearing up pages, and at the end of the presentation, they presented a poem they had written communally entitled "I used to believe and then I learned some more". Each person stood up to recite the verse that she/he had written, and then tore up the paper on which the verse was written, before she/he sat down. In the discussion following the presentation, this action was explored.

Mary: So we were also connecting back then to the initial film clip where they had to tear something out so this was why we tore our poem as well, so we had to let these go
Terry: Right.
Mary: And we were hoping the Heads of Schools….(*laughing*)…that they might have to tear a page out of their book, let go of some of their beliefs. We felt we wouldn't get them on board unless they really understood they were going to have to challenge their own belief systems in relation to the book.

The Skelligs team also had a great sense of playfulness that was particularly visible in the shadow acting of their presentation. They played with the medium of shadow acting, including props and lighting. This "play with a purpose" that both teams used is crucial to the hard fun that happens at the edge of chaos; this goes "beyond the apathy of strict order and the over-excitement of chaos to generate an ordered chaos that permits freedom within structures and fun within limits" (Rea 1997:1).

Terry: … it was very enjoyable, thanks a million. Its very thought provoking and entertaining, a great combination. Can you tell us why you decided to take the angle you took; in terms of deciding the kernel of the problem and the way you presented it?
Beatrice: Well I think, as we said in the role play there, that our job wasn't introducing what PBL is and giving them all that background, because that was already going to be tackled on the first day. So we sort of sat around and thought what do we have to offer that is unique. And we felt that it was an insight into the process of PBL, to actually let them see what happens at a meeting, or a tutorial meeting and how…eh…the whole thing works. That is where it came from.
Joan: We wanted a different space for the role-play. Because we wanted them to have the, you know how sometimes you have role plays and you watch them and they can be quite distracting because you are watching say what people are wearing or thinking gosh she is a really good actor. So we wanted to have something that didn't concentrate on what people looked like, we wanted to concentrate on the voice and create some sense that you are watching something that has already taken place. To put it in a retrospective space.
Maura: The style of the presentation was designed to grab people's attention, and that it would be something you would remember afterwards. (*laughter)*
Philip: I guess also that they would have gone through a day in the seminar, perhaps having watched presentations that were more dry so this would have been something at the end, which might have caught their imagination a bit.

At the participant validation session where I presented my analysis to the teams, Kate talked about the playfulness of her students as they worked on a problem about Mary who was mid-career and considering her future options as a marketing manager. She talked about how her postgraduate marketing students played with a cardboard box representation of a marketing manager.

> I am absolutely fascinated by the way they are doing it. Yesterday one of the girls produced a cardboard box with a face painted on it and said let's use this to get a handle on Mary on whom the problem is based.

My understanding of hard fun is in its context of the play ethic to which it belongs. In terms of the play ethic, play can is viewed, not as something separate from work and learning but as a media for both. Kane (2004a)

contrasts the play ethic with the work ethic to highlight that in the future play will become our dominant way of thinking, doing, learning and adding value. Play can be a fruitful approach to different types of work including science, education and media. Kane (2004b:38) quotes Freyerabend (1999) to introduce the general applicability of his theory of play and to illustrate the role of play in science:

> [Science] is a bricolage of experimentation…initial playful activity is an essential prerequisite of the final act of understanding…new scientific practice needs time to develop its conceptual tools and its empirical data by playing with them, that is by constantly repeating and combining them until they become common usage or reality.

Kane (2004b) explains that play is about engagement and that the Indo-European root behind the old English *plegian* is found in Celtic, German, Slavic *dtegh* meaning to engage oneself. Hard fun fits very well into the modern rhetoric of play. A key figure in this scholarship of play is Sutton-Smith (1999) who views play as frivolity, play as progress, play as imagination and play as selfhood. The idea of play as "selfhood" both asserts that we are only fully human when at play and that through play we can develop a more integrated self:

> Schiller coined his timeless play aphorism ' Man only plays when in the full sense of the word he is a man, and he is only completely a man when he plays' –he was defining play like Shelley's imagination as something that could unify the divided selves of early modern society (Kane 2004b: 96).

Central to the play ethic is a way of thinking which tries to close a huge gap in modern living, the gap between who we are and what we do (Kane, 2004b).

The Hardness of Hard Fun

From the students' language-in-use, I interpreted that the hardness in learning in PBL had three dimensions: the high level of activity demanded by the nature of the learning, the hard level of difficulty associated with the learning required to work on problems, and the transformative dimension of the learning in terms of change in attitudes, values and beliefs.

The High Level of Activity Demanded by the Nature of the Learning

The high level of activity demanded by the nature of the learning in PBL was one aspect of the hardness of the learning. A defining characteristic of hard learning (as opposed to passive learning) is whether the students themselves are actively engaged in their learning rather than merely being recipients of transmitted knowledge. One way of differentiating hard and soft learning is in terms of whether the students themselves are doing the action or are passively observing others in action. A striking characteristic of the hardness of the learning in PBL was the fact that the students themselves decided the learning issues and action plans for completing the work. The students defined the problem, reviewed the facts, brainstormed ideas, sought out resources and information, reasoned through the problem, completed the other work that they decided to do, made their own decisions on which directions to take or not to take and finally, they presented their learning. Hanora talked about this activity in terms of the type of tasks that had to be completed

> working it through, tackling it and breaking it down into units (*hand moves up and down and across from left to right*) and addressing them.

She also talked about the high level of activity in terms of having to do the presentation themselves:

> Em I would love to leave them with the fact that we were so creative, and the amount students, we put it all together without anybody's help, no lecturers.

Frank saw PBL as a solution to two major problems he had, namely, implementing a new, demanding curriculum and the high failure rate at the international examinations for a programme for aeronautic engineering technicians. There were new topics introduced to the curriculum and it was essential for students to pass the exams in order to gain employment as aeronautic engineering technicians. A continuation of the same approach that

was being used would not address these two crucial issues. At the time of the participant validation session, Frank, who had piloted PBL with aeronautic engineering technicians and was doing research on this initiative had this to say:

> We are close to employers. It's very obvious we cannot continue the way we are going… PBL is a very clear solution to some of the problems we are trying to grapple with. I got them to do it in a difficult module and it was very successful… I had an interview with the head of the Aviation Authority this morning. The first thing he said was that this new curriculum cannot be done in the time the teacher has face-to -face. You are going to have to get these people in some shape or fashion to do it themselves. I was nodding my head and making sure the recorder was working well (*laughter*). If I had written the speech for the man! (*laughter*). I said as it just so happens I have piloted PBL.

Frank's students had to do much active learning themselves, however, a PBL approach meant there was a possibility that this hard work could also be hard fun.

The Hard Level of Difficulty Associated with Learning

Not only was the learning hard due to the high level of activity, it was also hard because of the hard level of difficulty. As well as defining the difficult problem, deciding on learning issues, engaging in independent study and sharing their knowledge in an academic debate, the students had to go beyond academic debate and synthesise their learning to design and produce the product required for the problem for a specific audience.

The Glendalough team talked of their learning in terms of "I used to believe" versus "and then I learned some more" and summarised their learning about problem-based learning in a poem, entitled *I used to believe and then I learned some more.* The learning they talked about was hard in terms of the difficulty level of meeting the challenge of the problem. In particular, they talked about the high difficulty level associated with the learning required in the way they decided to address the problem:

Kate: And sometimes the harder thing to do probably distils the essence a bit better. It was extremely difficult to come up with that poem. What it actually did for us, distil the essence of what the PBL experience was like for us.

The Transformative Dimension of the Nature of the Learning

The transformative dimension of the nature of the learning was the third dimension of the hardness of the learning in PBL. I begin my discussion of this dimension by presenting a poem that the students from the Glendalough team wrote. This poem shows how the learning was hard because of the transformation in their beliefs and attitudes. The learning extended deeper, beyond levels of knowledge and skills acquisition, to attitudinal change. At the end of the presentation for the " Help" problem the Glendalough team decided to recite the following poem they had written.

Sue: (*Stands up to read verse*)
I used to believe
that I was the lead, and what the students need was to follow
and then I learned some more. (*Tears up written verse and sits down*)
Noel: (*Stands up to read verses*)
I used to believe
that my teaching style gave cause to smile
and I enjoyed my delivery style
and then I learned some more
I used to believe that students learned according to my notes
would give me cause to gloat
and then I learned some more.(*Tears up written verses and sits down*)
Bob: (*Stands up to read verse*)
I used to believe
that students will always be bright and white
and all would be enabled and not disabled
and then I learned some more.(*Tears up written verse and sits down)*

Sue: (*Stands up to read verse*)
I used to believe
that the knowledge learned in college
gave lifelong sources for my courses
and then I learned some more.(*Tears up written verse and sits down*)

Julie: (*Stands up to read verse*)
I used to believe with all my might and height *(laughter*) [she is short]
I could shelter students from the mess of real life
and then I learned some more. *(laughter*)
(*Tears up written verse and sits down*)

Frank: (*Stands up to read verse*)
I used to believe
that I'd be beholden
to the curriculum of olden
and then I learned some more. (*Tears up written verse and sits down*)

Kate: (*Stands up to read verse*)
I used to believe
that there were new learning and teaching methodologies
and they were a load of codologies
and then I learned some more. (*Tears up written verse and sits down)*

Ruth: (*Stands up to read verse*)
I used to believe (*laughing)*
I used to believe
that talk of process
was all hocus-pocus
and then I learned some more. (*Tears up written verse and sits down)*

Kate: (*Stands up to read verse*)
I used to believe
that their workload was vicious
and that their assessment was not pernicious
and then I learned some more.
(*Tears up written verse and sits down)*

Mary: (*Stands up to read verse*)

I used to believe that education of the visceral should be peripheral
and stirring emotion would cause commotion
and then I learned some more. (*Tears up written verse and sits down)*

Ruth: (*Stands up to read verse*)
I used to believe
That the role of assessor was not an oppressor
that lecturers grades need not to be explained
and then I learned some more. (*Tears up written verse and sits down)*

Sue: (*Stands up to read verse*)
I used to believe
that you can start new courses
with promises of resources
and then I learned some more *Tears up written verse and sits down)*

Mary: (*Stands up to read verse*)
I used to believe
that Heads were there to fear
I'd better watch out and steer well clear
and then I learned some more. (*Tears up written verse and sits down)*

All: *(Stand up to say lines)*
Now we are going to ask for ear
its time we got everything out in the clear
(All sit) (Audience applause and laughter)

The form and function of the language-in-use in this poem is that of a poem of transformative learning. In the first line of each verse, the verb is in the past perfect tense " I used to believe" while the verb in the fourth line is in the past tense "I learned". This shows that over time, each person changed what she/he believed. The action of each person tearing up her/his verse and letting the pieces of paper fall after they have read their verse(s) symbolizes the letting go of old teaching beliefs and approaches.

Agency can be seen very clearly in the use of "I" and "we" in the poem. The concept of agency acknowledges that the actions of people are partly, but not totally, socially constructed, and that agents "have their own 'causal powers', which are not reducible to the causal powers of social structures and practices" (Fairclough 2003:22). Each person stood up for her/his verse and read what she/he wrote. For the final two lines, the full team stood up and recited the lines together. I argue that the students were remaking their selves, and having their selves remade through the context of learning in the PBL tutorials and that these twin processes occurred simultaneously. There was a dialectic relationship between agency and contexts (Giddens and Loyal 1998). This transformative learning contained characteristics outlined by Mezirow (1991:161) as:

> An enhanced level of awareness of the context of one's beliefs and feelings, a critique of their assumptions and particularly premises, an assessment of alternative perspectives, a decision to negate an old perspective in favour of a new one or to make a synthesis of old and new, an ability to take action based upon the new perspective, and a desire to fit the new perspective into a broader context of one's life.

Transformative learning involves the imaginative insights of visualisations, that is, of playing with new possibilities. The students talked in terms of "I used to believe and then I learned some more." Letting go of old perspectives is part of this perspective transformation. Learning involves a transformation of self. The change to a new way of learning through PBL, with the associated changes in the students beliefs about different aspects of learning and teaching are manifested in the change to a new genre, the genre of a poem. At the end of the presentation, there was a discussion and I asked the students why they had chosen to write a poem.

Terry: And why a poem?
Mary: Well it was because it was something that would be shared. And that we could tease out what we were challenged. So the title of the poem was *I Used To Believe*, its quite provocative, because we in the kernel of this project had to include that we really saw this whole PBL process for us as a big major change, managing change, so in all management of change one's beliefs are always questioned and challenged. So that is why we decided to do it…
Julie: PBL was something new for the students, a new process that they had to go through and I think when Mary came in with the idea of a poem,

it was like Oh My God! I am not a poet! *(laughter)* , to write something like that. So it's something like that experience that the students would have to go through as well, just doing something new.
Kate: It's taking you out of your comfort zone, gets you, challenges you a bit more.
Sue: It's also a different way to reflect on parts you had contributed to the group work and the process, the PBL process, nice from that point of view and summarise it in two sentences.

Fairclough (1992) uses the term genre referring to a relatively stable set of conventions that is associated with a socially ratified way of acting and interacting. He views changes in genre and changes in social practice as being dialectically related. In *Discourse and Social Change* this relationship is described as follows:

> Changes in social practice are both manifested on the plane of language in changes in the system of genres, and in part brought about by such changes (Fairclough, 1992:126).

Poetry is often used, as it was in the PBL students' poem, to capture emotional and attitudinal change. In the poem, students described how their beliefs and attitudes about many aspects of learning and teaching have changed, as a result of experiencing problem-based learning as students in an education development module.

Through their poem the students were engaging in ideological critique by questioning their beliefs. This de-mythologising of their learning and teaching situations involved them questioning both their teaching strategies and their intentions. There was some movement from a teacher focus to a student focus and the students were also deeply questioning their underlying attitudes. In the poem, there is some movement away from the intention of the transmission of information. This de-mythologising of reality had the potential to lead to transformative social action. The learning was hard as it is working at the transformative level of beliefs, values, attitudes and ideologies. The students were experiencing attitudinal change that is the hardest, and also the most important type of learning. When long-held beliefs, values and attitudes

are challenged, turned upside down or replaced by new ones, it may be experienced as both hard in terms of transformative work, and fun, in the sense of a liberating freedom of having new attitudes and beliefs that may serve ourselves and others better. And so how can we enhance hard fun in PBL initiatives?

Nine Practical Enhancers of Hard Fun

Enhancer one: Design hard fun problems
Enhancer two: Design assessments as learning opportunities
Enhancer three: Design PBL compatible assessments
Enhancer four: Facilitate tutorials in ways that combine academic rigour with enjoyment.
Enhancer five: Encourage effective team formation
Enhancer six: Give attention to the physical environment
Enhancer seven: Be transparent about how you assess the team product and/or the team process
Enhancer eight: Design PBL staff development initiatives to include opportunities to reflect and work on beliefs and values about teaching and learning.
Enhancer nine: Give lecturers opportunities to experience hard fun as PBL students in order to provide a good starting point for them to encourage their students to have similar experiences.

Enhancer One: Design hard fun problems

Understanding the concept of hard fun can stimulate problem designers to design problems that are hard enough to really challenge students and open-ended or creative enough to have space for fun. I have set participants on problem-writing workshops the challenge of writing hard fun problems. Having a team of stakeholders e.g. lecturers (from the discipline and others from a different discipline), students, professionals from workplaces, librarians, education developers and education technologists working together

to design problems helps to give them the depth and breadth that can make them engaging and challenging.

Variety and challenge are important in learning and designing problems in different media and encouraging students to work in different media is one way of providing this variety. The following problem (in the form of a project brief) was for a toxicology module for third year science students, where they were encouraged to work in different media and to be creative and playful.

Figure 5.6 Toxicology Module Problem by Carmel Hensey

- Each group is required to design a learning aid to teach the fundamentals of organ specific toxicology.
- Be creative, you are free to work in any media (e.g. film, model, poster, wiki, app, podcast…..).
- The learning aid should convey the key points regarding toxicity in a particular organ and the mechanisms of damage in a particular organ using at least 3 major toxins to demonstrate toxic mechanisms in the organ.
- On completion of this task each group will have to give a brief overview of their strategy and type of learning aid developed to the class. The learning aids will then be available to all students during the practical periods, where you will use the available tools to learn about toxicity in different organs.
- All aspects of organ based toxicity will be examined in the end of term MCQ, so it will be important that students take this opportunity to learn from each other's projects

Carmel Hensey found that games were popular; both traditional and computer format

Figure 5. 7 TOX HOP- Board game- focus is on liver toxicity

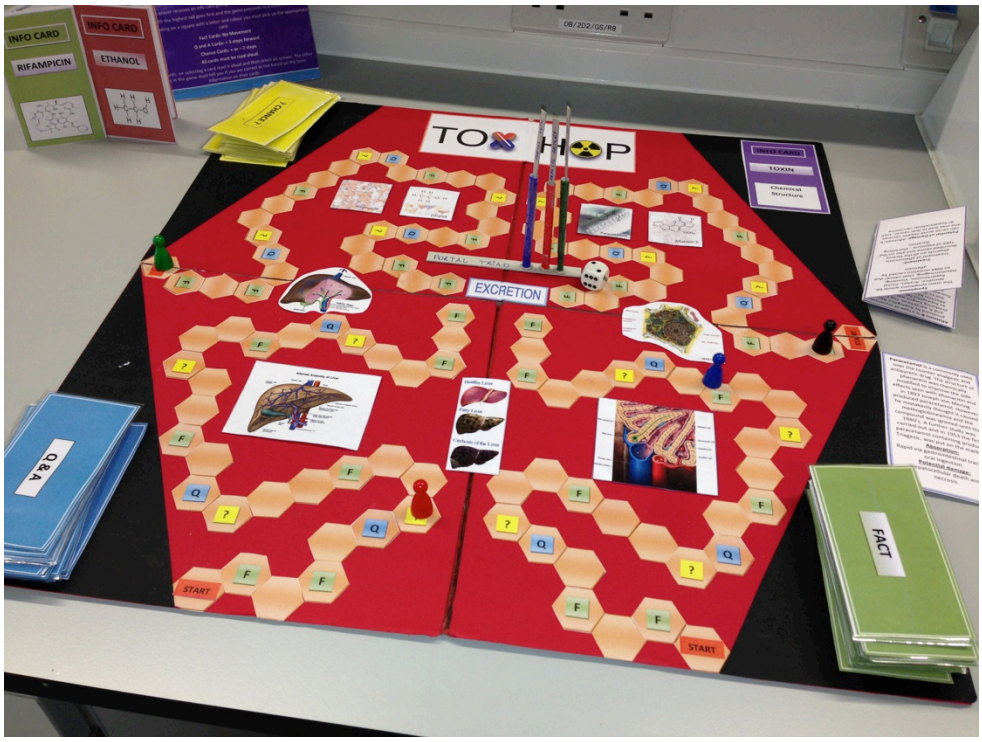


Figure 5. 8 Renal Pursuit Board Game focus is on kidney toxicity.

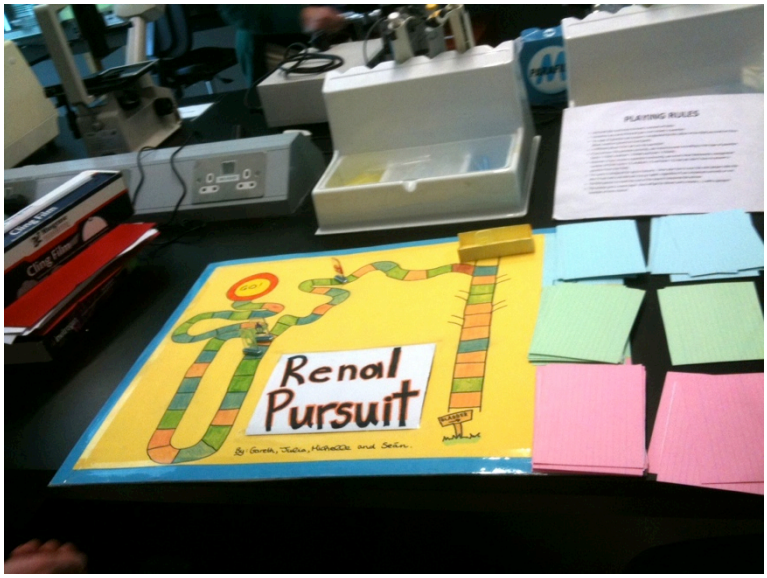
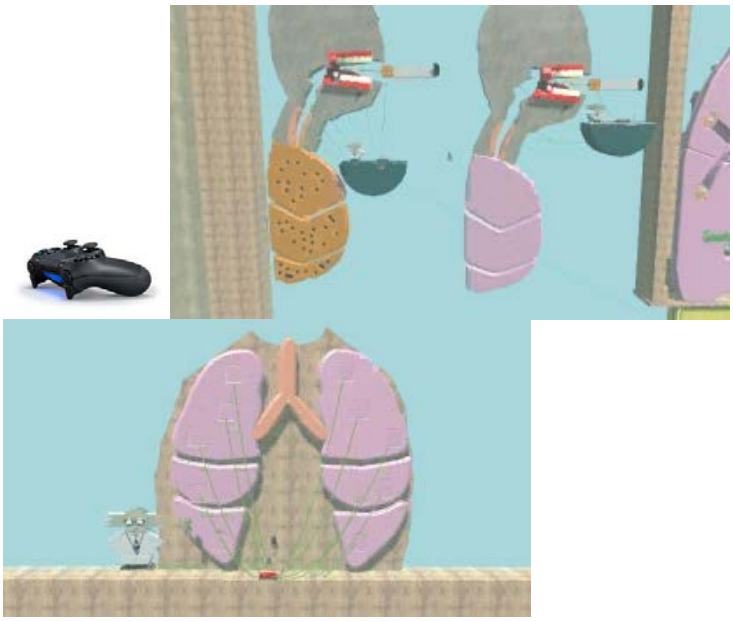


Figure 5. 9 Screen shots from Lung Tox PlayStation game.



Also websites and digital media designed for use on smartphones or other mobile electronic devices proved popular including the following:

A website on reproductive toxicology designed for smartphones: note the series of videos created for this application.
http://myapp.is/repro%20tox

A wiki on blood toxicity: note the different pages designed for visual learners, audio-visual learners and “table people”. Mnemonics and Rhymes were also created.
http://toxic-responses-in-the-blood.wikispaces.com/Welcome%21

A website on kidney toxicology:
http://toxicologyofthekidney.weebly.com/

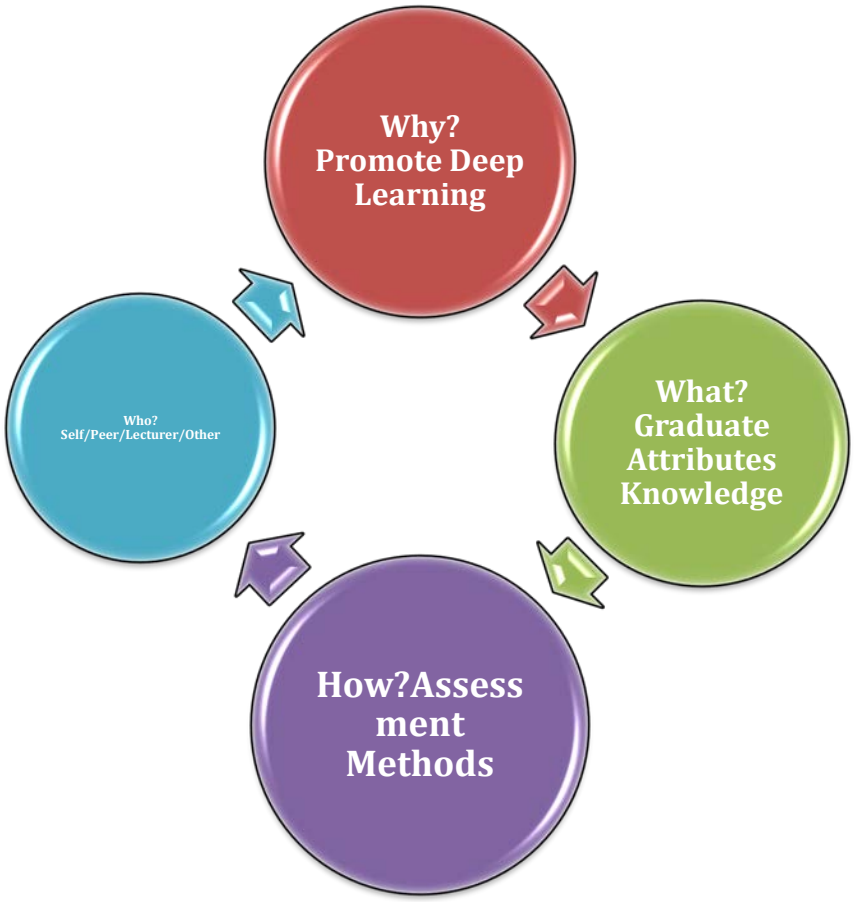
See chapter two for further practical strategies for designing problems together with some more sample problems.

Enhancer Two: Design assessments as learning opportunities

Assessments serve many purposes including encouraging students to engage in deep learning, measuring what students have learned, checking the competency of practitioners and assuring the standards of awards. In problem-based learning the major focus on the design and review of assessments needs to be on how well the assessments promote *deep learning*. In deep learning the intention is for students to seek personal meaning for themselves, working at understanding concepts and their interrelationships and using evidence to give explanations and make arguments (Martin and Saljo 1976, Entwistle 1988). In PBL contexts, the intention is for students to understand new concepts by linking them to what they know and relating them to the problem they are working on so that they will be able to use their new understanding again with new problems in different contexts. As assessments drive learning we can design them to foster deep learning. This will also mean re-educating students to see assessments as learning events and opportunities for feedback as steps in a wider developmental process. In problem-based learning, assessments should not just be about testing students but should also be designed to be learning opportunities and so there is assessment as learning for the students. For example students can learn much from seeing different assessed team presentations and asking each team questions about their presentations. Designing assessments as learning opportunities allows the potential for learning as hard fun to be realised. For example, in the toxicology module, students learned much from working with the learning aids produced by the different groups.

In PBL initiatives if the main answer to the “Why?” question of assessment is to promote deep learning then this provides a basis for answering the other “What, “How?” and “Who?” questions.

Figure 5.10 Designing PBL assessments to promote deep learning



In the toxicology module, Carmel Hensey reports that the rationale for introducing problem-based learning generally and PBL compatible assessments in particular was to improve student engagement with the subject, promote deep learning and peer learning. The innovation was in reversing the lecturer-student roles for a component of the course and facilitating students to research and develop learning aids for use by their peers.

It is crucial to re-educate students to see assessments as learning events and opportunities for feedback as steps in a wider developmental process. Doing feedback well in PBL contexts includes building in calibration mechanisms as

part of the assessment process that is both formative and summative. These include:

> Channels to enable learners to check knowledge sources, develop understanding, calibrate their judgement against expert and peer work, regular opportunities to judge their own work before it is marked (Molloy and Boud 2013:26).

Sharing their learning from their independent study enables them to check and widen their knowledge sources. Fixed resource sessions where an expert makes a presentation and answers questions allows them to compare their knowledge to expert knowledge. Sometimes I get students to peer review their assignments. A student writes to a fellow student about what type of feedback they want. The pair discussions are an opportunity to review the work of a peer and their own work in comparison. For this to work well it is important to teach students how to give and receive feedback. I agree that we need to "focus more on students using feedback than on giving feedback" (Walker 2015:232). I encourage students to receive feedback as a gift or present and as an addition to their learning. Encouraging them not to be defensive and to make and carry out an action plan based on the feedback is key. In discussing how feedback is the breakfast of champions I sometimes tell stories of how my own work benefited from feedback that I acted on.

Self and peer summative assessment in conjunction with tutor assessment can help to " obtain a holistic view of students' contributions" (Alias et al 2015: 309), particularly when assessing teamwork. Guidelines on assessing group work incorporating self, peer and tutor assessments are provided in the further resources section.

Enhancer Three: Design PBL compatible assessments

If you have designed challenging engaging problems and facilitated PBL tutorials well, it would be a contradiction then to continue unreflectively with previous old assessments. It is important to give serious thought to making the assessments PBL compatible. When working with curriculum teams I challenge them to make strong links between the problems and the

assessments. I ask them “How can you design the assessments so they fall out of the problem?”

Assessment strategies “must support the central concept of PBL such as contextual learning, constructive learning and collaborative learning” (Schuwirth and van der Vleuten 2010:193). In this book I have focused on four key characteristics of PBL namely, the problem, the PBL tutorial, the PBL process and learning. So in reflecting on how PBL compatible proposed assessments are, it is useful to review them in relation to these characteristics.

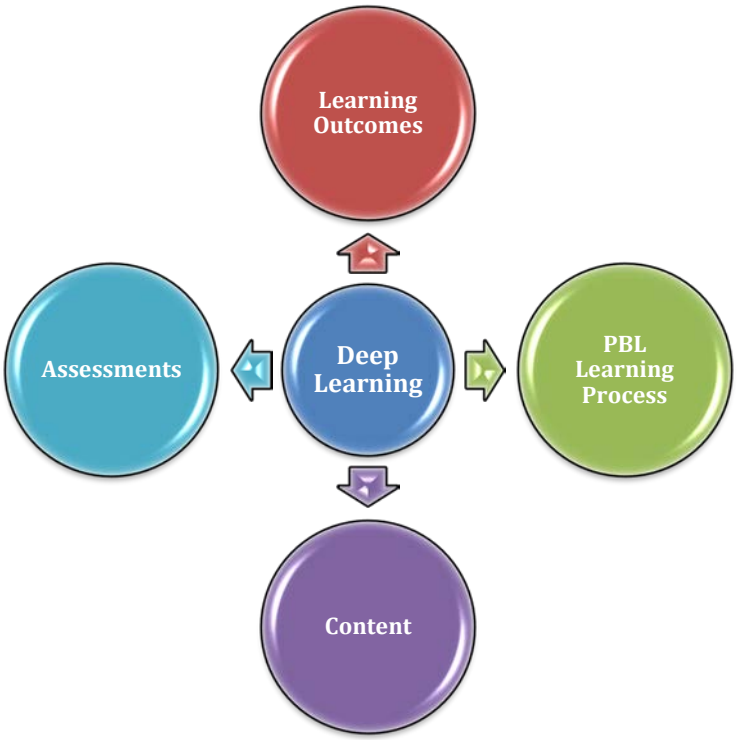
Fig 5.11 Reviewing the PBL compatible assessments

PBL characteristic	Review questions
Problem	What is *the relationship between the problems and the assessments*? Do students see clearly by working well on the problems they will do well in the assessments? Have you considered how some or all of the products that students produce from working on the problems could be assessable products? Could students do a reflective paper on what they have learned from working on the problems and how?
PBL tutorial	How is *the work in the PBL tutorial assessed*? Is it the team product and/or the team process to be assessed? How is it self-assessed by the students/ peer-assessed, and/or tutor assessed? What group assessments are there? What is the balance between group and individual assessments? Can students name the title of some of their assessments i.e. what they want to learn, like they name their learning issues in PBL tutorials?
PBL process	How do the assessments encourage students to make *connections* between the different elements of the PBL process e.g. the problem, the tutorial work, independent study, practicals/labs, lectures, work placements, skills sessions, research seminars etc. How do the assessments encourage students to see PBL as a *continuous developmental process* and to reflect individually and in groups where they are in that developmental process?
Learning	How are the assessments designed to promote *deep learning*? How are the assessments designed to encourage students to engage in *metacognition* and to be reflective on the content and processes of their learning? How do the assessments encourage students to develop high levels of skills in information literacy and become *independent learners*? How do the assessment encourage students to take responsibility for their learning? How do the assessments encourage students to be clear about what they know and what they don't know? Has the overall assessment strategy been reviewed for the

	danger of over-assessment? What weighting is given to the different assessments and what does this signal to the students?

Biggs and Tang (2007) highlighted the importance of constructive alignment that is, aligning learning outcomes, teaching methods and assessment. In PBL it is vital that these are all aligned to promote deep learning.

Figure 5.12 Aligning PBL curricula



In the toxicology module Carmel Hensey decided on the mixture of a group assessment based on the product and process of working on the problem and an individual MCQ to test breadth of knowledge from learning from the learning aids created by all the groups.

Figure 5.13 Group assessment of the learning tool, Carmel Hensey

• Comprehension of topic. 30% • Identification of Key concepts/Clarity of Delivery/Level Appropriate to Stage 3 Pharmacology. 30% • Enhancements to learning (visual/auditory/interactive etc.). Novelty/Creativity & rational for chosen methodology-submit a

paragraph (max 250 words). 30%
- Reflection on group work- submit a paragraph (max 200 words) on what went well and did not go well within the group. What actions would you take to improve the group process? 10%

Pettigrew et al (2010) challenge us to tailor our PBL compatible assessments to the abilities of our students and the nature of our discipline by providing a variety of assessments by choosing between the following variables

1. Group or individual assessment
2. Oral or written
3. Formative or summative
4. Peer or tutor assessed
5. Classroom or workplace context.

A meta-analysis by Gibels et al (2005) reviewed the influence of the reported effects of problem-based learning:

> Three levels of the knowledge structure that can be targeted by assessments of problem-solving are used as the main independent variables: (a) understanding of concepts, (b) understanding of the principles that link concepts and (c) linking of concepts and principles to conditions and procedures for application. PBL has the most powerful effects when the focal constructs being assessed were at the level of understanding principles that link concepts (Gibels et al 2005:27).

So when we are designing PBL compatible assessments it is advisable that they test not only the understanding of concepts but also an understanding of the application of principles that link the concepts. Principles help in understanding the nature of a problem and are an aid to brainstorming, planning and evaluating actions for problem resolution.

In addition to curriculum alignment Macdonald and Savin-Baden (2004: 7) suggest the following guiding principles that are particularly relevant to professional programmes but can also be adapted for other programmes

- Assessments should be ideally based in a practice context in which students will find themselves in the future-whether real or simulated

- Assess what the professional does in practice, which is largely process-based professional activity, underpinned by appropriate knowledge, skills and attitudes.
- Assessments should reflect the learner's development from a novice to an expert practitioner and so should be developmental throughout the process.
- Students should begin to appreciate and experience the fact that in a professional capacity they will encounter clients, users, competitors, statutory authorities, etc. who will, in effect, be assessing them
- Students should also be able to engage in self-assessment, evaluation and reflection as the basis for future continuing professional development and self-directed learning.

For further details of specific assessment methods to choose from, see the further resources section of this chapter.

Conceiving of learning as hard fun also has implications for assessment of learning in PBL. Students should be encouraged to exploit both the "hardness" and the "fun" of assessment as learning by having appropriately high standards and demanding assessments and yet some freedom to try new things, re-define the challenge, take a few risks occasionally and work in chosen media. Sometimes it can be appropriate for students to decide the focus and title of their own assessment. This mirrors the PBL process where students define their own learning issues, the questions they want to research further. In a module on problem-based learning for university lecturers I facilitate, one of the assessments is a team assessment based on the work on a problem. The second assessment is an individual assessment, where students choose the title of the question they want to work on. Consideration can be given to having all or some of the assessments marked on a pass/fail basis (rather than graded) as well as some assessments being team assessments in order to encourage creative and cooperative learning in PBL. In my module on problem-based learning both the individual and the team assessment are marked on a pass/fail basis.

Enhancer Four: Tutors facilitating tutorials in ways that combine academic rigour with enjoyment.

Understanding learning as hard fun in PBL encourages us as PBL tutors to be intellectually challenging and academically rigorous with students, but also to have space for student creativity and room enough for laughter and joy. Tutors clearly giving students the responsibility for defining their own learning issues and doing the learning themselves sends a strong signal to them that they must actively engage in hard work in order to resolve the problem. It is helpful to facilitate students being academically rigorous by being very clear about the high standards and hard work expected e.g. high level of research, reading peer-reviewed journals and synthesising what the research says that is relevant to the problem. Bringing previous students in to do a presentation on their experiences of PBL and showcasing some of their work is another way of demonstrating the high expectations that need to be met.

Tutors can ask “hard” questions and challenge students to think through their responses. This modelling can then encourage students to ask one another the type of questions that will lead to deep learning. I have also found that having appropriate outside experts/stakeholders come to the presentations (resulting from work on problems) to ask questions and review them can be one way of signalling that you are raising the bar, and this encourages students to do themselves proud. For example, I had some staff from the university’s international office and international postgraduate students come to listen to the presentation, ask questions and review the work of students working on a problem, which they had framed about designing a new course that aimed to attract many international students.

This hard work needs to take place in the context of students being comfortable with and enjoying their fellow team members. One way of creating this space is giving students the opportunity to get to know one another a little. For example, on the first day with one tutorial group, I brought in postcards of paintings and places and asked each one to pick a postcard that told us something about themselves (other than work or study) and to say a few words about this. In the tutorial space there should be room enough for joking and laughter. As the tutorial teams are small, eight or less, there is the

opportunity for students to get to know one another and to enjoy being with one another. This is particularly important for first years making the transition to higher education. Tutors and students who enjoy working in a PBL team show this naturally and their positive emotions can be contagious. A key result from a review by Albanese and Mitchell (1993) was that students found PBL to be more enjoyable and nurturing than traditional teaching. Enjoyment and fun help with motivation that is vital to learning (Barrett 2005).

David Ryan, a second year medical student from the University of Edinburgh remarked to me *" I would not have enjoyed university as much without PBL".* He said he got to know more people and made friends through PBL. He mentioned that in first year at the end of a problem the tutor would get them to do a round where each student would share a "fun fact" they had come across when working on the problem with the rest of the team. Here are a few of the fun or interesting facts David told me:

- Warfarin and other anticoagulants were originally used as rat poisons and were thought to be unsafe for humans. This belief changed in 1951 when an army inductee survived a large dose of warfarin in a failed suicide attempt
- Carbonated alcoholic drinks make people drunker more quickly than non-carbonated drinks.

In Aalborg where play has been consciously incorporated into problem-based learning in a new model of PpBL where it led to more relaxed and open relationship with the tutor, honest and meaningful sessions fun and where:

> the students seemed to get the needed confidence and courage to let go of their desire to be in control. They began to engage in the world more authentically and intuitively, which encouraged them try out new ways to approach the project and the learning process as a whole. We interpret this as an important step towards development of more creative students (Thorsted et al 2015: 75).

Enhancer Five: Encourage effective team formation

It is no fun if in a group of eight only five show up and are left to do all the work. Encouraging attendance is important for team formation. Attendance

can be linked to assessment. For example in one course I taught, students signed in and you had to have at least 80% attendance to pass the course. It is important to explain to students that important learning takes place in the tutorials and why it is vital to attend. Also students' responsibility for the team product and process can be discussed. Students can also be encouraged to explore in their teams how they will work with issues of attendance e.g. if students cannot attend for a good reason that they e-mail the student chair to let them know that they will not attend and how they will continue to work on the problem and engage in the teamwork. Good attendance and hard work together can help a team to bond.

Enhancer Six: Give attention to the physical environment

It helps to make the physical environment as welcoming and comfortable as possible. If it is possible to have tea and coffee facilities and if students can bring in some snacks, this can help to create a good relaxed atmosphere. Students can have the freedom to bring in artefacts that can help with the problem and to make the space their own. With some problems it is possible for students to choose to work with media they find particularly enjoyable e.g. video, webpages etc. Students can come up with and follow through their own ideas for making the physical space and the virtual learning space enjoyable and their own.

Enhancer Seven: Be transparent about how you assess the team product and/or the team process

Assessing the team product and process is often a thorny, hard and difficult issue in PBL. Firstly it is important to explain to students that in professional work you are often assessed as a team not individually e.g. a team submitting a funding proposal, a team submitting a tender etc. So sometimes being assessed as a team in college is compatible with certain professional work. In professional work we rarely get to choose our project team and students working in allocated teams mirror this demand that can sometimes be hard work.

It is crucial to be very clear about the criteria that will be used for assessing the team product and or/process. These explicit criteria can be written by the lecturers, the students, negotiated between these two parties or set by another party e.g. professional body or client. The discussion of these criteria is very important for learning. It needs to be clear who is doing the assessment-self/peer/tutor/other? There is a range of ways to assess teamwork for you to choose from. In the further resource section investigate the options for assessing group work. Being clear about how the product and/or process of the teamwork will be assessed provides opportunities for the teamwork to be a combination of hard work and enjoyable fun.

Enhancer Eight: Design PBL staff development initiatives to include opportunities to reflect and work on beliefs and values about teaching and learning.

Following Cooper and Trowler's (2002) model PBL staff development initiatives should include hints and tips but move beyond this, to include opportunities for the internalisation of learning theories and concepts, and adopting new value-based approaches to teaching and learning. Supporting lecturers to develop as reflective transformative practitioners includes encouraging them to reflect on their values and beliefs about teaching and learning and to critically analyse the assumptions underpinning these beliefs and values.

Figure 5.12 Dimensions of Teaching Development in New Academic Staff in Higher Education (Cooper and Trowler 2002)

Aspects of Development (effects)	**Activity or Learning Involved**
Accumulation	• Tips and tricks of teaching-memorised and practiced
Assimilation	• Internalisation of learning theories and improved understanding of learning and teaching processes. Extension of pre-existing cognitive and emotional schemata associated with everyday learning but no fundamental change
Accommodation	• Restructuring of cognitive and emotional schemata due to dissonance. A Gestalt 'aha' experience of 'penny drop' moment. New practices and attitudes are adopted
Transformation	• Identity change often associated with a crisis. Completely new approach to teaching and learning that can be life changing

Prosser and Trigwell (1996:80) argue that academic development that focuses on teaching strategies " is unlikely to be successful without an on-going focus on the intentions that are associated with the strategy".

It is helpful if PBL staff development initiatives provide space for the explorations of motivations, intentions and values for introducing this approach to higher education. This discussion does not have to be separate but can be interwoven into discussions about the purposes and processes of PBL. For example in discussing why people use PBL, this can be linked to what people value in higher education and the specific professions. When discussing practical strategies for facilitating tutorials there can be a discussion of the intentions and motivations behind these strategies. Then lecturers can share some of this understanding about their intentions and motivations for using PBL with their students. Lecturers working at the level of beliefs, values and intentions about teaching can be both hard work and an enjoyable liberating experience at the same time.

Enhancer Nine: Give lecturers opportunities to experience hard fun as PBL students in order to provide a good starting point for them to encourage their students to have similar experiences

Whether a PBL staff development initiative is a short one-day event or a longer event e.g. a module, it is important to design opportunities for academic staff to experience PBL as students. Having experienced learning as hard fun first-hand, viscerally, cognitively and emotionally they will be well placed and motivated to facilitate similar experiences for their students. When I do evaluations of PBL staff development initiatives and ask people what was most useful and why, they always highlight the opportunity to experience PBL as students. They then talk about things that were difficult e.g. hard to get the process going at the start and the high level of challenge of the problem and the things they found enjoyable e.g. they enjoyed the different characters and viewpoints within the team and the creativity.

Conclusion

I consider hard fun as a threshold concept in understanding the lived experience of learning in PBL. A threshold concept is defined as:
a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting,

or viewing something. (Meyer and Land 2003: 1). I found hard fun as a new way for me to interpret and understand the students' talk about learning.

Threshold concepts are considered to be transformative, integrative and troublesome (Meyer and Land 2003:1). This experience of creating the concept of learning in PBL as hard fun has transformed my understanding of learning in PBL. This important insight has influenced both the way I think about and the way I implement PBL and PBL education development. The concept of hard fun is integrative in that it brings together the different dimensions of learning as hard fun.

Learning in PBL is about the fun of laughter, creativity and playfulness and the hardness of the demanding activity levels, the difficulties, and the transformations. Fun without hardness is frivolity and hardness without fun is drudgery. Learning in PBL demands both the fun of playing with ideas and the hardness of refining and reworking ideas. Hardness and fun are complementary parts required for learning.

The concept of hard fun is troublesome because some people have difficulties with considering the notion of fun in learning as academically rigorous and practically and professionally relevant. It is also troublesome in that hard fun is counter intuitive by juxtaposing the words "hard" and "fun" to form a concept. I argue that hard fun is an illuminative threshold concept for understanding learning in PBL, that is, it offers us a new way of thinking about and doing "learning" in PBL. There are practical ways to enhance hard fun in PBL initiatives.

Summary of Practical Enhancers of Hard Fun

1. Design hard fun problems
2. Design assessments as learning opportunities
3. Design PBL compatible assessments
4. Facilitate tutorials in ways that combine academic rigour with enjoyment.
5. Encourage effective team formation
6. Give attention to the physical environment
7. Be transparent about how you assess the team product and/or the team process
8. Design PBL staff development initiatives to include opportunities to reflect and work on beliefs and values about teaching and learning.
9. Give lecturers opportunities to experience hard fun as PBL students in order to provide a good starting point for them to encourage their students to have similar experiences.

Further Resources

Resources on Deep Learning

Deep and Surface Approaches to Learning. The Higher Education Academy. Engineering Subject Centre
http://exchange.ac.uk/learning-and-teaching-theory-guide/deep-and-surface-approaches-learning.html

Atherton J S (2013) *Learning and Teaching; Deep and Surface learning* [On-line: UK]
http://www.learningandteaching.info/learning/deepsurf.htm

Creative Challenges for Science Students Video
http://www.ucd.ie/teaching/showcase/items/title,327463,en.html

Resources on Assessment

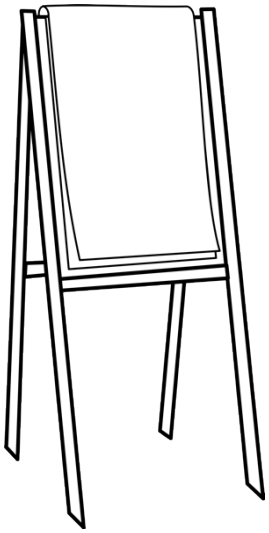
Macdonald and Savin-Baden. (2004) A Briefing on Assessment in Problem-based Learning. *LTSN,* Assessment Series No 13
ftp://www.bioscience.heacademy.ac.uk/Resources/gc/assess13.pdf

Atherton J S (2013) *Learning and Teaching; Forms of Assessment* [On-line: UK]

http://www.learningandteaching.info/teaching/assess_form.htm

The Centre for the Study of Higher Education (CSHE) Assessing Group work
http://cshe.unimelb.edu.au/assessinglearning/03/group.html

Action Plan



On your own and with your team think of a specific problem-based learning initiative you are currently designing or facilitating

- What are your intentions for introducing problem-based learning?
- What words particularly struck you in this chapter? Why?
- What new specific enhancers of hard fun would you like to use?
- What are your ideas for adapting these strategies for your contexts?
- What additional suggestions would you propose? Why?
- What will be your approach to your assessment strategy?
- What further reading or resource viewing have you been inspired to follow-up?

A PBL Practitioner's Response by Jane Ostrander

Response to the chapter by Jane Ostrander, Ph.D., Director, Experiential Learning Center, Truckee Meadows Community College, Reno, Nevada, U.S.A

Creativity, Courage, and Career Self-Efficacy through Hard Fun with PBL

There is a life force, an energy, a quickening that is translated through you into action, and because there is only one of you in all of time, this expression is unique. And if you block it, it will never exist through any other medium and it will be lost. The world will not have it. It is not your business to determine how good it is nor how valuable nor how it compares with other expressions. It is your business to keep it yours clearly and

directly, to keep the channel open.

Martha Graham, quoted by Agnes DeMille in *Martha: The Life and Work of Martha Graham*
[R.S Zander & B. Zander (2000), *The Art of Possibility*, p. 116]

Our students need to have the entrepreneurial skills, confidence, and courage to find and/or create employment opportunities amidst changing technologies and cultures of work. Our approach to education needs to adjust so that our graduates are prepared for success in this changing landscape of work. PBL provides an opportunity for students to come into their life and career purpose--to dance their individual dances. PBL and hard fun specifically challenge students to stretch their limits and master new life and work skills. PBL done well can increase student engagement and career self-efficacy—the belief in one's own ability to succeed in the entrepreneurial globally competitive world of work.

PBL is neither easy to create nor simple to facilitate, yet research and our experiences in classrooms have shown that the benefits to students justify the effort required. How do you start transforming the culture of the classroom to a PBL experience? By changing the space in the classrooms to be experimental, edgy, challenging, uncertain, playful, daring, uncomfortable, and celebratory; By allowing space within the learning for individual and collective dances to unfold.

Our PBL projects (http://www.learnpbl.com/), funded by the National Science Foundation's Advanced Technological Education program, have worked with instructors, researchers, employers, and students to improve the development and implementation of PBL at community colleges across the U.S.A since 2003. We began with formal curriculum materials developed by consultants in collaboration with instructors and industry but soon realized instructors wanted to create their own materials for their students. We shifted to training instructors, either individually or in multi-discipline teams, to create scenarios and tasks for their own classrooms. Eventually we trained instructors to train others, scaling up the innovation nationally.

Our original goal was introducing professional skills (e.g. communication, teamwork, problem-solving) into the education experience of technicians. Over time we came to realize the value added by PBL is deeper and broader than we anticipated. Yes, well-designed challenges provide students the opportunity to master professional skills. However, what is even more important in our experience is that PBL challenges students to exercise courage, creativity, and leadership skills that will serve them well in their careers and life.

PBL is about exploring a philosophy of teaching and learning that centers the educational experience on the student as a whole being who co-builds the learning experience with fellow students, the instructor, and community. Our best PBL instructors challenge and support their students to do what often seems impossible. Instructors have reported that the more challenged their students were, the more engaged they became. As the Carnegie Foundation for the Advancement of Teaching (http://www.carnegiefoundation.org/) has found in their work with developmental mathematics instruction in community colleges, productive persistence by students leads to deeper learning and increased belief by the students in their ability to master challenging problems. Hard fun with PBL

provides students an experience in doing the impossible that they can build on when next faced with an impossible challenge. The fun is in meeting the challenge successfully, being able to choose what they are doing moment to moment (the freedom of creativity), the shared successes and failures, and the satisfaction in a job well done. Instructors consistently comment on how engaged the students become once they realize finding the answer is their job, not the instructors.

This chapter provides practical, practice-based strategies for implementing hard play that can be applied today by PBL practitioners in the classroom and in Professional Development Workshops to improve their practice of PBL and their students' learning. Following the steps suggested will fast track the reader's design and implementation of PBL challenges for her/his own classroom. Expanding the quality and quantity of PBL implemented in classrooms will in turn improve the quality of our graduates and our workforce.

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Chapter Six

Reflective Pause

A New Model of Four Interrelated illuminative Concepts for understanding Problem-based Learning

In this final chapter it is time to have a short reflective summary and pause. This book has presented and explored four illuminative concepts to stimulate fresh and invigorated thinking about problem-based learning and inspire your PBL practice.

> Concepts are essential to advancing understanding and for the development of practice. We create them as we understand and organise our environment and our place within it. And we organize our environment and practice through developing our concepts…Concepts permit us to make sense of the world and apply this sense making to new contexts and circumstances. This is the power of concepts… (Jackson and Shaw 2002:1).

My model consists of four interrelated concepts that are each presented in separate chapters. These are namely:

1) The problem as a provoker of a liminal space (chapter two)

2) The PBL tutorial as a potential site for dialogic knowing (chapter three)

3) The PBL process as finding and being in flow (chapter four)

4) Learning as hard fun (chapter five)

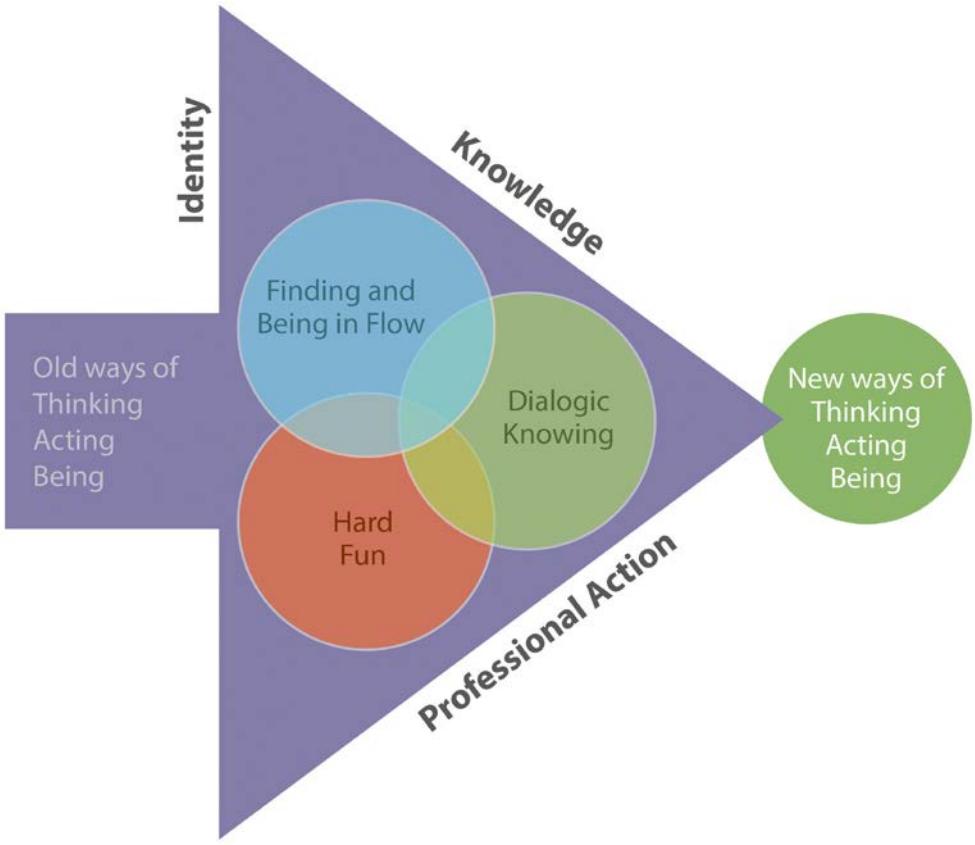
Each of these concepts together with related practice strategies and case studies are explored in the previous chapters. Each chapter has contributed to building up the model by presenting a new illuminative concept and its interrelationships with other concepts.

For the first time, in this chapter this new model as a whole is presented. The

PBL problem can provoke a liminal or threshold space between 1) current levels of knowing and new levels of knowing, 2) habitual forms of professional action and forms of professional action new to the learner and 3) satisfaction with current identities and a desire to explore other possible identities. This liminal space is represented by a triangle with these three dimensions. PBL students move within and beyond the liminal spaces prompted by the problem and learn and grow in three ways. These are: using the PBL tutorial as a site for dialogic knowing, developing flow, creativity and mindfulness in the PBL process and experiencing learning as both hard and fun at the same time.

The following figure is a visual representation of the model. These illuminative concepts are represented as interrelated and overlapping.

Figure 6.1 Barrett Model of Four Interrelated illuminative Concepts for Understanding Students' Talk about Problem-based Learning



In addition to representing the new model visually I also present it in terms of a new definition of problem-based learning.

New Definition of Problem-based learning

At the start of the learning process in problem-based learning, students are presented with a problem. Students work through the problem in small teams in PBL tutorials. The PBL problem can provoke a liminal space, a threshold space, between old levels of knowledge and new levels of knowledge required to work on the problem, between habitual forms of professional action and new forms of professional action and between current identities and new possible identities. PBL tutorials offer the potential for dialogic knowing. The degree, to which this is realised, depends on the extent to which students co- construct: democratic social relations, knowledge, and shared control, in the talk of the tutorials. The PBL process used by the students includes reviewing facts, brainstorming ideas, naming learning issues, engaging in independent study, reasoning through the problem and carrying out action plans. This PBL process, which includes the tutorial, independent study and learning from resources, is punctuated with times of confusion and times of boredom. The PBL process has at the edge of this chaos, the potential to create the conditions that lead to flow. Flow is a state of optimal performance where challenge and skill are matched and the students are fully and mindfully engaged in the task at hand. In the PBL process students can find flow and develop their creativities and mindfulness. The learning that emerges from this PBL process is hard fun, it is fun and hard at the same time. Play is a medium for learning in terms of the importance of playing with ideas as a prerequisite to understanding and play as development, imagination, and creativity. PBL challenges students and tutors conceptions of learning and teaching in higher education. A PBL approach encourages us to treat PBL itself as a problem and to interrogate our current definitions of PBL in the light of experience, research and lively honest conversations in an on-going debate.

Pause and Reflect

Now is your final opportunity for you to pause and reflect on your experience of engaging with the book as a whole.

- Which concepts did you find most inspiring? Why?
- How could this new model of problem-based learning inform the development of your practice?
- Which practice strategies are most relevant to your educational context?
- Which of the case studies did you find most useful?
- Which resources did you find helpful?
- What ideas from this book do you want to share with colleagues?
- What ideas of your own has this book stimulated?
- What is your next step for developing your PBL initiative?

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A New Model of Problem-based Learning: Inspiring concepts, Practice Strategies and Case studies from Higher Education

This book is for both experienced problem-based learning (PBL) practitioners and people starting a new PBL initiative. As PBL practitioners you will be able to re-imagine and re-invigorate your problem-based learning courses through adapting the concepts, practice strategies and case studies presented in this book to your own context. The new inspiring concepts elaborated in this book are fresh ways of re-conceptualising problem-based learning. New concepts are important, as we need new ways of thinking about PBL in order to find new ways of designing and implementing PBL. The uniqueness of this book is its focus on the power of student discourse in tutorials to teach us how to both understand and practise problem-based learning. The concepts presented in this book emerged form a discourse analysis of the naturally occurring talk of students in PBL tutorials. Practice strategies linked to these concepts are presented in ways that will enable you to choose and adapt the ones most relevant to your context. International case studies of PBL practitioners using these strategies from a variety of disciplines provide examples to offer you inspiration. Questions and online resources provide you with further material to develop your PBL initiatives

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Terry Barrett is an Assistant Professor in Educational Development at University College Dublin. She has over twenty years experience of working with problem-based learning (PBL) as an education developer, programme coordinator, tutor, researcher and research supervisor. She has worked in the design and implementation of PBL initiatives in a range of disciplines including nursing, medicine, physiotherapy, ultrasound, science, computer science, English literature, liberal arts, business, agriculture, community development, education, hospitality, tourism and policing. She has worked as a problem-based learning consultant in Ireland and abroad. She has presented keynote papers on PBL in Ireland, England, Finland and Australia

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