Routledge
Taylor & Francis Group

Journal of Further and Higher Education

ISSN: 0309-877X (Print) 1469-9486 (Online) Journal homepage: http://www.tandfonline.com/loi/cjfh20

Learning about the problem in problem-based learning (PBL) by listening to students' talk in tutorials: a critical discourse analysis study

Terry Barrett

To cite this article: Terry Barrett (2013) Learning about the problem in problem-based learning (PBL) by listening to students' talk in tutorials: a critical discourse analysis study, Journal of Further and Higher Education, 37:4, 519-535, DOI: 10.1080/0309877X.2011.645464

To link to this article: http://dx.doi.org/10.1080/0309877X.2011.645464

Published online: 09 Feb 2012.

Journal of Further and Higher Education, 2013
Vol. 37, No. 4, 519–535, http://dx.doi.org/10.1080/0309877X.2011.645464

Learning about the problem in problem-based learning (PBL) by listening to students' talk in tutorials: a critical discourse analysis study

Terry Barrett*

UCD Teaching and Learning, University College Dublin, Dublin, Ireland

(*Received 18 April 2011; final version received 4 August 2011*)

Despite the fact that student discourse in problem-based learning (PBL) tutorials is central to PBL there is a scarcity of discourse anlysis studies of PBL. This concept of the problem as a provoker of a liminal space was derived from a critical discourse analysis study of how PBL students talked about the problem in the naturally occuring talk in PBL tutorials. This illuminative concept provides problem-based learning curriculum designers and tutors with new ways of thinking about problems in PBL initiatives. Some of this student dialogue about the problem is presented and analysed. The three dimensions of this concept – namely: the knowledge, identity and professional development dimensions – give us fresh ideas for designing engaging and challenging problems for our students in different educational contexts. The practical implication of conceptualising of the problem as a provoker of a liminal space are discussed together with ideas to widen our repertoire of approaches to problem design.

Keywords: problem-based learning; problem; tutorials; discourse analysis; liminal space; threshold concepts

Introduction

In this journal, Clouston (2007, 183) argued that discourse analysis 'could enable an understanding of how effective problem-based learning is constructed'. I agree with her that discourse analysis 'can be an effective means of reflexive practice' (Clouston 2007, 183). Although students' talk in problem-based learning (PBL) tutorials is the pivotal learning site in PBL, few studies have involved conducting a discourse analysis of this talk (Hak and Maguire 2000; Leung 2002; Clouston 2007).

This paper is based on a study that used critical discourse analysis (CDA) to analyse students' naturally occuring talk in PBL tutorials and involved video and audio-recording all of the PBL tutorials of two teams of

*Email: terry.barrett@ucd.ie

students undertaking a PBL module (Barrett 2008). The research question at the centre of this paper is: 'What can we learn about the problem in problem-based learning from how PBL students talked about it in PBL tutorials?'

In the study, two teams of eight lecturers were completing a module that was part of an education development postgraduate diploma in learning and teaching in higher education. The PBL students in this study were all lecturers in higher education in Ireland. The lecturers came from a variety of disciplines including engineering, business, art and design, nursing and architecture. These participants were problem-based learning students for the module.

The aim of the module was to enable participants to design, deliver, assess and evaluate problem-based learning curricula. The content of the module developed from the students' work in teams on two consecutive problems about PBL. The participants used a PBL process guide as an aid in assisting them to work through the PBL process. Thus, both the content and the process of this module were problem-based learning and it was all of the participants' first experience of PBL.

Hendry et al. (1999, 369) in this journal, asserts that 'an optimal teaching environment in PBL includes (1) realistic problems'. Well-designed, high quality realistic problems have been highlighted as a key success factor in problem-based learning initiatives (Azer 2007; Gijselaers and Schmidt 1990; Schmidt and Moust 2000). The central aim of this paper is to explore what we can learn about the *problem* in PBL by listening to how PBL students talked about it as they worked on problems in PBL tutorials. A previous paper focused on what we can learn about the PBL *process* from listening to students' talk (Barrett 2010).

A liminal space is an in-between, betwixt and between state (Meyer and Land 2006). The concept of liminal space is from the Latin word *limen*, meaning threshold or boundary (Meyer and Land 2005). The history of the origin of the notion of 'liminality' is traced back to ethnographic studies of social rituals:

> The notion is drawn from the seminal ethnographic studies conducted by van Gennep (1960) and Turner (1969) into central social rituals, such as rites of passage associated with the initiation of adolescent boys into manhood. Turner adopted the term 'liminality' (from Latin *limen*, 'boundary or threshold') to characterise the transitional space/time within which the rites were conducted. (Meyer and Land 2005, 375)

The purpose of this paper is to present the concept of the problem as a provoker of a liminal space that emerged from a research study (Barrett 2010). This overview is in terms of both a conceptual understanding of the problem as a provoker of a liminal space and a discussion of the practical implications of this idea for problem design.

Problem-based learning and problem design

The classical definition of problem-based learning is:

> 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 emphasis).

Many learning approaches use problems but what characterises problem-based learning is that students are presented with the problem at the start of the learning process before other curriculum inputs. Students work in small teams in PBL tutorials on the problems. They engage in independent study between tutorials. I conceive of problem-based learning not as a mere teaching technique but a total approach to education that involves: problem design, PBL curriculum development, PBL tutorials, problem-based learning compatible assessments, developing students' knowledge and capabilities and is underpinned by a philosophy of PBL (Barrett and Moore 2010).

Quality problems in problem-based learning are authentic, real-world engaging, motivating, challenging, deliberately ill-structured and multi-dimensional and they challenge students to develop specialist knowledge together with key skills and to develop their ability to understand key concepts and work with common practice problems (Barrett, Cashman, and Moore 2010; Conway and Little 2000; Gijselaers 2005; Jonassen and Hung 2008).

Methodology

This was an action research study where action research is conceived of as a form of applied philosophy that 'unifies the process of developing theory and practice' (Elliott 2009, 24). The twin processes of the theorising of practice of the informal theory and the situated theorising of the academic practice of the problem-based learning module formed the praxis of this action research study (Usher and Bryant 1989). I used the illuminative concept of the problem as a provoker of a liminal space and the practice insights developed from this research not only to improve this module but also to develop my practice as an education developer working with lecturers on new problem-based learning initiatives in different disciplines, contexts and countries and to facilitate them to creatively develop their PBL practice in general and problem design in particular.

Within the action research approach, a critical discourse analysis study of students' talk in PBL tutorials was conducted. The study aimed to understand problems in PBL by learning more about this from how PBL students talked about the problems they were presented with as triggers for their learning. The focus was on listening to the voices of students and the language they used to describe PBL experiences. Discourse analysis operates

from a social constructionist paradigm which perceives the students' talk and the students' worlds as mutually constitutive, and views students' talk about the PBL process as being 'socially constructed' and 'a kind of social practice' (Widdowson 2007, xv). Pseudonyms were given to these PBL students, the two PBL teams, the title of the programme and the name of the institution. The two teams were given the pseudonyms 'the Glendalough team' and 'the Skelligs team'. In accordance with ethical guidelines the participants completed a process of written informed consent.

In practice, there were two stages to the data analysis. The first stage was the identification and exploration of the interpretive repertoires of how each team separately talked about the problem. Interpretive repertoires are the building blocks that people employ to construct the different versions of topics, processes and events that they are experiencing. My analytical unit was not one student but the set of interpretive repertoires used to talk about the problem. In the PBL tutorials, discourses competed with one another. This exploration of the interpretive repertoires was informed by critical discourse analysis. So, in working from this perspective of viewing language as discourse, as social practice, I was analysing 'the relationship between texts, processes and their social conditions' (Fairclough 2001, 21), rather than simply analysing texts. The three dimensions of critical discourse analysis are respectively: a description of the formal properties of the text, an interpretation of the relationship between the text and the interactional process, and an explanation of the relationships between interaction and social contexts (Fairclough 2003; Bloor and Bloor 2007). I presented and discussed the first draft of my analysis of how the students talked about the problem to each team separately at two participant validation sessions. Participants confirmed and challenged my analysis together with adding further insights and making additional connections between different parts of the data.

The second level of analysis involved deriving the illuminative concept of the problem as a provoker of a liminal space by analysing the interpretive repertoires students used to talk about the problem across both teams, and relating the emerging ideas to relevant literature. Concepts are 'generalisations from particulars and help us to make sense and give meaning to our experiences' (Cohen, Manion, and Morrison 2000, 13). The reasoning process was an abductive one combining the inductive analysis of students' talk with the deductive reasoning of making links between emerging ideas and related concepts in the literature.

The concept of the problem as a provoker of a liminal space

From the data of the research study (Barrett 2008), I interpreted that the two problems in the module provoked liminal spaces for the students. Liminal spaces as betwixt and 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 a place of transition, transformation, stagnation or attempted regression. The study suggests that 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' to use the words of the Irish playwright Dunsany (1972). To use another rural metaphor it is like a natural green threshold space by the hinge of a rustic gate that marks the threshold between familiar fields and the start of the fields beyond, a space of possibilities. Meyer and Land argue that 'the connection between liminality, creativity and problem-solving would also merit further enquiry' (2005, 380).

This paper contributes to the existing literature on liminality in learning by exploring the relationship between PBL problems and liminal spaces. 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 current levels of knowing and new levels of knowing, satisfaction with current identities and a desire to explore other possible identities, habitual forms of professional action and forms of professional action new to the learner. These liminal spaces are seen in the students' language-in-use in the tutorials.

Each of these three dimensions of the problem as a provoker of a liminal space will be discussed followed by the respective implications for the practice of problem design.

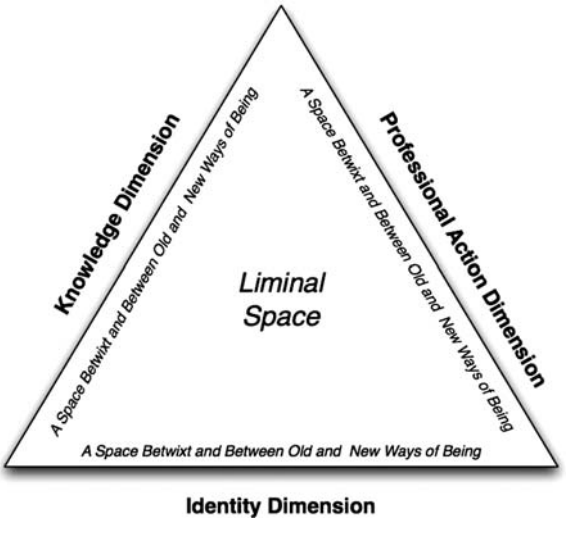

Figure 1. The problem as a provoker of a liminal space (Barrett 2008, 131).

The knowledge dimension of a problem as a provoker of a liminal space: the space between old and new ways of knowing

The problems in this PBL module created liminal spaces where the knowledge required for working on them was not obvious and straightforward but unclear and troublesome. The language-in-use that is quoted in this paper 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. The students talked about three types of knowledge: knowing 'that', knowing 'how', and self-knowledge.

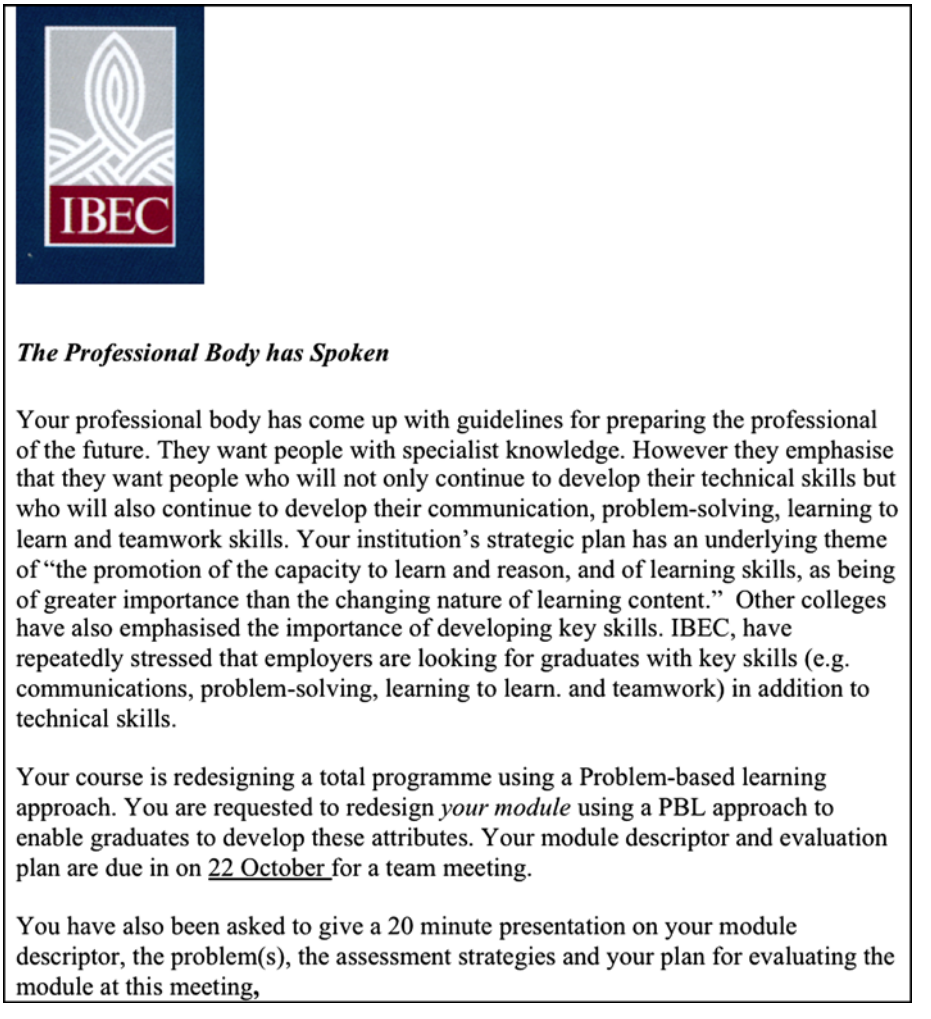

Figure 2. 'The Professional Body Has Spoken' problem.

Sometimes the students talked about a gap in their personal knowledge in terms of knowing 'that' or knowing 'about' (to use their words) as they named what they needed to learn in order to work on the problem. I agree with Eraut (1994) that this gap should be considered as lacunae in their personal knowledge, rather than propositional knowledge, as these students developed 'some constructs, perspectives and frames of reference' which were 'essentially personal even if they have been influenced by public concepts and ideas circulating in their community' (Eraut 1994,106). Sometimes process knowledge, the 'know how' of specific skills was also required to work on a problem. For example, when students developed their process knowledge in terms of teamwork skills, information literacy skills and presentation skills in order to work on a problem.

The students talked about the different aspects of the knowledge dimension of the problem as a provoker of a liminal space in three contexts. The first context was their talk in the PBL tutorials about their experiences of problems they worked on as PBL students. The second context was their talk of designing problems for a module, as they worked on the first problem. The third context was their talk in the participant validation sessions as they made links between these two contexts and designing and using problems in their own teaching situations.

Firstly, I explore how the lecturers talked about the problems they worked on as PBL students. 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 first problem was called 'The Professional Body has Spoken'

When the Glendalough team were discussing this problem Noel remarked:

> 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 work on and 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 a 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:

> 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.

Kate, another 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]
> *Mary*: We are creatively lost.

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

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

Sue made this comment in a tutorial half way through the 14-week module. 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 where she had to let go of the control of the teams more than in her previous approach to group work. Developing new teamwork skills is important, in terms of Eraut's (1994) argument that the area of 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 developed propositional knowledge, knowing 'that', and process or procedural knowledge, knowing 'how'.

Secondly, I 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. 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 on. They later decided that other students 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 life long 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 lat-

> eral 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 problem has provoked the students to explore the liminal space between what they already know about professional and personal development individually and new levels of personal knowledge that can be achieved through sharing their existing knowledge and seeking new knowledge. The students were drawing on their prior knowledge of their professional experience of teaching various disciplines and their experience of their own professional development.

The major theme of how the Skelligs team talked about the problem was in terms of the interpretive repertoire: '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, skills are not merely a question of technical know-how but involve the integration of personal knowledge and the embedding of appropriate attitudes.

Designing problems to maximise the knowledge dimension

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 the difficult to understand, important 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)

Discipline	Threshold concept
Economics	Opportunity costs
Biology	Hypothesis creation
Accountancy	Depreciation
Ultrasound	Piezo-electric effect
Geoscience	Deep time
Health Science	Caring
Higher Education	Problem-based learning

Figure 3. Some threshold concepts in specific disciplines.
Sources: Clouder 2005; Meyer & Land 2006; Trend 2009; Barrett et al. 2010.

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). They 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.

What are the important threshold concepts for your students? What are your ideas about designing problems around these threshold concepts? Designing problems around threshold concepts is one way to maximise the potential of the knowledge dimension of the liminal space provoked by the problem, particularly in terms of 'knowing that'. Problem designers should also create problems that use the potential of PBL problems to developing 'knowing how' from the professional procedural knowledge provoked by the problem and the process skills developed by working in a PBL team.

The identity dimension of a problem as a provoker of a liminal space: the space between old and new ways of being

In the talk of the participants about the problem, they talked about being in a space between old and new teacher identities, between old and new ways of being in the world. The space provided by PBL problems in this module encouraged active learning by the participants, who were interested in the problem as their problem. They explored their identity, 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 *we* 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.

The Glendalogh team talked about the problem in term 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'. In their lan-

guage in use the participants were talking about the problem being about 'them' and about 'us'. Identity is about positioning and this positioning happens through language.

> *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, 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 Skelligs team argued that the problems they were designing for this module on personal and professional development would go 'beyond skills' to develop 'that inner concept of themselves'. In other words, skills are not merely a question of technical know-how but involve the integration of personal knowledge and the embedding of appropriate attitudes and self-awareness.

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.

The participants talked about how this 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 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.

Designing problems to maximise the identity dimension

Writing students into the problem in their professional or student role is a powerful way to help them identify with the problem. In the module of the study, one of the problems began with 'Your professional body…' Other examples of this approach are 'As a group of third year physiotherapy students you…' and 'You are a team of consultants…' In addition, problems can be designed to give students spaces to explore what type of professional they want to become and what are their individual emerging areas of interest, specialism and style are. Furthermore, problems about the nature of new professions and the changing identities of specific professions internationally can be designed. In addition other problems can be designed about national, European and global identities.

Designing problems in ways that problematise the problem definition itself can set up antithetical patterns of dialogue. In other words, because the problem is written in such a way that the problem definition itself – what actually is the problem – is not clear, then a discussion can ensue in which different or opposite points of view about what the problem is about can be debated. This then can involve all participants in the important work of problem identification. All professionals including lecturers and psychologists will be presented with confusing real-life problem in their practice. One of their first tasks is to define the kernel of the problem and this is often not the presenting problem.

The way that problems are written can encourage participants to engage in problem identification. Becoming a professional, or engaging in continuous professional development, is not just about acquiring professional knowledge. It is also about being able to define the kernel of a problem and being able to stand over this professional judgment. In professional practice other professionals may agree or disagree with their definition of the problem and clients/service users/students may also agree or disagree with that decision or may seek a second professional judgment elsewhere. For there are many and competing theories in each discipline, for example there are many different schools of psychology. It is vital that students are able to ask themselves the following questions: Where do I situate myself? Why? How do I define the problem? What is my professional identity? Who am I? What type of a professional do I want to become? What is my chosen style of working? How does this link to my sense of personal and professional identity?

I argue that it is one of the important roles of higher education to promote learning processes that challenge lecturers and students to continually ask these question and problem-based learning with well designed ill-structured problems is one way but not the only way of doing this. How will you design problems to maximise the identity dimension of problems in your context?

The professional action dimension of the problems as a provoker of liminal space: the space between old and new ways of acting

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. 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'.

In order to maximise the professional action dimension of the problem we need to re-examine the size, 'real-life' nature and action outcomes of the problems we design. There were two large problems in this 14-week module. Larger and longer more real-life size problems have greater potential for professional action than smaller problems. Some participants following the module moved away from just using small problems to also using big problems with her own students.

For example, Kate said that she used PBL with a group of third-year undergraduates and a postgraduate group and she explained that she was well set up in terms of infrastructure with syndicate rooms in the library, laptops and a website to support the course. The postgraduate group was given one big problem at the very start of the module and this is how she described it:

> They break into groups and work on the problem. I am not good at getting them to reflect. I am directive and not good at staying out and letting them be confused. I am absolutely fascinated by the way they are doing it.

The 'space' word in this concept of the problem, as a provoker of liminal space is important. Kate talked about that she was aware of her general tendencies to be directive, and that sometimes now she stood back and gave her students some space to work on the professional action dimension of the problem in their own ways. Kate said that she brought in some people from industry, including a senior executive from the biggest sales and marketing agency in Ireland, and that this person was fascinated by observing students in a tutorial and amazed ('gobsmacked') at the high standard of the end product they produced and the way the students worked on the problem.

'Gobsmacked' is a slang word commonly used in Ireland to mean utter amazement.

Designing problems to maximise the professional action dimension

Two participants 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. They then brought the students to London where they did their presentation alongside the employees of the design company. I was interested in 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.

It is also possible to combine problem -based learning and action learning in a form of problem-based action learning that facilitates students' learning from discussing, researching and operationalising the problem through taking action. I consider that PBL traditionally focused on discussing simulated problems that attempted to mirror problems in professional practice in the classroom. I think that the professional action dimensions of problems can be stretched further, by designing problems that necessitate carrying out social action in real professional contexts:

> 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)

Real-life problems that require social action are larger problems that require more time than the smaller problems traditionally used in PBL. It is interesting that the participants in the module of the study moved beyond working on the problem in the tutorial and continued to work on the problem by engaging in professional action with their own students in the context of their specific professions and programmes. My argument is that the professional action dimension of problems as provokers of liminal spaces has not been traditionally exploited fully for its learning potential in PBL. Originally PBL problems were seen as a way of bringing problems from professional practice into the classroom as a starting point for learning. I consider that the current challenge of using PBL problems to bridge education and work is to explore and implement ways of enabling students and workers and student-workers of different kinds, to work on real-life problems in the work place and to follow through with the professional action required to resolve these problems. Participants can then learn from these situated expansive learning opportunities. Engeström (2001, 138–9) defines expansive situated learning as follows:

> In important transformations of our personal lives and organizational practices, we must learn new forms of activity which are not yet there. They are literally learned as they are being created. . .. The object of expansive learning activity is the entire activity system in which the learners are engaged. Expansive learning activity produces culturally new patterns of activity. Expansive learning at work produces new forms of work activity.

The challenge of writing problems in a continuous professional development unit such as this module is to write problems that encourage the self-engagement of expansive learning for the student–worker. Key to designing problems that maximise the professional development dimension is designing problems in multidisciplinary teams including workplace supervisors, professionals with different specialisms, lecturers, students, librarians, education technologists and other stakeholders. What are your ideas for developing the professional action dimension of problems in your contexts? Who are the stakeholders you want to involve in problem design?

Conclusion

Firstly I argue that there is much to be learnt about the nature of the problem in PBL from listening to students' talk in tutorials. Secondly, conceiving of the problem as a provoker of a liminal space gives us new ways of thinking about designing problems in PBL initiatives. Thirdly I argue that designing PBL problems should not merely be about convenient hooks to hang new knowledge on, rather problems should be designed to maximise their

Figure 4. Implications for problem design of conceiving of the problem as a provoker of a liminal space.

potential for developing students' knowledge, identities and professional behaviour and attitudes.

The following figure summarises the ideas discussed for widening our repertoire of approaches to doing the work of problem design.

Note on contributor

Terry Barrett is a lecturer in education development at University College Dublin where she works with curriculum development teams to design, implement and research PBL initiatives in a range of disciplines. She has worked as a problem-based learning consultant nationally and internationally. She has recently co-edited (with Sarah Moore) *New Approaches to Problem-based learning: Revitalising your Practice in Higher Education*. New York: Routledge.

References

Azer, A. 2007. Twelve tips for creating trigger images for problem-based learning cases. *Medical Teacher* 29, no. 2/3: 93–7.

Barrett, T. 2001. Philosophical principles for problem-based learning: Freire's concepts of personal development and social empowerment. In *The power of problem-based learning. Refereed proceedings of the 3rd Asia Pacific Conference on PBL, 9–12 December*, ed. P. Little and P. Kandlbinder, 6–17. Newcastle, Australia: Problarc.

Barrett, T. 2008. Students' talk about problem-based learning in liminal spaces. PhD diss., Coventry University.

Barrett, T. 2010. The problem-based learning process as finding and being in flow. *Innovations in Education and Teaching International* 47, no. 2: 165–74.

Barrett, T., D. Cashman, and S. Moore. 2010. Designing problems and triggers in different media: Challenging all students. In *New approaches to problem-based learning: Revitalising your practice in higher education*, ed. T. Barrett and S. Moore, 36–49. New York: Routledge.

Barrett, T., and S. Moore. 2010. An introduction to problem-based learning. In *New approaches to problem-based learning: Revitalising your practice in higher education*, ed. T. Barrett and S. Moore, 3–17. New York: Routledge.

Barrows, H., and R. Tamblyn. 1980. *Problem-based Learning: An Approach to Medical Education*. New York: Springer.

Bloor, M., and T. Bloor. 2007. *The practice of critical discourse analysis: An introduction*. London: Hodder Arnold.

Brown, R., and A. Gilman. 1960. The pronouns of power and solidarity. In *Style in language*, ed. T.A. Sebeok, 253–76. Cambridge, MA: Massachusetts Institute of Technology Press.

Cohen, L., L. Manion, and K. Morrison. 2000. *Research methods in education*. 5th ed. London: RoutledgeFalmer.

Conway, J., and P. Little. 2000. From practice to theory: Reconceptualising curriculum development for problem-based learning. In *Problem-based learning. Educational innovations across disciplines: A collection of selected papers*, ed. O.S. Tan, P. Little, S.Y. Lin, and J. Conway, 169–79. Singapore: Temasek Centre for Problem-based Learning. http://pbl.tp.edu.sg/Curriculum%20Planning/Articles/JaneConwayPennyLittle.pdf.

Clouston, T. 2007. Exploring methods for analysing student talk in problem-based learning. *Journal of Further and Higher Education* 31, no. 2: 183–93.
Dunsany, E. 1972. *Beyond the fields we know*. London: Pan Books.
Elliott, J. 2009. Building educational theory through action research. In *The Sage handbook of educational action research*, ed. S. Noffke and B. Somekh, 28–38. London: Sage.
Engeström, Y. 2001. Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work* 14, no. 1: 133–56.
Eraut, M. 1994. *Developing professional knowledge and competence*. London: Falmer.
Fairclough, N. 2001. *Language and power*. Harlow: Pearson Education Limited.
Fairclough, N. 2003. *Analysing discourse: Textual analysis for social research*. London: Routledge.
Gijselaers, W. 2005. Putting minds at work. Keynote paper presented at the International Conference on Problem-based Learning, PBL in Context: Bridging Work and Education, June 9–11, in Lhati, Finland.
Gijselaers, W., and H. Schmidt. 1990. Towards a causal model of student learning within the context of problem-based curriculum. In *Innovation in medical education: An evaluation of its present status*, ed. Z. Nooman, H. Schmidt, and E. Ezzat, 95–114. New York: Springer.
Jonassen, D., and W. Hung. 2008. All problems are not equal: Implications for problem-based learning. *The Interdisciplinary Journal of Problem-Based Learning* 2, no. 2: 6–28.
Hak, T., and P. Maguire. 2000. Group process: The black box of studies on problem-based learning. *Academic Medicine* 75: 769–772.
Hendry, G., M. Frommer, and R. Walker. 1999. Constructivism and Problem-based Learning. *Journal of Further and Higher Education* 23, no. 3: 359–71.
Leung, W. 2002. Why is evidence from ethnographic and discourse research needed in medical education: The case of problem-based learning. *Medical Teacher* 24, no. 2: 169–72.
Little, P., and P. Kandlebinder. 2001. Introduction. In *The power of problem-based learning. Refereed proceedings of the 3rd Asia Pacific Conference on PBL, 9–12 December*, ed. P. Little and P. Kandlbinder, 5–8. Newcastle, Australia: Problarc.
Meyer, J., and R. Land. 2005. Threshold concepts and troublesome knowledge (2): Epistemological and ontological considerations and a conceptual framework for teaching and learning. *Higher Education* 49, no. 3: 373–88.
Meyer, J., and R. Land. 2006. *Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge*. London: Routledge.
Schmid, H., and J. Moust. 2000. Factors small group tutorial learning: A review of research. In *Problem-based learning: A research perspective on learning interactions*, ed. D. Evensen and C. Hmelo, 19–51. Mahwah, NJ: Lawrence Erlbaum.
Trend, R. 2009. The power of deep time in geoscience education linking 'interest', 'threshold concepts ' and self-determination theory. *Studia Universitatis Babes-Bolyni* 54, no. 1: 7–12.
Usher, R., and I. Bryant. 1989. *Adult education as theory, practice, and research: The captive triangle*. London: Routledge.
Widdowson, H.G. 2007. *Discourse analysis*. Oxford: Oxford University Press.