

The problem-based learning process as finding and being in flow

Terry Barrett*

Centre for Teaching and Learning, University College Dublin, Dublin, Ireland

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. This paper focuses on what we can learn about the PBL process from listening to how PBL students talked about it in naturally occurring talk in tutorials. The illuminative concept of the PBL process as finding and being in flow was derived from a critical discourse analysis of the tutorials of two PBL teams. This paper proposes that conceiving of the PBL process as finding and being in flow assists in maximising the potential for student learning in PBL.

Keywords: problem-based learning; flow; discourse analysis; talk

Introduction

The purpose of this paper is to report on new problem-based learning (PBL) research and relate this research to theory and practice. For the purpose of this paper, PBL is defined as the learning that resulted from teams of PBL students working on problems (Barrett, 2005; Barrows & Tamblyn, 1980). The PBL process includes being presented with a problem, PBL tutorials, independent study to work on learning issues, sharing and discussing what had been learned from independent study in tutorials together with preparing and giving presentations of their work on the problem.

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. These participants were PBL students for the module. The aim of the module was to enable participants to design, deliver, assess and evaluate PBL 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 working through the PBL process. Thus, both the content and the process of this module were PBL.

Hak and Maguire (2000), in a seminal paper entitled 'Group process: the black box of studies on problem-based learning', identified the need for more studies on what actually happens in PBL tutorials, stating that it is a vital yet under-researched area of PBL. The need for discourse analysis studies of PBL tutorials is highlighted by Leung (2002). Clouston (2007, p. 183) suggests that discourse analysis methods including critical discourse analysis (CDA) 'could enable an understanding of how effective problem-based learning is constructed'. This paper makes a contribution to this gap in the literature. The research problem at the centre of this paper is 'What can we learn about the problem-based learning process, from how lecturers as problem-based learning students, talked about it in PBL tutorials?'

*Email: terry.barrett@ucd.ie

Methodology

I locate myself as a researcher with a social constructionist worldview and see the social practice of the language in the tutorials as an interrelationship between agency and contexts. This research was conducted from a perspective that saw students constructing their understanding of the PBL process through their talk in PBL tutorials, and saw their talk in PBL tutorials constructing their understanding of the PBL process.

This research is based on the video and audio-recorded dialogue, of the full set of tutorials for the module for two teams. In accordance with ethical guidelines all participants completed a process of written informed consent. Pseudonyms were given to these PBL students, the two PBL teams, the title of the course and the name of the institution. The two teams were given the pseudonyms of the Glendalough team and the Skelligs team.

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 PBL process. 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 PBL process. Willig (2001, p. 95) clarifies that the function of interpretive repertoires as used by a range of discourse analysts, is 'to construct alternative, and often contradictory, versions of events'. For example, one interpretive repertoire used was 'PBL process: Not O.K. confusion versus O.K. confusion'.

This exploration of the interpretive repertoires was informed by critical discourse analysis (CDA). CDA is compatible with my stance of viewing discourse and the world as mutually constitutive. 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, p. 21), rather than simply analysing texts. The three dimensions of CDA 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 (Bloor & Bloor, 2007; Fairclough, 2001).

The second level of analysis involved deriving an illuminative concept about the PBL process by analysing the interpretive repertoires 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, & Morrison, 2000, p. 13).

Students talked about the process being 'confusing' and being 'lost'

The Skelligs team talked about the PBL process being 'confusing' and 'messy'. Some students in the Glendalough team viewed being 'lost' in the PBL process as positive, while others viewed this 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 problem is about.
 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 organise 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 then 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 talked about being 'lost' and 'a bit stuck'. I named an interpretive repertoire of the PBL process for the Glendalough team as: 'PBL process: Not O.K. confusion versus O.K. confusion'.

The confusion was due to the challenge of working on a problem (using the PBL process) that was too great 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.

However, there was not a divide into two clear-cut, fixed, polarised positions. In the 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 polarised positions. I identified these two competing ways of representing this confusion as an interpretive repertoire: 'The PBL process: Not O.K. confusion versus O.K. confusion' (Figure 1).

O.K. Confusion	Not O.K. Confusion
One of the big things is we organise 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, Jesus where do you start if you have a whole course like this to take.
Hurray! I'm delighted we are lost.	I don't see how we can get to the end of it.
We are creatively lost.	But they will know what to do.
But also this thing, it's about jump into the thing. Sure we have jumped into it. So we are a bit stuck.	

Figure 1. Interpretive repertoire 'PBL process Not O.K. confusion versus O.K. confusion'.

The edge of chaos is a term for the place where there is a balance between too much chaos and too much order. I interpreted that the edge of chaos was the site where new knowledge was generated by the PBL teams, where learning took place and where a new sustainable way of working together as a team was redefined. Based on my analysis of students’ talk about the PBL process and on a conceptual framework for understanding the edge of chaos generally (O’Connor, 1999), I have devised a framework for understanding the PBL process as one at the edge of chaos. It is at the edge of chaos where the flow of optimal performance is possible (Figure 2).

For the PBL process, this may 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 straitjacket), they may find sustainable ways of working as a team that will foster the growth of learning at the edge of chaos.

How do we make some order out of chaos? Some people are frustrated by the stress of confusion, while others gain strength from it. It is argued that the difference between the two responses is that the latter know how to transform frustrating confusion. They know how to transform the situation into ‘a new flow activity that can be controlled and will be able to enjoy themselves and emerge stronger’ (Csikszentmihalyi, 1991, p. 203). As well as talking about the anxiety of confusion the students from both teams also talked about experiencing boredom, and lack of interest.

Chaos	Edge of Chaos	Order
Frustration and anxiety Confusion and messiness Inability to concentrate	<i>Knowledge</i> <i>Creativity</i> <i>Learning</i> Flow	Habit Rigidity Boredom Obsessional behaviour
No rules for PBL process No PBL process guide No specific roles Free for all	<i>Sustainable way of working as a PBL team</i> <i>Communication bearing in mind agreed ground rules for this team that are reviewed and using a PBL process guide as a scaffold not a straitjacket</i>	Too many rules Fixed and rigid PBL process guide Fixed and rigid roles
Freedom from and freedom to do things	<i>Freedom to do things within these agreed ground rules</i>	Lack of freedom

Figure 2. The edge of chaos as the site of learning and flow in the PBL process. Adapted by me to understand the edge of chaos as a site of learning and flow in the PBL process from a general conceptualisation of the edge of chaos (O’Connor, 1999, pp. 201–203).

Students talked 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 talks 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, p. 24) assert that: ‘Boredom ... occasionally haunts almost any sustained act of learning’. In these PBL modules 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 at times.

Students talked about experiencing boredom and this was analysed and interpreted by me as a researcher. I interpreted this boredom as a non-flow state that can lead to flow in PBL. A state of boredom means that the challenge is too low in relation to skills level, according to Csikszentmihalyi (1991). Phillips (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. Csikszentmihalyi (in an interview with Goleman in *The New York Times*, 4 March 1986, cited in Goleman, 1996) conceptualises flow as occurring in the delicate zone between anxiety and boredom.

Students talked about ‘doing something completely different’ and ‘creative’ when faced with a ‘scary’ and ‘different’ challenge

Hanora, from the Skelligs team, talked about being given a challenge 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’. She was talking about the impression she would like to leave with heads of school with their presentation on their experience of being PBL students. This presentation was the result of them working on one problem. Hanora said:

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.

Hanora 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'. Hanora 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' in learning.

I interpret that she 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'. 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.

These factors resonate with three main elements in the creative process as named by Robinson (2001, p. 111) as:

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

The generation of ideas was central to this creative process of flow. In the Skelligs team, Joan talked about the PBL process where one idea triggers other ideas:

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 the PBL process as an enjoyable, likable process that she wanted to stay continually doing. She also talked about the creative dimensions of the PBL process, using the word 'imaginative' twice. This process had a productive element to it, yet was a different way of thinking about what had to be produced. I identified an interpretive repertoire for the Skelligs team as: 'PBL process: Critiquing discourse of the PBL process versus Liking discourse of the PBL process'.

Noel, from the Glendalough team, talked about how the process was: '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.

Kate talked about how she had considered herself a 'control freak' and was only happy on an airplane journey if she was 'the pilot'. As a result of experiencing the PBL process and the high-quality products that emerged from it, her major realisation was that: 'the product could even be better despite the fact that I am not in the driving seat'.

I interpret this talk in terms of PBL students experiencing flow sometimes in the PBL process. In the flow state a high level of challenge is matched with a high level of skill and there is a feeling of using one's skills to the maximum:

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. (Csikszentmihalyi, interview with Goleman in *The New York Times*, 4 March 1986, cited in Goleman, 1996, pp. 91–92)

The PBL process as a process of finding and being in flow

I argue that the concept of the PBL process as finding and being in flow helps us to both think about and facilitate the practice of the PBL process in new ways. The concept of finding and being in flow was my way of making sense of students' talk about the PBL process in this study. 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 or where there is a mismatch between the two. My argument is that finding flow involves experiencing lack of flow states in the PBL process and that, in this study, these lack of flow states were a necessary prerequisite to achieving flow states. Lack of flow states are part of students' talk about the PBL process in this study. The concept of finding and being in flow is apt for describing and understanding the different ways these students talked about the PBL process, in the journey of meeting the challenges of working through problems.

My use of the concept of finding and being in flow is in an elaboration of Csikszentmihalyi's (1996, 1997) concept. Csikszentmihalyi defines flow as:

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. (1996, p. 1)

Implications for practice

Flow cannot be ordered to happen in the PBL process. However, there is a need for PBL tutors to be aware of both the enhancers and inhibitors of flow so that their

approach to tutoring can aim to facilitate students moving towards flow and so that they can appreciate the function of the lack of flow states on the way towards flow. Csikszentmihalyi (1991) outlines the three enhancers for movement towards flow as:

- (1) Unselfconscious self-assurance.
- (2) Focusing attention on the world.
- (3) The discovery of new solutions.

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. Students listening to one another without preconceived ways forward is key to developing group flow (Sawyer, 2007).

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, p. 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, p. 86). I consider that the learning space provided by PBL need not to be constrained by too many rules and procedures, and may yet provide some scaffolding for learning. By understanding the edge of chaos as a potential site for the development of learning and creativity, students and tutors would be better equipped to understand the epistemological meaning of chaos, and to move forward in ways that would support the development of deep learning and a variety of forms of creativity.

Problem designers can design problems that are sufficiently challenging that they stimulate and stretch students to develop higher levels of knowledge and skills than their current levels and then experience the optimal performance state of flow (Csikszentmihalyi, 1997). Problems can be designed in a variety of media and give students the freedom to work on the problems using different media to stimulate creative thinking. Course co-ordinators can facilitate students having sufficient tutorial and independent student time to engage fully in the PBL process.

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 these with other students new to PBL in student induction programmes.

It is important to develop student creativity for personal, economic and social reasons (Jackson, Oliver, Shaw, & Wisdom, 2006). On a personal level increased creative capacity leads to: effectiveness and enjoyment as learners, satisfaction and happiness as people, and new possibilities and imaginings as architects of our futures. At the economic level, in our globalised and technological knowledge economy 'we must produce students who can manipulate, transform and create new knowledge' (Caridad Garcia-Cepero, 2008, p. 295). At the social level creativity is the need for students to play their role in addressing social problems such as poverty and environmental issues: 'The hope is that students will use their creative productivity to respond to the challenges and needs of the society' (2008, p. 295).

More work needs to be done in ‘connecting creative capital and university pedagogy’ (McWilliams & Dawson, 2008, p. 633) in order to make creativity the ‘centrepiece’ of higher education.

From an education development perspective, the challenge is to facilitate lecturers to understand and to critique the key concept of the PBL process as finding and being in flow. I argue that a powerful way of doing this is that lecturers become PBL students for a module in order to experience the liminality of the confusion and messiness that is the PBL process and their status as lecturers who are also students. This is a fertile ground to foster shifts in thinking and learning. Tan (2009) argues for the interconnection between PBL and creative ways of knowing, creative processes, creative learning environments and creative pedagogies. I assert that understanding the PBL process as one of finding and being in flow assists in making these connections stronger.

In summary, I argue that by experiencing and understanding the PBL process as a process of finding and being in flow, students would be in a better position to transfer their use of this process across a wide range of situations, in higher education and in different workplaces. At the participant validation session Beatrice from the Skelligs team said she keeps ‘coming back to that we need to help students develop a process, learning to learn’. The language-in-use of the participants about the PBL process combined with Greeno’s insights on transfer, challenge us to look at the transfer of knowledge not just in terms of transfer of specific knowledge to different problems or tasks, but in terms of transfer of processes to different work and social life situations:

The important notion in a situational view of transfer is how what is being transferred is not knowledge from task to task, but patterns of participatory processes across situations. (1997, p. 12)

Notes on contributor

Terry Barrett is a lecturer in education development at the Centre for Teaching and Learning, University College Dublin. She is also joint co-ordinator of the Enquiry and Problem-based Learning Project. Her research interests are problem-based learning, creativity and collaborative academic writing.

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