Problem-based Learning in Higher Education: Untold Stories

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Prologue

It is Monday morning, 8.45, and the door of the design studio bursts open. Tim and Bill rush over to Jack to tell him that they have cracked the problem scenario. The group have been working on the problem all weekend but struggled, until now, to figure it out. The two who have found a way of managing the problem scenario share their views with the others. The group is oblivious to the tutor until he comes over to tell them that they have got the wrong answer. They are defeated, deflated and distraught that they have worked so hard for no result. Tim remains unconvinced that they are wrong and while the tutor gives the class a mini lecture he sits and works it all out again. At the end of the session, the group argue with the tutor who discovers, through this group, that there are in fact several ways to solve this particular problem.

One of the difficulties today is in writing a book that reflects the complexity of its subject. The students in the scenario above demonstrate some of the challenges for staff and students involved with programmes that use problem-based learning. For example, part of the challenge for the students here was in being prepared to contest the solution proffered by the tutor; to value their own perspectives and their own voices enough in the learning process to argue their case. Being able to do this is something that many students who have previously experienced lecture-based methods of learning at school or at college will find complex and difficult. This is because problem-based learning demands of them a sound understanding of the knowledge they have researched and explored, and an ability to critique information. At the same time they are also expected to take up a position towards the problem situation with which they have been presented in relation both to their prior experience and the new knowledge they have gained. Problem-based learning can offer students opportunities to engage *with* complexity, and help them both to see ambiguity and learn to manage the ambiguities that prevail in professional life. It can also help students to integrate learning across subjects and disciplines and to take up a position towards the knowledge on offer. For staff, the challenges of using problem-based learning are equally complex in that they relate not only to issues of

teaching and learning; but also to the personal challenges that emerge as students question their perspectives and prior experience.

Making sense of problem-based learning

Problem-based learning is an approach to learning that has grown in breadth and depth across the world since the 1970s, yet the bulk of the literature concentrates on practical applications of problem-based learning in particular settings rather than on the examination of the complexities and challenges involved in its application. This book sets out to challenge some of the current understandings of problem-based learning (which have largely emerged through misconceptions of problem-based learning as a complex and multifaceted approach to learning) through setting up the argument that the potential of problem-based learning is yet to be fully realized. This argument stems from a number of perspectives. First, as a researcher I saw, and continue to see, problem-based learning implemented in diverse curricula and what is apparent is that problem-based learning can help students to 'make sense' for themselves. What I mean here is that problem-based learning is an approach to learning through which many students have been enabled to understand their own situations and frameworks so that they are able to perceive how they learn, and how they see themselves as future professionals. Yet in many curricula these issues are not often fully acknowledged, nor are students supported in managing the personal and learning challenges with which they are presented through problem-based learning. Research findings will be used to demonstrate and support this argument in the form of a framework, termed Dimensions of Learner Experience, which emerged *from* data that arose out of the first British cross-site study into problem-based learning (Savin-Baden, 1996). This study explored staff and students' expectations and experiences of problem-based learning in four different professions and educational environments.

Second, the argument has emerged from my own fascination about the ways in which the theory of problem-based learning is (and is not) played out in practice. For example, there is a confusion about the difference between problem-based learning and problem-solving learning. Problem-solving learning is the type of teaching many staff have been using for years and the focus is upon giving students a lecture or an article to read and then a set of questions based upon the information given. Students are expected to find the solutions to these answers and bring them to a seminar as a focus for discussion. Problem scenarios here are set within and bounded by a discrete subject or disciplinary area. In some curricula students are given specific training in problem-solving techniques, but in many cases they are not. The focus in this kind of learning is largely on acquiring the answers expected by the lecturer, answers that are rooted in the information supplied in some way to the students. Thus, the solutions are always linked to a specific curricula content, which is seen as vital for students to

cover in order for them to be competent and effective practitioners. The solutions are therefore bounded by the content and students are expected to explore little extra material other than that provided in order to discover the solutions.

Problem-based learning is different. The focus here is in organizing the curricular content around problem scenarios rather than subjects or disciplines. Students work in groups or teams to solve or manage these situations but they are not expected to acquire a predetermined series of 'right answers'. Instead they are expected to engage with the complex situation presented to them and decide what information they need to learn and what skills they need to gain in order to manage the situation effectively. There are many different ways of implementing problem-based learning but the underlying philosophies associated with it as an approach are broadly more student-centred than those underpinning problem-solving learning. This is because students are offered opportunities, through problem-based learning, to explore a wide range of information, to link the learning with their own needs as learners and to develop independence in enquiry. Problem-based learning is thus an approach to learning that is characterized by flexibility and diversity in the sense that it can be implemented in a variety of ways in and across different subjects and disciplines in diverse contexts. As such it can therefore look very different to different people at different times depending on the staff and students involved in the programmes utilizing it. However, what will be similar will be the focus of learning around problem scenarios rather than discrete subjects.

It is possible to trace the origins of problem-based learning back to early forms of learning that demanded the diverse kinds of problem-solving and problem management that emerge in problem-based curricula. For example, Socrates presented students with problems that through questioning enabled him to help them explore their assumptions, their values and the inadequacies of their proffered solutions. Aristotle, too, argued that in 'every area' the philosopher, or in our case, the student, has got to begin by setting down what he terms 'the appearances'. Thus, in working on a particular problem, say for example the problem of knowledge, the philosopher would begin by setting down the 'appearances' of knowledge. What would be included under this heading would not just be our perceptual experiences but also our ordinary beliefs about knowledge. Having set this down the philosopher will look for any contradictions. If contradictions are found, sifting and sorting will occur until decisions are made about which beliefs are more central than others and these will be preserved, others that conflict will be discarded, and so in the end it will be possible to return to ordinary discourse with increased understanding. This kind of increased understanding and examination of perspectives and frameworks is encouraged through problem-based learning because it offers students opportunities to examine their beliefs about knowledge in ways that lecture-based learning and narrow forms of problem-solving learning do not.

More recently the work of Dewey (1938) has influenced the way in which knowledge is perceived: not as something that is reliable and changeless but as something that is an *activity*, a process of finding out. Dewey's challenge to the world of science – that *we* are the very stuff and substance of the world and as such we must work from the middle of a situation in which our most reliable beliefs are at best imperfect or inadequate – is that we are not spectators, but agents of change. Dewey's perspective was thus a pragmatic stance towards knowledge. He argued that knowledge was bound up with activity and thus he opposed theories of knowledge that considered knowledge to be independent of its role in problem-solving enquiry. His views on this were played out in practice by his emphasis on learning by doing, which can be seen as essentially a problem-solving approach to learning. The fact that much of what Dewey proposed is now largely taken for granted in many areas of higher and professional education can perhaps be said to be a measure of his success.

Although it has been argued here that learning through exploring problem situations is not new (this will be addressed further in Chapter 1) problem-based learning was popularized during the 1960s as a result of research by Barrows (Barrows and Tamblyn, 1980) into the reasoning abilities of medical students. Their research stemmed from a desire to develop in medical students the ability to relate the knowledge they had gained to the problems with which the patients presented, something they found that few medical students could do well. Yet when Barrows and Tamblyn undertook their study, which in many ways could be said to have alerted the world of higher education to problem-based learning, they probably had little real understanding of the worldwide impact it would still be having decades later. What they highlighted were clear differences between problem-solving learning and learning in ways that used problem scenarios to encourage students to engage themselves in the learning process; problem-based learning. Yet the attraction of problem-based learning and its uptake during the 1970s and 1980s in Canada, Australia and the United States, and during the late 1980s in the UK, seemed to lie not only in its timely emergence in relation to other worldwide changes in higher education, but also because of new debates about professional education. These related to a growing recognition that there needed to be not just a different view of learning and professional education, but also a different view about relationships between industry and education, between learning and society and between government and universities. Such debates continue. For example, the shifts away from the relatively unfashionable notion of liberal education, that is the kind of education where students are encouraged to have virtually unrestricted access to knowledge and that knowledge is to be valued for its own sake, have meant shifts towards curricula that focus on what students are able to *do*. These kinds of curricula I shall term operational curricula (after Barnett, 1994) since they tend to focus on encouraging students to develop narrow sets of prestated competencies. By focusing curricula upon such narrow skills students are consequently offered little scope or latitude in terms of

the long-term usefulness of such sets of skills to professional life. Yet the kind of higher education that can help develop in students the capacities to be able to operate effectively in society, whilst simultaneously giving them opportunities to have unrestricted access to knowledge, is on offer through problem-based learning. Problem-based learning is an approach that can embrace both liberal education and operational curricula, by offering students opportunities for undertaking learning that holds real meaning for them in circumstances where knowledge is valued for its own sake *as well as* in the context of accountability and market related values.

Finally, the argument that problem-based learning is yet to be realized developed from my own frustration that much of the literature in this field has set out to offer the world of higher education guidance in, and examples of, the implementation of problem-based learning but little, in real terms, that deals with the difficulties and complexities of the approach. Problem-based learning is something to get excited about, it is an approach that *does* matter, because through its implementation it is possible to provide many rich and innovative opportunities, which will help improve student learning. To begin to see these kinds of possibilities through problem-based learning is to begin to realize its value to the world of higher education and the world of work. Problem-based learning can help students to *learn with complexity*, to see that there are no straightforward answers to problem scenarios, but that learning and life takes place in contexts, contexts which affect the kinds of solutions that are available and possible. Learning such as this is not just a straightforward method of solving problems, but it helps people to learn how to learn and to link learning with their own interests and motivations. It can help students to learn in the context of 'real life' and focus the explorations they undertake, when engaging with problem-based learning, on their practice.

Current problem-based learning literature centres predominantly upon important concerns about ways in which problem-based learning is seen, used and implemented. Texts that offer helpful guidance, that explain curricula change and demonstrate the value of problem-based learning to staff and students are numerous. Whilst these are not only useful but vital to enable others to implement problem-based learning, in the main they tend to portray a positive world in which problem-based learning 'works' and is valued. These texts are important in enabling us to make changes and to move towards curricula that are problem-based, yet at the same time they also portray a world that exists for few. Furthermore, there is a certain expectation that problem-based learning can and will make a difference but often the reality of the expected differences in learners' lives is not articulated. For example, there is little research to date that has explored the impact of problem-based learning upon staff and students' lives or examined the impact of implementing problem-based learning upon the institution, or the impact of implementing problem-based learning in an institution set up for lecture-based learning. Such personal and organizational concerns need to be highlighted and engaged with in ways that do justice to staff, students

and institutions involved in problem-based learning. It will then be possible to see that problem-based learning involves more than just curricula innovation and change, and encompasses a greater challenge than just meeting issues and concerns on the UK Government's agenda, such as lifelong learning and skills for life and work.

This book, therefore, sets out to embrace and value the current research and literature in the field of problem-based learning to date, but it also takes a step further. What is offered here is a theoretical framework that emerged from staff and student data. The example of the students at the beginning of the chapter is just one of the 'real life' stories that emanated from these data. In the field of qualitative research the ideal is to allow theories to ensue from data, but despite what is espoused, models and frameworks are imposed all too often on data in ways that do not allow for the emergence of human action and experience. The framework presented here evolved from my own sense making and engagement with the perspectives of those involved in problem-based learning programmes. Inevitably my own experience of problem-based learning as a former facilitator, as a consultant and as a researcher was part of that sense making but the framework was not imposed, instead it emerged from the lives of those involved in the study. This is a conception, a theoretical language in which students' voices are central to the understanding of the framework of Dimensions of Learner Experience.

What I am arguing for are new perspectives, different truths about what is really occurring on problem-based learning curricula and in the lives of those involved with them. The consideration of personal experience in learning is something that is noticeably lacking in the literature about learning in general, and problem-based learning in particular, yet for many, personal experience is that which makes learning both possible and meaningful. New definitions and new meanings of learning often emerge when the interaction of ideas and experiences collide with one another. They also arise through forms of learning, such as problem-based learning, that challenge our very selves. Textbooks in the field seem to relate little to the actual stories being told during my own research and by colleagues implementing problem-based learning: ways in which learners and teachers managed complex and diverse learning in the context of their lives in a fragile and often incoherent world. These are the untold stories.

Learning . . .

The continuing debates about the nature and process of adult learning have created a minefield of overlapping concepts, with few clear frameworks for understanding the relationship between the context and the experience of the learner. Traditionally, learning theories have been grouped into categories, from the behavioural traditions through to the critical awareness theorists, but with full acknowledgment that one may overlap with another.

However, those in the field of critical awareness have argued that theirs is not simply another perspective on adult learning but rather a shift in ideology. The ideals of this tradition stem largely from theorists, such as Freire (1972, 1974), who argued that social and historical forces shape the processes through which people come to know themselves and develop their view of the world. Learning is therefore seen to occur in a social and cultural context and this necessarily influences what and how people learn. Learners, therefore, must seek to transcend the constraints their world places on them in order to liberate themselves and become critically aware.

Yet the promoters of the cognitive tradition (Ausubel *et al.*, 1978) have argued that new information has to be interpreted in terms of both prior knowledge and shared perspectives. Thus, the existing cognitive structure is the principal factor influencing meaningful learning. In practice this means that meaningful material can only be learned in relation to a previously learned background of relevant concepts. One of the central issues to emerge from this tradition was that of the 'learning context', which will be explored further in Chapter 2. The notion of learning context is important because although students' learning strategies and the processes they have adopted do have a certain stability over time, the learning context affects the quality of student learning (Marton *et al.*, 1984). The acknowledgment of the importance of the learning context has thus begun to raise concerns not only about student learning *per se*, but also has brought to the fore the importance of the learner as a person whose experience is often somewhat marginalized in studies about ways in which students learn.

Those in the humanistic field (Rogers, 1969) contend that significant learning is to be obtained only within situations that are both defined by, and under the control of, the learner. Here the aims of education are on self-development and the development of a fully functioning person. The prior experience of the learner is acknowledged and it is also recognized that students may be constrained by their own negative experiences of learning. The teacher (termed, in this tradition, facilitator) helps to provide a supportive environment in which learners are enabled to recognize and explore their needs. Learning in this tradition is seen as involving the whole person, and not just the intellect, thus educators in this tradition aim to liberate learners and allow them freedom to learn (Boud, 1989).

Finally, the developmental theorists offer us models that in many ways seem to take account of cognition and development. The teacher's concern here is in enabling students to develop both understandings of the nature of knowledge and ways of handling different conceptions of the world, so that knowledge acquisition is seen as an active process. It has been from this field that a number of innovative studies have arisen. For example, from a qualitative study of men at Harvard, Perry devised nine positions that described how students' conceptions of the nature and origins of knowledge evolved (Perry, 1970, 1988). This classic study put issues of learner experience centre stage and argued that students proceed through a sequence of developmental stages. In this description of the attainment of intellectual

and emotional maturity the student moves from an authoritarian, polarized view of the world, through stages of uncertainty and accepting uncertainty, to finally an understanding of the implications of managing this uncertainty. The student then accepts the need for orientation by a commitment to values and eventually gains a distinct identity through a thoughtful and constantly developing commitment to a set of values. Belenky *et al.* (1986) were stimulated by Perry's work to explore diverse women's perspectives, and they identified five categories of 'ways of knowing' and from this drew conclusions about the way women see truth, knowledge and authority. For example, women began from a position of silence where they saw themselves as mindless and voiceless and subject to the whims of external authority. In later stages women constructed knowledge; this was where the women viewed all knowledge as related to the context in which it occurred, and experienced themselves as creators of knowledge. It is the work of these developmental theorists that seems to offer some of the more tenable models of learning. They are models which, to a degree, acknowledge that what is missing from many curricula is a recognition of the role and relevance of learning from and through experience, which can prompt the shaping and reconstructing of people's lives as learners and teachers.

The argument

The central argument of this book is that the potential and influence of problem-based learning is yet to be realized in the context of higher education. My thesis is that problem-based learning is an important approach to learning, based in the experiential learning tradition, which needs to be more centrally located in higher education curricula than it is currently. My argument centres around seven themes, which will recur throughout the book:

1. Problem-based learning as a concept and approach is often misunderstood. This tends to result in mistaken perceptions about the possibilities for its use in higher education.
2. Problem-based learning has often been confused with forms of problem-solving learning, which has resulted in the terms being used interchangeably. In some cases this has meant that problem-based learning has been interpreted too narrowly and utilized in limited ways.
3. Misunderstandings of problem-based learning have resulted in an underestimation of its value in terms of equipping students for a complex and changing professional life and the opportunities that can be gained through it to improve student learning.
4. There exist a number of *forms* of problem-based learning but decisions about which form to adopt is rarely made explicit by staff in curricula documents or to the students involved in the programmes. These different forms need to be made explicit as each offers different advantages and emphases to the students, the academe and to the world of work.

5. There is, as yet, little known about what actually occurs, as it were, *inside* problem-based curricula in terms of staff's and students' 'lived experience' of the curriculum. This has consequences. First, students', and to some degree staff's, voices are largely missing from the literature on problem-based learning. Second, key elements such as learning context, learner identity and 'learning in relation' are rarely acknowledged or discussed when implementing or enacting problem-based learning.
6. Learning should be seen as a cyclical process in which students make *transitions* through which they develop increasing (and also sometimes decreasing) understandings of themselves, their context, and the ways and situations in which they learn effectively.
7. The full potential of problem-based learning will only be achieved through:
   - understanding and acknowledging the similarities and differences between problem-based learning and problem-solving learning
   - making the form of problem-based learning on offer explicit
   - recognizing the impact of the organization upon the implementation and enactment of problem-based learning
   - acknowledging that problem-based learning can offer staff and students the opportunity of learning to 'make sense' for themselves, personally, pedagogically and interactionally
   - realizing the value and complexity of it as an approach to learning and the ways in which it can help students to understand and challenge their situations and frameworks by encouraging them to *learn with complexity* and through ambiguity.

The plan

Part 1 begins by exploring problem-based learning through an analysis of its theoretical and philosophical underpinnings and examining the reasons for its growing popularity in the context of worldwide change in higher education. Chapters 1 and 2 focus specifically on how the value of problem-based learning in the context of a learning society has been underestimated. Within these chapters it is also argued that there is work to be done in deepening understandings of the nature and guises of problem-based learning. These chapters provide the platform for the development of the argument that discussions about problem-based learning should be firmly located within a language of experiential learning.

Part 2 explores both the theory and the practice of problem-based learning in the context of four British universities. It presents and then examines the framework of learning that emerged from research and that has subsequently been developed in practice. Four short curricular case studies in Chapter 3 demonstrate the multidimensional nature of problem-based learning within different disciplines and educational environments. The focus of Chapter 4 is on a new framework for understanding the nature of learner

experience on problem-based learning programmes that arose from a cross-site investigation into problem-based learning. This framework, termed 'Dimensions of Learner Experience', and the concepts of *personal stance, pedagogical stance and interactional stance* are presented and examined from a theoretical and practical perspective. Chapter 5 argues that students are offered, through problem-based learning, opportunities to recognize and value their learning experiences and to develop independence in inquiry. These opportunities can promote transitions in learning. This chapter fleshes out the framework of Dimensions of Learner Experience by using students' data to demonstrate personal, pedagogical and interactional concerns. It also examines some of the ways in which problem-based learning fosters transitions in students' learning from disjunction to integration and vice versa, in preparation for the next section.

Part 3 explores ways of understanding and implementing principal ideas and challenges that emerged from the framework of Dimensions of Learner Experience. It centres on making sense of problem-based learning and managing its implementation and utilization at a number of different levels. The section begins, in Chapter 6, by documenting the ways in which staff, students and course designers may be enabled to recognize, acknowledge and act on the existence of disjunction so that it can be managed effectively at an individual and organizational level. It examines students' experiences of disjunction in the context of a series of catalysts. Chapter 7 explores the nature of transitions and argues that transitions are not something for which students should take total responsibility. This chapter also explores the extent to which problem-based learning programmes offer greater opportunities for effective management of transitions than do more traditional lecture-based programmes. Chapter 8 concludes this section by exploring the rival agenda in higher education and the fragility of learning environments that necessarily impinge upon problem-based programmes.

The final two chapters of the book locate problem-based learning in the world of higher education in general. Chapter 9 begins by exploring, in brief, the ways in which interpretations of knowledge and learning, and conceptions of the learner, affect how problem-based learning is played out in practice. The rest of the chapter presents and explores five models of problem-based learning. Chapter 10 concludes the book by considering the implications of implementing problem-based learning both for management and organizations in general. It explores some of the current political issues that have organizational and educational implications and discusses the ways in which organizational structures can impinge upon problem-based learning.

Part 1

A Web of Belief?

1

Problem-based Learning Underestimated

Introduction

The central argument of this book is that problem-based learning needs to be located more centrally in the world of higher education than it is currently. Through this chapter the concept of problem-based learning is examined in order to explore both competing understandings of problem-based learning and underlying reasons for its use and increasing popularity. It is argued that problem-based learning is not just a different method or style of teaching. Instead it is a different philosophical approach to the whole notion of teaching and learning. For example, I argue that at the heart of this approach is the development of important abilities, such as flexibility, adaptability, problem-solving and critique. Abilities such as these have been highlighted by government and industry as central to the development of future professionals. Whilst the current trend in many universities is to provide programmes for skills development, such as negotiation, group work, team work and presentation skills, the advantage which problem-based learning offers is the development of such skills in a learning environment where they are part of a wider learning approach. This chapter demonstrates the ways in which a critical understanding of problem-based learning can broaden perspectives about what is actually on offer through this approach. However, at the same time it is also important to examine and question some of the agenda that have prompted the implementation of problem-based learning in the context of worldwide change in higher education. Thus, the latter section of the chapter explores some of the reasons why problem-based learning may have been underestimated or, in some cases, implemented under rather questionable circumstances.

The emergence of problem-based learning

The notion of learning through solving or managing problems is not new, as the introduction shows. However, the emergence of problem-based learning

as a specific concept and approach emanated from the work of Barrows, who discovered through his research into medical education that 'medical students and residents for the most part did not seem to think at all. Some gathered data ritualistically and then tried to add it up afterwards, while others came up with a diagnosis based on some symptom or sign, never considering possible alternatives' (Barrows and Tamblyn, 1980: xi). Problem-based learning was developed at McMaster University in Canada where Barrows set out to design a medical school curriculum based solely on small group, student-centred learning. The rationale for problem-based learning stemmed from years of observing experts engaged in clinical reasoning, resulting in Barrows and Tamblyn (1980) claiming that problem-based learning was based on two assumptions. The first was that learning through problem situations was much more effective than memory-based learning for creating a usable body of knowledge. The second was that the medical skills that were most important for treating patients were problem-solving skills, rather than memorization. Yet, what was important about the approach adopted at McMaster was that the focus was not on problem-solving learning whereby individual students were expected to answer a series of questions from information supplied by a lecturer. Instead they were asked, in small teams, to explore a problem situation. Through such an exploration students were expected to examine the gaps in their own knowledge and skills in order to decide what information they needed to acquire in order to resolve or manage the situation with which they were presented.

As Barrows and Tamblyn's model was being developed during the early 1970s there was also increasing interest in the medical world in students' ability to develop problem-solving skills. Other research indicated that medical students were lacking in problem-solving skills (see for example McGuire, 1972, 1985). In parallel, there was interest in understanding students' approaches to problem-solving activities and with it came criticism of the unnaturalness of much laboratory research in cognitive psychology (Neisser, 1982). This resulted in wide-ranging studies of students' problem-solving abilities with a growing emphasis on the use of qualitative methods (Laurillard, 1979, 1984). This early research into problem-solving and clinical decision making prompted interest and research within professions allied to medicine (for example Higgs, 1990; Terry and Higgs, 1993). There was, however, a shift away from focusing on the generation and testing of hypotheses as a means of arriving at a major clinical decision, and a greater emphasis on clinical reasoning as a process occurring throughout clinical practice. This work in part stemmed from some of the early studies into problem-based learning where it was increasingly seen that learning problem-solving abilities in situations isolated from a relevant context did not facilitate effective transference to the clinical environment. What became increasingly apparent was that although problem-solving skills were a useful acquisition for students, it was the application of such skills to a clinical situation that was vital. This was because problem-solving learning tended

in the main to be seen as a step by step approach to solving a problem that denied the complexities and difficulties of a clinical situation. In contrast, problem-based learning confronts students with the challenge to manage a clinical situation, which requires them to incorporate diverse resources such as existing knowledge, data collection, interpersonal skills, reflection and reasoning ability in order to meet that challenge.

The bulk of the literature in the late 1970s and 1980s argued for the use of problem-based learning (including, and beyond, the original reasons suggested by Barrows and Tamblyn 1980) for four key reasons. These were, first, to develop students' reasoning skills; second, to enable learning to take place within a context that was relevant to the students; third, to ensure that learning was attuned to the world of work; and finally to promote students' self-directed learning abilities, that is, learning that fostered independent enquiry. A number of articles at that time cited lists of advantages of problem-based learning over more traditional ways of learning (Neame, 1982; Coles, 1985) and others suggested that problem-based learning was found to be more enjoyable and stimulating by staff and students involved in such programmes (Olson, 1987). However, few seemed to tackle many of the underlying assumptions of problem-based learning or relate such assumptions to current trends in the broader context of changes within higher and professional education.

There has been a shift in recent years away from literature that describes problem-based learning, and how it is working in particular courses, towards critical analyses of problem-based learning, which are more sensitive to the complexities of this approach to learning and teaching. This demonstrates the increasing move away from the 1980s decade of evangelism (Boud and Feletti, 1997) towards a deeper consideration of the emerging themes and issues. This can be seen in particular through literature that has argued for problem-based learning as being an approach which can be responsive to the needs of the age. In practice, this can be seen in the increasing demand for the development of particular 'skills' within curricula and with it the realization that problem-based learning is a means of helping students developing such skills. Such skills are commonly termed 'key skills' and are the kinds of skills such as working with others, problem-solving and improving personal learning and performance. Key skills are being offered to undergraduates in order to both enhance their degrees and to produce graduates with well-developed personal and interpersonal skills. The development of key skills has become increasingly important as higher education in the 1990s is being encouraged to produce graduates who are flexible and have market-related skills and abilities. At the same time there is a growing awareness that a focus on skills development at the expense of the development of abilities to research and critique information may result in a 'performative slide' (Barnett, 1998). The concept of a performative slide is that in the desire to equip students for life and work there tends to be an increasing focus on what students are able to *do*. Higher education is sliding towards encouraging students to perform rather than to necessarily think and do.

The result is that students are equipped to undertake tasks, to carry out instructions, and to work with others, but they are not necessarily able to analyse or critique the situation in which they find themselves or the information with which they have been presented. Yet what is on offer through problem-based learning are opportunities for students to develop the required key skills but in a context where they are also encouraged to develop the ability to critique issues and information, and to take up a position towards the situation with which they have been presented.

Understandings and interpretations of problem-based learning

In many ways it could be argued that problem-based learning worldwide is in crisis. There is often a feeling, in any field, that things were better in the days when it was clear what was meant and it was understood how things should be. It seemed that there was a time when many believed that everyone either knew or did not know what counted as problem-based learning and what did not. Yet it seems there is a sea change. Most of those who feel that problem-based learning possesses given characteristics and ways of being have adopted outright the model of problem-based learning as laid out by Barrows and Tamblyn (1980). This is the position taken by those who argue for a prescriptive means of implementing problem-based learning and who suggest that unless it is enacted in a specific way then the ability to promote particular learning principles through it is considerably diminished (for example Engel, 1997). However the notion that problem-based learning can be described as something definable that can be contained within boundaries only serves to create two further problems. The first is that these narrow ideals unnecessarily tend to set traditional notions of learning against progressive ones. The second is that it sets up misconceptions about what might be seen and accepted as problem-based learning and what might not. Instead I would argue that problem-based learning has many guises and differences, and that these can stem from the discipline or professional knowledge base into which it is introduced, and/or the structural and pedagogical decisions that have been made during implementation and subsequent enactment. For example, the pedagogical decisions, that is those decisions which relate to the kind of teaching and learning methods that underpin and are adopted in a curriculum, can affect the ways in which problem-based learning is played out in practice. For instance, engineering is a subject that for many years has used problem-solving approaches to learning, largely in the context of lecture-based programmes. The implementation of problem-based learning in engineering may be affected by an overarching pedagogical view, such as the perspective that students require a sound body of knowledge and sufficient mathematical skills before they are knowledgeable enough and equipped to engage with problem-based learning. The result is that problem-based learning is more likely to take

place in the third year of such a programme. Other disciplines may be affected by the traditional ways in which they have always been taught and the values and distinctive views of knowledge held by those within them. Contrastingly, there are other subjects, such as those within health sciences, which are based on other subjects and disciplines and are therefore less bounded by a distinct pedagogy of their own. Perhaps it is this lack of a strong underlying disciplinary base that has made it easier for these areas, such as health sciences, to adopt problem-based learning than those subjects with a stronger disciplinary base. Yet at the same time particular traditions and practices can also be an impediment, such as the kinds of traditional views of what was expected of a nurse or a physiotherapist undertaking apprentice-style training where they were required to learn by example and following instructions to the letter.

At this point it is perhaps important to sound a cautionary note. It may seem that I am arguing that all learning is problem-based or that all learning that involves some kind of problem-solving is problem-based learning. The difficulties and dilemmas involved are more complex than this and are related to conceptions of teaching and learning, understandings about what counts as knowledge, and a whole host of other concerns that will be dealt with later in this book. This leaves us with the problem about what it might mean to implement problem-based learning when it is difficult to know what it is that is being attempted. A way forward from this is to argue instead for a set of key characteristics that, within a given context, may come together as a whole to form a problem-based approach. Problem-based learning might then be seen as an ideology rooted in the experiential learning tradition that can be adopted within modules, across semesters or throughout curricula. Boud (1985) and Barrows (1986) both have listed characteristics of problem-based learning. Both have argued that problem-based learning is not to be seen as a particular way or method of learning, rather it is to be seen as learning that has a number of differing forms. Boud (1985) suggested that problem-based learning differs according to the nature of the field and the particular goals of the programme. He noted that developments in problem-based learning have drawn on a number of ideas in addition to problem-centredness, the most important of which he sees as student-centredness. Boud subsequently outlined eight other characteristics of many problem-based learning courses:

1. An acknowledgement of the base of experience of learners.
2. An emphasis on students taking responsibility for their own learning.
3. A crossing of boundaries between disciplines.
4. An intertwining of theory and practice.
5. A focus on the processes of knowledge acquisition rather than the products of such processes.
6. A change in staff role from that of instructor to that of facilitator.
7. A change in focus from staff assessment of outcomes of learning to student self- and peer assessment.

8. A focus on communication and interpersonal skills so that students understand that in order to relate their knowledge, they require skills to communicate with others, skills which go beyond their area of technical expertise.

Barrows has suggested that the combination of design variables for problem-based learning, when linked to the educational objectives, is endless. He concluded that the term problem-based learning must be considered a genus from which there are many species and subspecies. As such, all types of problem-based learning must be evaluated in terms of issues such as the type of scenarios, assessment methods, learners' autonomy and the way in which teaching and learning occurs. Barrows (1986) thus proposed a taxonomy of problem-based learning methods that explains differing meanings and uses of problem-based learning. The taxonomy has highlighted the educational objectives that it is possible to address through problem-based learning and it has included the following combination of varieties in use:

1. Lecture-based cases – here students are presented with information through lectures and then case material is used to demonstrate that information.
2. Case-based lectures – in this instance students are presented with case histories or vignettes before a lecture that then covers relevant material.
3. Case method – students are given a complete case study that must be researched and prepared for discussion in the next class.
4. Modified case-based – here students are presented with some information and are asked to decide on the forms of action and decisions they may make. Following their conclusions, they are provided with more information about the case.
5. Problem-based – in this instance students meet with a client in some form of simulated format that allows for free enquiry to take place.
6. Closed-loop problem-based – this is an extension of the problem-based method, where students are asked to consider the resources they used in the process of problem-solving in order to evaluate how they may have reasoned through the problem more effectively.

The perspectives offered by Barrows and Boud have demonstrated the multifaceted nature of problem-based learning, a position which has been supported and subsequently developed by Margetson in a number of articles during the early 1990s. Margetson (1991b) suggested that problem-based learning should be seen as more than just a different method of learning, but rather as a specific stance towards both knowledge and the position of the student in the learning process. He has argued for a different view of learning and an alternative starting point from traditional approaches to teaching. Problem-based learning may be seen as 'a conception of knowledge, understanding, and education profoundly different from the more usual conception underlying subject-based learning' (Margetson, 1991b: 43–4). Over the past decade, Margetson has tackled a number of the complex

issues relating to problem-based learning from a broad philosophical perspective. He has offered some important perspectives to those wishing to understand the philosophical underpinnings of problem-based learning and some of the multifaceted difficulties that emerge when attempting to implement problem-based learning organizationally. Margetson argued in the early 1990s for an examination of the relationship between teaching and facilitation and an exploration of the significance of problem-based learning in relation to current educational reform. Furthermore, he suggested (Margetson, 1991a) that the assumption that 'knowledge is certain' persists and that the assumed link between certainty and knowledge is used to justify lecture-based methods of teaching. Margetson's thought-provoking arguments have been a challenge to many implementing problem-based learning, particularly in the areas of science and medicine where there is often a greater emphasis on acquiring certain knowledge than in the subjects of arts and social science.

Arguments such as this demonstrate that there are not narrowly defined characteristics of problem-based learning. Instead there are people working in contexts using problem-based approaches. Problem-based learning is an approach to learning that is affected by the structural and pedagogical environment into which it is placed, in terms of the discipline or subject, the organization and the staff concerned. As will be seen later, it is possible to articulate overarching features of curricula that use problem-based learning, from which it is possible to formulate broad models. However, since the emergence and popularization of problem-based learning, many have sought to define it in some way. It would seem at first glance that it is only by unpacking characteristics that any comparison about what makes problem-based learning different from other ways of learning is possible. Yet merely to list specific and narrowly defined characteristics does not in fact untangle the philosophical conundrums of problem-based learning. Walton and Matthews (1989) have argued that problem-based learning is to be understood as a general educational strategy rather than merely a teaching approach, and have noted that there was no fixed agreement as to what does and does not constitute problem-based learning. However, they have argued that for problem-based learning to be present, three components must be able to be differentiated. The suggestion that these authors make offers real clarity about how problem-based learning might be seen and understood. They present parameters within which to understand problem-based learning without losing the sense of its vitality and complexity as an approach. The three broad areas of differentiation are as follows:

1. Essential characteristics of problem-based learning that comprised curricula organization around problems rather than disciplines, an integrated curriculum and an emphasis on cognitive skills.
2. Conditions that facilitated problem-based learning such as small groups, tutorial instruction and active learning.

3. Outcomes that were facilitated by problem-based learning such as the development of skills and motivation, together with the development of the ability to be lifelong learners.

This particular interpretation of problem-based learning offers modes of understanding this educational strategy that take account of the complex nature of learning. At the same time it is an interpretation that encapsulates the differing ways in which students learn in diverse professions across a variety of institutions.

Problem-based learning in the changing terrain of higher education

Over the past few decades there has been increasing pressure on higher education worldwide to re-examine and make explicit its aims and outcomes. In the United Kingdom (UK) the move towards a market model of higher education, that is a model of higher education which is responsive to market demands and forces in the wider society, has paralleled increasing demand for accountability to the public and State and for greater vocational relevance. This shift towards, and openness to, market forces has resulted in closer links between higher education and industry. This has promoted changes in curricula generally, in particular the development of personal qualities for life and work exemplified through the growth of key skills programmes in higher education curricula. Expansion in higher education, with the move towards a mass rather than an élite system has to some extent occurred through the widening of access and the continuing attempts to broaden the social mix in higher education. Innovations such as National Vocational Qualifications (NVQ), access courses and the accreditation of prior experiential learning (APEL) have meant that the clientele within the system has changed, albeit slowly, bringing new challenges and complexities. For example, a more diverse student population than former years requires a broader range of teaching and learning methods, which can take account of a variety of student learning needs and study patterns. Flexible approaches to learning and new and different forms of distance education are just a few of the recent demands diverse students require of the higher education system. Such demands have caused many departments to consider such approaches as problem-based learning to take account of students' requirements (for example Taylor and Burgess, 1995).

New debates about professional education have also been influential in putting problem-based learning high on the agenda within higher education. For example, Eraut (1985) argued that higher education needed to develop a role beyond that of creating and transmitting knowledge, by enhancing the knowledge creation capacity of individual and professional communities. This would therefore require a greater exchange between higher education

and professions. Arguments such as this have prompted discussions around the nature of knowledge and the ways in which knowledge is used and perceived in the context of professional education. Others have explored the nature of different types of professional curricula and suggested that the integration of theory and practice within professional curricula was vital, and that this integration should be seen in terms of the worth of, and consequent assessment of, practice within the curriculum. Such research and literature have prompted the incorporation of ways of helping students to understand how practitioners think and reflect in action into both curricula and professional practice. One such way was seen to be the inclusion of problem-based learning within professional curricula (for example Sadlo, 1994; Cawley, 1997) and more recently the shifts towards valuing and accrediting initiatives such as work-based learning.

Professional education is an area that has grown and developed through a number of changes since the 1960s and Barnett (1990) has argued that the growth of professional education is possibly the most significant feature of development of higher education in the UK over the past 30 years. The largest area of growth in the use of problem-based learning is in the area of professional education. This can be seen in the diversity of literature and texts that offer guidance to those in professional education wanting to implement problem-based learning (for example Alavi, 1995; Boud and Feletti, 1997; Taylor, 1997; Glen and Wilkie, 1999). Problem-based learning is also increasingly being seen in professional education as a means of managing the growing and widening knowledge base of individual professions, since curricula can no longer expand to cope with such demands. As a result students in professional education are increasingly being equipped to 'manage knowledge' rather than being expected to have assimilated it all before qualification. Thus it can be seen that experimentation around the use of problem-based learning has been shaped by new questions being raised about professional education in the context of unprecedented world expansion in higher education during the 1960s and again during the 1980s and late 1990s. Change in the UK appeared to have emerged as a result of the government's growing demand for greater accountability within education and employers' preferences for graduate entrants with key skills. This is seen, too, in such examples as the report *Tomorrow's Doctors* (General Medical Council, 1993), which recognized the merits of learner-centred and problem-orientated approaches to learning, and strongly encouraged the adoption of these approaches within British medical schools. Following their entry into higher education, a number of nursing schools in the UK also committed varying proportions of their new curricula to problem-based learning.

Despite the value seen by many in the implementation of problem-based learning, there is also a need to be careful that it is taken up for sound reasons and it is not adopted in ways that go down the slippery slope towards the performative slide. To focus too much on what students are able to do and on their ability to perform, could be to deny many students

the vital opportunities to critique the situations and information with which they are being presented. Yet the adoption of problem-based learning sometimes occurs on the one hand because it is seen as an innovative means of managing curricula difficulties or introducing innovation in teaching and learning (Silver *et al.*, 1997). On the other hand it may have been implemented because it is seen to offer opportunities to call for the end of knowledge, disciplines and staff–student boundaries, an end befitting a fragmented, ambiguous postmodernity. There appears to be a number of interrelated reasons for the increasing popularity of problem-based learning while at the same time there is an apparent underestimation of it as a catalyst for change within curricula and a prompt to transitions in people's lives. Yet problem-based learning has been underestimated in a variety of ways which means that it is not yet located centrally within the higher education system.

Problem-based learning underestimated?

Although problem-based learning has so far been underestimated in terms of its overall use value in higher education, there are clear signs of its growth and increasingly popularity. This is important, but what is of concern is that it is not always supported in the growth areas by the organization into which it is placed, and thus although there is growth, to some extent much of this is at the marginalized end of the system (see for example the findings of the study into innovation undertaken by Silver *et al.*, 1997). However, the popularity of problem-based learning does also seem to be occurring due to a series of trends, some of which could be said to have dubious motives behind them. These can be mapped as follows.

Labour market demands for key skills

Problem-based learning offers opportunities for students to learn in teams, develop presentation skills, learn negotiation abilities and develop research skills and many other abilities. Such skills and abilities are highly valued by a variety of public and private sector clients, who are playing an increasing role in UK higher education. Problem-based learning is clearly recognized as offering students a means of acquiring such skills and abilities in the context of curricula where it then becomes unnecessary to bolt on extra sessions to enable students to acquire market related skills. The value here is in the centralization of activities in problem-based learning curricula, which can prompt students to engage not only with skills for life and work, but also to develop an ability to critique, instead of fragmenting the nurturing of particular activities through skills training sessions. The disadvantage is that problem-based learning can be seen as the sole means of 'giving students skills' rather than implementing problem-based learning with a

clear understanding of the wider pedagogical and organizational implications of its use.

The incorporation into curricula of professional agenda

Interprofessional education is growing in the UK and problem-based learning is increasingly being viewed as a vehicle to promote and implement it. There has been a shift away from forms of shared learning where students of different professional groups, as it were, 'share' the same learning experience by receiving lectures and seminars on subjects of common ground. Instead there is an increasing desire for forms of learning to occur in which students engage with each other through debate, group work and problem-based learning, in which they are educated with and through each other. Such forms of learning, defined here as interprofessional education, seek to enable students to develop sound understandings of different professional perspectives, to understand the similarities and differences between them, and to encourage an exploration of discipline and subject boundaries. Students are also helped to experience the different ways in which professions utilize the same knowledge in different ways.

The desire to marry problem-based learning with interprofessional education has emerged through a realization that, brought together, these educational approaches can help students to engage with and manage many of the barriers and difficulties of working in interprofessional teams. The introduction of either shared learning or interprofessional education ideas into the undergraduate curriculum can seek to meet this need for interdisciplinary understanding at an early stage of the young professional's working life. Shared learning is seen as any learning or teaching in which participants are drawn from two or more professional groups (Barr, 1994), and may include workshops and seminars as well as lectures. Interprofessional education uses a variety of teaching methods and learning strategies to encourage interaction and interactive learning across the professions. The aims of interprofessional education are likely to include the development of skills and attitudes as well as knowledge, whereas shared learning may have more limited aims.

Integrating these two approaches can help students to not only learn about team work but also what it means to work in an effective team. Thus in the UK, agencies such as the National Health Service (NHS) National Training Forum and the NHS Training Authority have supported interprofessional education. Health service consortia are promoting problem-based learning in the context of interprofessional education in order to develop professionals of the future who are flexible and adaptable, but also because there appears to be a belief that interprofessional education is cost effective and thus economically worthwhile. Over time it might be that the financial pressures on the NHS and higher education will mean that there is increasing support for a method such as problem-based learning, which is expected to meet multiple aims and decreased funding requirements.

The declining unit of resource in higher education

There has been a fall of over 30 per cent in the public funding that UK universities have received per student since 1980 (Williams and Fry, 1994), and the cuts continue. In the shift from an élite to a mass system there has been an increased participation in higher education compared with former years, with the result that university resources are increasingly overstretched. Large student numbers, decreasing resources and overextended staff is beginning to characterize the state of higher education worldwide. For some, problem-based learning is seen as a means of teaching a larger group of more diverse students than in former years, using less face to face contact. For example, if students are learning in groups without a member of staff to facilitate the process, then staff can be available to undertake research and other activities that may help the survival of their department. A more cynical perspective is to suggest that new and more interesting ways of learning than lecture-based learning, such as problem-based learning are likely to attract students because they provide 'infotainment'; a liberal mix of information and entertainment (Ritzer, 1996). Ritzer has suggested that:

> In addition to the demands of increasingly consumerist parents and students, the pressure on colleges and universities to change is being fueled by economic factors, especially the relative decline in funding of higher education. With outside funding being reduced, the university responds, among other ways, by cutting costs and by attempting to attract and keep more new (and paying) 'customers'. The new means of consumption are attractive models because they not only excel at attracting customers, but also at reducing costs.
>
> (Ritzer, 1996: 188)

This kind of infotainment will be particularly evident in curricula that include the added attraction of information technology and distance learning components. Students will see kinds of learning such as this as efficient, independent, low cost and fun. Thus, universities who utilize problem-based learning 'infotainment-style' will expect to attract more students whilst at the same time reducing costs.

'*It seemed like a good idea*'

Problem-based learning is being adopted because it is seen to be fashionable and offers kudos to those involved in curricula innovation and change. For some it may be implemented in order to enhance promotion prospects, for others it is seen as a helpful means of engaging students in learning instead of boredom, while also offering staff themselves a new and entertaining way of teaching for themselves. At an organizational level problem-based learning may be adopted to solve practical curricula difficulties such

as merging departments of the same discipline when two institutions unite. Alternatively, problem-based learning may be utilized when large subject areas, such as health sciences, move into the university sector. This has occurred in the UK when two or three Schools of Nursing and Midwifery have amalgamated and are subsequently incorporated into a university. Such schools have invariably been regional satellites with different curricula and pedagogical emphases. In instances such as this, problem-based learning has been adopted as means of managing diverse curricula agenda.

The opportunity to create a 'multi-inclusion' curriculum

Multi-inclusion curricula are, I suggest, the kind of curricula that are designed to enable students to cover a large body of knowledge and develop key skills, whilst providing them with large-scale infotainment by offering a wide variety of opportunities for learning. These kinds of curricula are designed to meet the requirements of multiple stakeholders; students, government, professional bodies, health service consortia and employers. The diversity of learning methods in higher education, along with the knowledge explosion, has meant that many curricula are overcrowded with both content and process. For example in some areas, such as health sciences, problem-based learning has been adopted in recent years for well-thought through pedagogical concerns, of which one has been the difficulty of managing the sheer volume of knowledge and abilities expected by employers in the health and social services. However, at the same time problem-based learning has also been seen as a place where it is possible to add in other interesting methods of learning, some of which are applicable and others which are not. Yet even those which are applicable, such as problem-solving learning packages that contextualize knowledge and provide relevant and meaningful learning experiences, can be overwhelming to the student in the face of so much other change. What can be seen then are curricula that are only problem-based in the sense that the students are so overwhelmed by knowledge(s), modules, distance learning, global study, clinical skills laboratories and web-based assessment that they spend the entire course trying to understand the similarities, differences and interfaces between all the approaches. There is a sense that 'multi-inclusion' curricula can offer too much choice so that ultimately incoherence and diversity created for the students through them can become disabling rather than enabling.

The means of responding to 'directed innovation'

The notion of directed innovation (Silver, 1998) stems from the idea that most innovation that is rewarded is directed by governments and institutions, and is necessarily funded by stakeholders. Therefore, what will be seen here is not guided and self-motivated innovation as in former years,

but innovation that is bounded by government policy, funding frameworks and institutional research policies. Problem-based learning is an approach that can also emerge as something which is part of a directed innovation, perhaps to secure monies or grants rather than because of clear pedagogical motivations. For example, industry funding for projects that link together learning technology and problem-based learning reflects the way in which learning can be hijacked to further the cause of university status and the carving out of personal careers supported by government agenda. A sound educational edge could be lost amidst other more tempting sweeteners. That is not to say that we should not take the money and run – but we need to be clear about who wins and loses when we do.

Conclusion

It is important to note that, although problem-based learning would seem to offer multiple advantages to staff, students and employers, the value of this approach from an educational viewpoint has been seriously underestimated. For example, problem-based learning can offer students opportunities to learn how to learn, and to develop key skills, independence in enquiry and the ability to contest and debate. For staff it can offer a means of responding to the problem of ever increasing pressures on curriculum content, opportunities for interprofessional education, and for implementing teaching that is grounded in the world of work, which can stimulate students to engage with the complexity and diversity of everyday problem situations. Problem-based learning can provide a means of managing the kinds of diversity that, amongst other things, offers a range of choice for the educator and the learner. Some of these choices and opportunities may be evident to those currently utilizing problem-based learning but they are rarely made explicit in the literature.

In this first chapter some of the current views, models and assumptions about how problem-based learning is understood have been explored in an attempt to begin to unravel the argument that problem-based learning has been underestimated, undervalued and misunderstood in the world of higher education. The lack of studies into what actually occurs inside problem-based curricula adds fuel to this argument because as a result there is, as yet, little known about staff's and students' 'lived experience' of the curriculum. The consequence of this is that because students', and to some degree staff's, voices are largely missing from the literature on problem-based learning, key elements such as learning context, learner identity and 'learning in relation' are rarely acknowledged or discussed when implementing or enacting problem-based learning. The next chapter examines these three elements that tend to be increasingly omitted from discussions concerning the implementation and enactment of problem-based learning in today's climate.