

PROBLEM-BASED LEARNING: OLD WINE IN NEW BOTTLES?

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The introduction of Problem-Based Learning (PBL) has resulted in significant changes to the way in which teaching and learning are viewed, and offers exciting possibilities for far reaching reforms. However, unless we pay attention to the fundamental philosophy that underlies our view of the world, what the purposes of education are, and in what settings lifelong learning should take place, we risk putting old educational wine into our new PBL bottles.

In many respects education seems to be stuck in a worldview firmly grounded in the 'logical positivism' developed in the 17th century. Such a philosophy believes that there are universal and fundamental laws that can be discovered by a process of reducing the natural world to its component parts, so resulting in knowledge that is both objective and certain. By contrast, a more contemporary paradigm would argue rather that our ideas about the world are nothing more than a series of social constructs, representations of the truth rather than truth itself, and that the context in which observations are made is a central issue rather than an irritating variable. Evidently, then, what counts as knowledge can be very different, depending on the philosophic stance of the curriculum, whether or not PBL is used as the educational methodology.

Another important question is the aim of the curriculum. Is it to produce knowledge for its own sake, or as a means to enable students to deal with problems now and in the future? Is the curriculum 'academic' in its intent, or 'vocational'? Is it concerned purely with propositional 'knowing what' knowledge derived from a host of essentially theoretical sources, or a more practical 'knowing how'? A curriculum that ignores such distinctions risks offering information and learning for its own sake, and will be concerned almost exclusively with the transmission of existing knowledge rather than challenging students to develop the skills needed to change the world in which they will live.

Who exactly is the target of the curriculum? PBL encourages group work, but to a great extent the focus is still on individual learning. A major assumption underlying this focus has been that work related knowledge is possessed by individuals alone. This view is being challenged, however, by the idea that some work knowledge is collective, and is possessed by work groups themselves, and not just by the individuals who make up the group. To what

extent should such groups, rather than individuals, become the target of educational activities?

In addition, if educational changes such as those promised by PBL are to be more than window dressing, then the setting in which learning takes place may be at least as important as the learning activities themselves. If we really believe in the concept of 'lifelong learning' it is clear that there will need to be a profound shift away from the educational institution as the centre of all educational events.

Problem-based learning provides an opportunity for challenging conventional ideas about learning and teaching, but may not be sufficient to produce significant educational reform without a fundamental realignment of the philosophy underlying the curriculum, its aims, and the settings in which learning takes place.

INTRODUCTION

“In this life, we want nothing but Facts, Sir: nothing but facts.” So declared Mr. Gradgrind who, we are told in Charles Dickens' book 'Hard Times', saw his pupils as “...little vessels, there and then arranged in order, ready to have imperial gallons of facts poured into them until they were full to the brim.”

The purpose of education, according to such a worldview, was to disseminate the wise words of the privileged few to the deprived many. We may have changed Mr. Gradgrind's 19th century educational practice of attempting to fill pupils to the brim by adopting methods such as Problem-Based Learning, but unless we pay attention to the fundamental philosophy that underlies our view of the world, what the purposes of education are, and in what contexts lifelong learning should take place, we risk putting old educational wine into our new PBL bottles.

WHAT COUNTS AS KNOWLEDGE?

Mr Gradgrind's educational philosophy was firmly grounded in the 'logical positivism' developed in the 17th century. Such an approach believes that there are universal and fundamental truths that can be discovered by a process of reducing them to their component parts. Such objects exist in a pure state, unaffected by any influences of the observer on the object being observed. Our knowledge of the world, then, is both objective and certain.

By contrast, a more contemporary paradigm – sometimes called 'social constructivism' - would argue rather that scientific ideas are a series of social constructs, representations of the truth rather than truth itself; that the neutrality of the scientist is a fiction, with interplay between the observer and the observed; and that the context in which observations are made is a central issue rather than an irritating variable.

In its essence the clash between these world views has to do with whether something is best understood by taking it apart or putting it together: by reducing it to its components, or by taking a holistic approach that considers that the whole is indeed greater than the sum of its individual parts; and whether the stance of the scientist should be that of a neutral observer, or that of someone who affects and is affected by the object of study.

Medical students, for example, often face this clash of worldviews at a very early point in their medical careers. During the preclinical part of the course in particular, in the anatomy, biochemistry and physiology laboratories, they are inculcated into a reductionist philosophy. The medium, cried Marshall McLuhan, is the message. The medium of many medical schools, with a fragmented discipline-based programme that deliberately isolates students from live human patients for at least the first two years, which may emphasise dissection over dialogue, chemistry over communication, and which in the years of clinical training is usually dominated by specialist-centred high-tech hospital care, gives a message that is strong and clear, and is firmly rooted in medicine's 17th century positivist heritage.

In other fields, however, the differences produced by positivist, reductionist approaches compared with constructivist and holistic points of view are now well established:

- Reductionism, and its assumption that the most effective way to generalise is from the parts to the whole, is being challenged by the holistic perspective that argues that generalisation is best made from the whole to the parts, because any system always shows properties that none of its parts can.
- Analytic thinking, which complements reductionism, is replaced by synthetic, integrative thought which attempts to systematically connect problems with each other in order to better understand their relationships, and so lead to their eventual resolution.
- The doctrine of universality, which holds that there are context-free laws of nature, is replaced by the doctrine of relativity, which holds that there are no universal truths, but only context-dependant processes.
- Finally, objectivity – the supposed objective and value-free stance of the investigator – is replaced by an understanding that all human practice is fundamentally subjective and value-laden, and that investigators cannot avoid being influenced by, and in turn influencing, the objects of their study.

If medicine were to be approached from a constructivist, rather than a reductionist point of view, then such a paradigmatic shift would:

- Make the patient's social context a central rather than a peripheral concern
- Accept 'conventional' medicine as one view of the world, rather than the only view
- Accept that the doctor is part of the equation, rather than just a detached observer
- Value understanding more than information

Evidently, then, 'what counts as knowledge' can be very different, depending on the philosophic stance of the curriculum, whether or not PBL is used as the educational methodology.

WHAT IS THE AIM OF THE CURRICULUM?

Is the aim of the curriculum to produce knowledge for its own sake, or as a means to deal with problems now and in the future? Is the curriculum 'academic' in its intent, or 'vocational'? Is it concerned purely with 'propositional' knowledge – 'knowing what' knowledge derived from a host of essentially theoretical sources. Or is it concerned with process knowledge – 'knowing how' knowledge which comes from learning skilled behaviour and deliberative processes?

Schon (1983) has made a cogent case that there are important distinctions between ‘knowing what’ and ‘knowing how’, and that there is often a clash between the “official” knowledge promulgated by the curriculum and the tacit knowledge used in the real world of practice. He argues for an educational approach that will encourage the development of reflective practitioners – professionals who are able to understand and articulate the theories, both explicit and implicit, that guide their actions.

In the preface to his book “The Reflective Practitioner” Schon (1983) writes, “I have become convinced that universities are not devoted to the production and distribution of fundamental knowledge in general. They are institutions committed, for the most part, to a particular epistemology, a view of knowledge that fosters selective inattention to practical competence and professional artistry”.

He argues that the positivist worldview is built into “the very tissues of the universities”, and produced a fundamental division of labour which made it the business of university-based scholars to create the fundamental theories which professionals and technicians would later apply in practice.

The problem that has arisen from such a division has been the often-stark gulf between the ivory tower academics and the real world practitioners. In Schon’s (1983) words, “ in the varied topography of professional practice, there is a high, hard ground where practitioners can make effective use of research-based theory and technique, and there is a swampy lowland where situations are confusing “messes” incapable of technical solution. The difficulty is that the problems of the high ground, however great their technical interest, are often relatively unimportant to clients or the larger society, while in the swamp are the problems of greatest human concern”.

Issues such as these become more important when we look at the extent to which the sorts of knowledge taught in universities is similar to, or conflicts with, the sort of knowledge that professionals use in their day to day practice. A curriculum that ignores such distinctions risks putting forward a concept of knowledge and learning ‘for its own sake’, and so becomes concerned almost exclusively with transmitting existing knowledge rather than helping students to develop skills that they can use in a professional context.

In part, the running debate in PBL programmes about the relative utility of expert versus non-expert tutors may relate to differences between propositional and process knowledge. On the one hand, while subject experts may have a much greater fund of propositional knowledge, they may be inclined to concentrate more on theory rather than practicality. On the other hand, the non-expert by definition will have less knowledge of the subject, but may be much better at facilitating the students as they attempt to navigate the swampy lowlands of the problem in question, so helping students convert ‘knowing what’ theory into ‘knowing how’ action.

In an ideal world, perhaps the best solution is to have a practitioner rather than an academic as a PBL tutor but this assumes, of course, that the practitioners are themselves aware of the distinctions between ‘knowing what’ and ‘knowing how’. Coles (2000) argues that they may not be so aware, and writes that unless professionals such as doctors “.....understand the underlying significance of their practice, and in particular the practical wisdom that is central to the professional judgements they are called upon to make, they will be in no position to ‘teach’ others. And because the nature of their ‘practical wisdom’ is largely hidden from

them, they will need help and support in unearthing it". The implication of this, he argues, is that any initiative in staff development to help professionals to learn how to teach must first enable them to understand and articulate the complex nature of their professional practice, and the changing knowledge that underpins it.

Problems Of The Information Age

Compounding the problem of the gulf between theory and practice is the information explosion, with the exponential growth of knowledge available to students. An Internet-based "Information Age", we are told, will result in changes even more dramatic than those that followed the industrial revolution.

There is a very real risk, however, that with the advent of the Internet we will be swamped in information of questionable value. T.S. Eliot understood this well when he asked, "Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?"

In the past, the emphasis was on 'just in case' knowledge – the curriculum was designed to provide the student with a storehouse of information that could then be drawn on during the student's professional career. Given the pace of change in all work environments, such an approach is neither practical nor desirable. Instead the focus will have to shift to 'just in time' knowledge, which means that students need to be able to access new information, for example, from the Worldwide Web, as and when they need it. There is a plethora of information out there, but a good percentage is of doubtful quality, so as well as learning how to access information, students need to be able to critically appraise it to ensure that it is really 'knowledge' and not just 'information'. Then they need to be able to apply their new knowledge to the problem they are faced with, taking into account the context in which they are situated, and the values of the participants, so converting raw knowledge into professional wisdom.

Knowledge, then, is not sufficient on its own, and does not necessarily equate to thinking. Indeed De Bono (1978) makes a firm distinction between the two: "...knowledge is no more a substitute for thinking than thinking is a substitute for knowledge...There are too many brilliant academics whose brilliance in their own fields and lack of it outside those fields show the difference between knowledge and thinking".

Individual Or Group Learning?

Another question to be asked is: who is the target of the curriculum?

Conventionally, the target has been the individual student, whose progress and ultimate success is measured by examinations that usually specifically prohibit cooperative activities. PBL encourages group learning, but with only a few exceptions the focus is still on individual learning, albeit aided and enhanced by the small group activity.

A major assumption underlying this focus on individual learning has been that work-related knowledge is possessed by individuals. This view is being challenged, however, by the proposition that some work knowledge is collective, and is possessed by work groups themselves, and not just by the individuals who make up the group.

As Boreham (2000) describes it, “the basic concepts for representing collective activity is the network. The nodes are actors and the connections between the nodes are the different ways in which they interact. Different nodes contribute different kinds of knowledge and the network develops an awareness which guides collaborative activity”.

An investigation of the work of the flight deck crew on aircraft carriers, for example, revealed what Weick and Roberts (1993) called ‘heedful interrelating’ – collective activity that ceased to exist as soon as the crew dispersed. Similar research in forest fire fighters in France (Samurcay & Rogalski, 1993) showed that they were able to anticipate and interpret each other’s actions, and that this collective knowledge allowed the integration of the specialist knowledge possessed by individual members of the team.

The implication of these studies is that as well as a focus on individual learning, there are likely to be advantages to an explicit attempt to improve collective levels of knowledge. Collective or ‘work process knowledge’ appears to be a separate layer of knowledge, over and above the specialist knowledge of individuals.

Failures of collective knowledge, rather than the mistakes of a single individual, may be responsible for accidents and errors. In their study of critical incidents in a sample of hospital Accident and Emergency departments, Boreham, Shea and Mackway-Jones (2000) found that risky situations “...were attributable, not to a lack of individual knowledge or skill, but to a lack of collective understanding of how the individuals needed to interact with each other”.

To what extent, therefore, should the PBL curriculum be designed to enhance the knowledge of the individual, and to what extent should it be directed to learning by the group as a whole which, in turn, would imply a much greater focus on group rather than individual evaluation, and an argument in favour of locating education as close to the workplace as possible.

WHERE SHOULD LEARNING TAKE PLACE?

If educational changes such as those promised by PBL are to be more than window dressing, then the context in which learning takes place may be at least as important as the learning activities themselves. The educational context carries meaning for the learner, quite apart from the activities that take place there.

Educational institutions, however, seem more often to be part of the problem, rather than part of the solution. Postman (1993), for one, views schools as mechanisms for information control, with curricula that organise, limit and discriminate among available sources of information.

Medical schools, for example, are first and foremost professional schools, and their adherence to professional norms influences the process of professional socialisation by the curriculum that is delivered, and perhaps more importantly by the curriculum that is omitted, and the curriculum that is hidden. In many respects the medical school curriculum is antithetical to science, reflecting as it does power as well as purpose, and in its encouragement to students to learn to recite the apparently correct answers, rather than how to appreciate and ask the right questions.

Bloom (1988) notes that despite half a century of radical changes in medical practice, the teaching of medical students has remained remarkably similar. He argues that medical education's manifest humanist mission is "...little more than a screen for the research mission which is a major concern of the institution's social structure", and that the modern medical school has grown to include the generic characteristics of large, complex social organisations in contemporary industrial society.

A natural outgrowth of the development of such complex organisations has been an ever increasing specialisation by workers within the structure, encouraged both by the bureaucracy of the structure, as well as the often reductionist worldview of its members. As a result, students are routinely exposed to subject experts whose view of the world is constrained by the ever-narrowing boundaries of their own discipline.

PBL was introduced in the late 1960's when the refinement of specialization was perhaps at its peak, but a lot has changed since then. The whole 'green' environmental movement has risen out of concerns about leaving the fate of the environment in the hands of specialists whose narrow concerns might not take a broad enough account of the harm resulting from their actions. Ecological and environmental assessments provide a generalist perspective of schemes proposed by those with a more narrow view, and the 1950's slogan of "Better living through chemistry" would nowadays be greeted with more scepticism than enthusiasm.

For specialists, the position of greatest comfort and certainty is one which occupies the centre of a system of thought, and permits what Kuhn (1970) calls 'normal science' - the rewarding process of the continuing subdivision of existing knowledge. Generalists live closer to the boundary between the known and the unknown. The boundary can be acutely uncomfortable as it approaches the limits of current understanding, but it is from such boundaries that real breakthroughs are likely to come, as alternate ideas are proposed that turn the old world upside down.

Tillich (1966), the German theologian, supported the view that the boundary was the best place for gaining knowledge, but he was also acutely aware of the risks and discomforts inherent in such a position. "At almost every point," he wrote, "I have had to stand between alternative possibilities of existence, to be completely at home in neither and to take no definitive stand against either. Since thinking presupposes receptiveness to new possibilities, this position is fruitful for thought; but it is difficult and dangerous in life, which again and again demands decisions and thus the exclusion of alternatives. The man who stands on many boundaries experiences the unrest, insecurity and inner limitation of existence in many forms. He knows that impossibility of attaining serenity, security and perfection".

A PBL curriculum, much more than a conventional curriculum, allows for students to explore boundaries and 'alternative possibilities of existence' to the extent that the planners and case writers allow it to do so. A specialist-dominated PBL curriculum risks becoming as constraining as a conventional, didactic approach. Young (1999) comments that "the idea that the curriculum is consciously or unconsciously designed to preserve certain interests remains important because it can provide the basis for a realistic assessment of the barriers to curriculum change and, in particular, the extent to which changes are resisted for ideological as well as for educational reasons".

Attempts to move the medical curriculum, for example, out into the 'real world' of community settings where the involvement of generalists might allow the development of alternative worldviews have been fraught with difficulty, and the educational experience

acquired in such relatively informal settings is consistently undervalued. If we really believe in the concept of 'lifelong learning', however, it is clear that there will need to be a profound shift from the educational institution as the centre of educational activity.

In conclusion, then, the curriculum of the 19th and 20th century:

- Promoted a positivist concept of knowledge for its own sake
- Overlooked the distinctions between academic and vocational knowledge
- Emphasized individual learning
- Developed teaching as an increasingly specialised and institution-based activity, decontextualised from real life experience

A more modern approach:

- Takes a constructivist approach, which emphasises the inter-relationship between subjects, and encourages a holistic view of the world
- Acknowledges the distinctions between 'knowing what' and 'knowing how'
- Sees group learning as an important activity in its own right, over and above its contribution to individual learning
- Reverses the trend to increasing specialisation, and moves education from the academic high ground to the community-based 'swampy lowlands' of the real world

Problem-based learning may provide a necessary opportunity for changing ideas about teaching, but by itself it is not a sufficient force without a fundamental realignment of the philosophy and aims of the curriculum, and the contexts in which learning might take place. We have a new bottle, but unless we put new wine into our fancy container, we may end up with educational reform but, in the long run, remarkably little change.

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