

Developing skills of problem-based learning: What about specialist knowledge

STEVEN W. WHITCOMBE

Cardiff University, United Kingdom

Abstract

Problem-based learning (PBL) is an educational approach that uses problems or ‘triggers’ to initiate students’ learning. Typically, students work in small groups (between eight and ten people), facilitated by a tutor, where they are required to identify, source, and contextualize knowledge to solve a given problem. The origins of PBL can be traced to the McMaster Medical School in Canada in 1965 but it has since become a popular means of delivering other disciplines, especially, but not exclusively, other healthcare courses such as nursing, occupational therapy, or physiotherapy. With its focus on group work, independent learning and knowledge application, PBL seemingly equips students with the capital to adapt to modern day, flexible economies. Previous research on PBL has focused on students’ learning styles or their approaches to group work but students’ understanding of knowledge and PBL has received little attention in the literature. This qualitative study explored undergraduate occupational therapy students’ perceptions of knowledge from one PBL course. The data were collected through the use of twenty semi-structured interviews and the findings were analyzed thematically and in relation to theoretical constructs derived from the sociologists of education Basil Bernstein and Karl Maton. The findings suggest that whilst PBL offered students the opportunity to develop and enhance skills such as team working, their understanding of professional specific knowledge was limited. In a climate where healthcare provision is becoming increasingly pluralized and inter-professional working is common, practitioners still require an understanding of the esoteric knowledge that differentiates their practices from each other. This research highlights the need for PBL educators to consider the types of knowledge that students’ acquire in addition to knowledge application and PBL skills.

Keywords: Problem-based learning, Knowledge, Skills.

Introduction

Problem-based learning (PBL) is an educational approach that uses ‘problems’ or ‘trigger’s’ to stimulate students’ learning. It involves students working cooperatively in groups of around eight to ten people facilitated by a PBL tutor. The key characteristic of PBL is that students focus on problem resolution without propositional, that is, up-front knowledge (Savin-Baden, 2000). Philosophically, PBL is supported by andragogical theories of learning (Knowles, Holton, & Swanson,

2005) that asserts adults learn best when they take responsibility for their own learning. It is also influenced by constructivist approaches to learning that stress the context-bound nature of knowledge and the personal meanings that individuals generate from learning experiences (Hendry, Frommer, & Walker, 1999).

PBL began in the McMaster Medical School in Canada in 1965 as a means to encourage students to apply knowledge to 'real life' case scenarios (Barrows, 1994). Here, the orthodox medical curriculum comprising a foundation in biological sciences followed by clinical experience in the practice setting was abandoned in favour of a fully problem-based curriculum where students engaged with PBL from the start of their studies.

In practice, this meant that the use of PBL consisted of a number of stages which have come to characterize how PBL is utilized, not only in the McMaster School but across other PBL programmes, for example in health professional courses, law and engineering degrees ever since. These stages or features of PBL include:

- An initial group discussion of the problem facilitated by a course tutor (but not necessarily a subject specialist) to clarify the problem and identify possible solutions.
- Identification through group discussion of the gaps in knowledge needed to tackle the problem.
- Establish the learning needs of the group in respect of the problem.
- The collection and exploration of newly acquired knowledge necessary to address students' learning.
- The application of new knowledge to the problem, leading to problem resolution.

Since its development, PBL has grown in popularity, particularly, but not exclusively, for vocationally orientated courses. In part, this growth may be attributable to the suggestion that PBL courses equip students with the 'self-directed', 'lifelong' learning skills that are central to new, 'knowledge-based' economies (Margetson, 1994).

Empirical studies of the outcomes of PBL support the notion that PBL programmes enhance students' skills. Antepohl, Domeij, Forberg, and Ludvigsson (2003) suggested that medical practitioners graduating through PBL courses demonstrate good problem-solving skills and are strongly equipped to integrate new forms of knowledge relevant to their work. Similar findings have been found with students of other health related disciplines; for example, physiotherapy (Soloman, Binkley, & Stratford, 1996). A number of studies have attempted to compare

the outcomes of PBL programmes with more traditional forms of curricula. For example, Williams (1992) and Distlehorst and Robbs (1998) compared students' level of knowledge retention as a consequence of studying on either PBL or lecture-based courses in health care courses. They found students from PBL programmes tended to possess more up-to-date knowledge five years after graduation than their traditionally educated colleagues. However, such comparative research can be problematic; as Colliver (2000) points out, comparative studies of PBL with other types of curricula tend to be small-scale and the significance of their findings at least in statistical terms, is questionable. Also, studies concerned with the outputs of differing educational programmes rarely focus on how these outputs are achieved. That is, they pay little regard to the learning processes and teaching activities that mediate outcomes.

Nevertheless, some studies of students' experiences of PBL have explored concepts like PBL as a learning process. Earlier studies (e.g., Newble & Enwistle, 1986) investigated students' learning styles and found that PBL students were more likely to adopt 'deep' rather than 'surface' approaches to learning. Deep learning is characterized by an orientation to seek meanings and relate ideas together, whereas surface learning encapsulates the notion of learning to memorize in order to complete tasks. Newble and Enwistle's (1986) study has been supported by more recent research (e.g., Richardson, Dawson, Sadlo, Jenkins, & Mcinnes, 2007) into health care students' experiences of PBL. Some of the most current research into students' experience of PBL has concentrated on students' engagement with PBL processes such as group work. Barret (2010) and Rubin, Kerrell, and Roberts (2011) have explored the creative group work approaches used by PBL students to address problem-based scenarios.

There has been little direct research on the subject of PBL students' understanding of knowledge. Schular and Finchman (2001) investigated students' use of knowledge and they found that students on a post-graduate dental course were quick to eliminate what they perceived as irrelevant 'unscientific' knowledge when faced with problem-based triggers. Savin-Baden's (2000) qualitative study of students' experiences of PBL did consider students' views of knowledge within a broader framework that she termed "dimensions of students' experiences" (Savin-Baden, 2000, p. 56). Within this framework Savin-Baden looked at students' views of knowledge and whether students' perception of knowledge affected their ability to engage in the PBL process. Her research tended to focus on how students related to PBL curricula and considered issues like feelings of disjunction or fragmentation that students may face with an unfamiliar learning method. Savin-Baden (2000) found that students cope with disjunction either through acknowledgement or engagement in a new learning process, or through avoidance and retreat by, for example, adopting strategies that have worked for them in the past.

The research described in this article shows how the relations *within* the learning environment and pedagogy of PBL itself shapes students' views of knowledge.

Methodology

The overall aim of the research was to explore occupational therapy students' perceptions of the knowledge that they need for occupational therapy practice. This was investigated through the following research questions:

- How do students on a PBL course determine what knowledge is important for occupational therapy practice? Who or what influences this decision?
- Does studying on a PBL course influence the 'types' of knowledge students prioritize?

Theoretical framework

For the purposes of this study, knowledge was classified according to Basil Bernstein's (2000) concepts of horizontal and vertical discourse. For Bernstein, horizontal discourse entails everyday or 'common sense' knowledge. Horizontal discourse is seen as common sense because it is available to everyone and arises out of a shared history of understanding. Bernstein (2000, p. 157) argues that horizontal discourse is likely to be "oral, local, context dependent and specific, tacit, multi-layered and contradictory across but not within contexts". Essentially, horizontal discourse is segmentally organized and its meaning is very dependent on the social context. In contrast, vertical discourse takes the form of a "coherent, explicit systematically principled structure" (Bernstein 2000, p. 157). Vertical discourse refers to scholarly knowledge where the meaning is less dependent on relevance to the social situation but related to other meanings in a hierarchical fashion.

Whilst Bernstein's taxonomy makes it possible to explore different forms of knowledge, Karl Maton's (2010) work on 'legitimation codes' was drawn upon in order to understand the types of knowledge that students prioritize. Maton (2010) argues that what is perceived as 'legitimate' knowledge within a discipline (such as occupational therapy) is dependent upon the relationship between what is known and who is proclaiming to know about the topic in hand. Disciplines that place importance on the object of study have, according to Maton, an epistemic relation to knowledge and these can be categorized according to a 'knowledge code'. Alternatively, disciplines that emphasize the voice of the person(s) who claim the knowledge possess a 'social relation' to knowledge. This can be represented

through a ‘knower code’ where the characteristics of those claiming to know takes precedence over the knowledge itself. Maton’s emphasis on knowledge relation is significant because his concepts can also be used to explore whether forms of pedagogy (in this case PBL) encourage students to develop specific relationships to knowledge.

Occupational therapy education in the United Kingdom

In the United Kingdom (UK), occupational therapists work largely in the area of health and social care. Their interest lies in how ‘occupations’ and activities can be used therapeutically to reduce the effect of illness or disability on an individual’s independence and/or to maintain a person’s sense of health and well being. In the UK, to become occupational therapists, students study for an undergraduate (three-year degree course) or a post-graduate qualification (two years) in occupational therapy. These programmes require students to complete a mixture of academic studies and practical (fieldwork) experience. Students need to complete a thousand hours of fieldwork experience (College of Occupational Therapists, 2008) under the supervision of qualified therapists and usually fieldwork practice is interspersed with the university based study. Occupational Therapy is a relatively young profession; the first training school in the UK was established in 1930 (Tyldesley, 1999). Because it is a young profession much of the academic content of occupational therapy courses is drawn from other fields, including general medicine, psychology, sociology, and biology. Occupational therapy is founded on a set of beliefs that include the notions of client-centred and holistic practice and a belief in the importance of activity for good health. Historically the profession developed out of custom and practice rather than from an evidence base (Wilcock, 2001). However, over the last 30 years occupational therapists have begun to examine its practice and this has led to the development of ‘occupational science’. That is, an exploration of humans as occupational beings including the need for, and the capacity to orchestrate everyday occupations over the life span (Yerxa et al., 1989). Occupational science provides a knowledge base for occupational therapy because it is concerned with:

- Why people engage in occupation?
- An understanding of the subjective experiences and personal meaningfulness of work, leisure and self-care occupations.
- An understanding of how occupations are organized, including the analysis of the skills needed to undertake occupations (Wilcock, 2001).
- An understanding of the role of occupation in the prevention of ill-health.

As Pollard, Sakellariou, and Lawson-Porter (2010) point out, an awareness of how occupation affects people, including their health and well being, offers occupational therapists opportunities to develop their services beyond their current areas of work in the health and social care sector. The importance of occupational science as a means to underpin occupational therapy practice has been recognized by the UK's national occupational therapy body; that is, The College of Occupational Therapists, who maintain that it should be a core component of all pre-registration occupational therapy curricula. (College of Occupational Therapists, 2008).

Research setting

A PBL occupational therapy tutor in one educational institution in the UK carried out the research. All the participants were recruited from a three-year, pre-registration, full-time programme in occupational therapy. This programme is fully problem-based, and from the outset tutors provided the students with problem-based scenarios (case studies) designed to 'trigger' students' learning. Academic subjects are not taught separately on the programme, consequently, when addressing problem-based scenarios, the programme tutors expect students to integrate knowledge from different disciplines with their life experiences and their knowledge of occupational therapy practice.

Research procedure

The data were gathered by means of in-depth, semi-structured interviews with occupational therapy students in the final year of their undergraduate programme. Students in the final (third) year were selected because this allowed for accounts of the students' experiences over the whole three years of the PBL programme.

Initially, forty-three students expressed an interest in the study; of these, 20 students were invited (random selection) to participate in the research. The 20 participants were asked to sign a consent form to verify they volunteered for the study and they understood the purpose of the research. The interview questions were largely explorative and focused on different aspects of the PBL programme; for example, the students' experiences of group work, their experiences of fieldwork practice, and questions relating to how they viewed knowledge. Each participant was then interviewed on one occasion for a period of between one and one and a half-hours. All the interviews were recorded on a digital Dictaphone and transcribed verbatim. Ethical approval for the study was obtained from a university ethics committee and pseudonyms were used to protect the identity of the research participants. Electronic copies of the interview transcripts were stored securely on

a password, protected computer and the hard copies of the same transcripts were stored in a locked cupboard accessible only to the researcher.

Bernstein's (2000) and Maton's (2010) theoretical concepts were used to analyze the data through a process of abductive reasoning. This process differs to deductive theorizing where research is driven by a theory itself and inductive approaches that aim to create theory(s) through inspecting different forms of phenomena. Abductive reasoning starts with the particular, from which conceptual ideas are developed, refined and then broadened out to theory (Coffey & Atkinson, 1996). The detailed analysis of each interview transcript led to data reduction and data compilation. To reduce the data, descriptive 'tags' were attached to each transcript in order to summarize segments of data, or sections of each interview transaction. Second level coding involved generating categories that linked data together to form new conceptual ideas. The concepts produced from each transcript were then displayed visually to compare and contrast the findings between individuals. The final stage of analysis led to data verification (Miles & Huberman, 1994) which involved drawing conclusions from the findings and developing themes from the data that were then linked with theory.

The trustworthiness of the research was addressed through the use of primary data; that is, interview excerpts to support and illustrate the interpretations. A reflexive approach (Finlay, 2002) to the research process was also adopted, and memos were used to question and challenge pre-conceived ideas about the subject of investigation and the researcher's understanding of PBL.

Research findings

A total of 18 women and two men participated in the research. The students' ages ranged from 20 to 38, the average age (median) being 21. The findings are presented under the themes of: PBL and Skills of Life-long Learning, and Knowledge as a 'Social Relation'.

PBL and skills of life-long learning

The students stated the PBL course had helped them develop key skills both as learners and as future occupational therapists:

PBL has helped me to learn and to develop as a student; it's allowed me to flourish, I feel like I know what my core skills are and what is expected of me (Vicky).

PBL has given us the skills to practice, it's helped us with skills like clinical reasoning and problem solving, you may get that on other courses, but the nature of PBL and the use of case studies forces us to do more of this (Anna).

Being able to access information and research literature was also perceived as a core skill that the students had acquired through participating in PBL:

I find it much easier to access things like journal articles through being on the PBL course, it's easier to access evidence... I've learned this over the three years (David).

This 'accessing of information' was seen as beneficial to the practice context of occupational therapy:

For me, occupational therapy is about having the skill of researching things. You can't know everything, and anyway your knowledge can get out of date (Kate).

As OTs [occupational therapists] you have to be able to know how to access information and decide whether it is relevant for your own practice (Louise).

Furthermore, the ability to access new knowledge was adjudged to prepare the students for 'life-long' learners of occupational therapy:

Finding new things out... is a skill that that you need to develop throughout your working life, regardless of the occupational therapy setting that you work in (Rebecca).

The process of working alongside others through PBL group work seemed to equip students with the team working skills that they also perceived as important for life and their professional careers:

PBL group work gives you that team emphasis, you are always problem-solving and discussing and working with others and I think that's necessary in terms of a skill throughout life really, regardless of where you work or what you do (Rebecca).

Group work broadens your perspective, it teaches [you] to work alongside others, which you are going to need as an OT (Nerys).

The students' experience of fieldwork practice provided them with the opportunity to learn skills that were difficult to acquire in the university setting:

Placement [fieldwork] provides the practical working with others and things that you can never learn in college like how to order equipment; the practical day to day working of the system like how are you going to be able to deliver the best OT services to your clients (Karen).

In this example, the ‘ordering of equipment’ and the knowing of how to go about delivering services refers to the everyday, localized knowledge of practice — in other words, the horizontal discourse (Bernstein, 2000) that is particular to the occupational therapists in that setting which authenticates the reality of occupational therapy ways of working. However, such horizontal discourse was not singularly acquired through the students’ fieldwork experiences, it was bolstered through the pedagogy of PBL itself:

PBL enables you to understand what OTs do. PBL gives you the skills to work as an OT, like how to manage caseloads and how to work with people. I think it [PBL] will make me a better practitioner (Fay).

PBL gives you the right mindset of learning. Being out there in practice actually reinforces what we are being taught in college (Vicky).

Knowledge as a social relation

For the students, the knowledge gained from their fieldwork practice (their placement experiences) was what separated them from other health and social care professionals:

I would say your knowledge of OT comes from practice (Bronwyn).

The knowledge that you get from placement is the big thing really, that’s the important stuff, it shows you what OTs actually do (Mia).

Moreover, the students differentiated occupational therapy practice through the philosophies of practice (such as client-centredness and holistic practice) and the qualities of therapists rather than specialist knowledge:

It’s hard to say what an OT is really. I think it is a belief in helping people to be independent. It is about seeing people as unique individuals (Anna).

You need to be caring to be an OT. You need to be client-centred and think about all the things that affects a person's... this is learned through the course (Joanne).

This can be represented by a social relation to knowledge; that is, a 'knower code' (Maton, 2010), where what matters is not what you know, but the type of person that you are. Occupational therapy understanding is constructed through a shared consciousness of the qualities and belief systems that in the students' view define an occupational therapist rather than knowledge of a subject such as occupational science. And through their engagement in PBL the students seem to prioritize occupational therapy qualities/beliefs and ways of working over specialist knowledge; that is, vertical discourse (Bernstein, 2000):

We haven't any particular knowledge because I find we take our knowledge from different places (Susan).

I think OT is about making people independent... nothing you can teach really (Carla)

Through the PBL group work and the case studies, we tend to start off with 'what is realistic in this setting'? What would an OT do? Then we might go and ring up an OT in practice, ask their advice and take it from there (Tara).

Knowledge was valued if it could be directly applied to the practice setting:

It's difficult to apply some of the theoretical stuff we pick up in college, you can't always transfer this learning into placement [fieldwork practice] because things are done differently (Gareth).

Because of this, the value of vertical discourse (Bernstein 2000); that is, knowledge that is context- independent, is less obvious:

I've never heard of occupational science (Carla).

Occupational science is an example of a vertical discourse that was not transparent through the transmission of PBL. The experiences of Paulette and Susan are typical of other students on the PBL programme:

I don't feel that we have had a definite period on the PBL course where we have learned about humans, how they use their time and what shapes their time. It's only because of my research project that I have ended up into the theory of occupation. But actually I'm not particularly confident in talking about this and don't even

know whether I should... I kind of thought, if it was important we would have done more on it. It has come from my own reading, the occupational therapy textbooks and articles usually have something to say about the nature of occupation and I kind of got it from there really (Paulette).

I don't know how much all this [occupational science] is connected to the practice of occupational therapy. If it is, then maybe it should be brought into the course (Susan).

Without the knowledge that specializes occupational therapy (the vertical discourse of occupational science) students may encounter problems in differentiating their services from others:

My last placement [fieldwork practice] was in a role emerging setting. This was a service for the homeless, it was community based and very multi-disciplinary that focused on health issues. But because everyone was working to the same idea, with similar beliefs, it was difficult to isolate the OT's role. Everyone seemed to focus on similar issues (Mary).

Working with the homeless is just one example of how the occupational therapy profession is trying to expand its work beyond the customary areas of practice. But in services where there is a collective ethos, and similar ways of working, specialist knowledge becomes more significant.

Discussion of the findings

The findings from this study support previous research; for example, Antepohl et al. (2003) that suggest PBL provides students with the opportunities to develop skills such as problem solving, accessing literature and clinical reasoning. These skills can be represented as forms of human capital (Hyry-Honka, Maatta, & Uusiautti, 2012; Putman, 2000) that advance, personal, social and economic well-being. The process of PBL requires students to engage in self-direction and to develop autonomous learning practices. It is through the ontogenesis of these skills that PBL students are able to adapt to change and accrue the human capital beneficial to life-long learning (Riley & Whitcombe, 2010). Moreover, PBL seems to develop students' social capital (Bourdieu, 1990); that is, the resources and extended networks they gain through collaborative learning. Through PBL group work, students share their knowledge, learn from each other, and pool their resources both within and outside of the academic environment.

In this study, whereas the students were able to identify the skills they had acquired through PBL, they were not able to evoke the specialist knowledge (occupational science) that differentiates their practice from others. In part, this might be accounted for by the way in which PBL is 'played out' in the research setting. Even though the practice principles of PBL are common across different programmes, the implementation of PBL can vary. It may be, for example, that the case studies used to trigger the students' learning were not explicit enough in terms of the need for the students to investigate issues related to occupational science. It may also be a particular problem for the occupational therapy profession. Occupational therapists have always had difficulty describing the unique properties of their work (Creek, 2003), but occupational science is relatively new and it may not be used widely enough to evidence occupational therapy practice. The problem with this is that occupational science not only provides the medium of evidencing current occupational therapy practice, it is crucial in terms of advancing occupational practice into new areas of health and social care.

The main issue arising from this research was that the students prioritized knowledge from occupational therapy practice over discipline specific, specialist discourse. There was a social relation to knowledge, a 'knower code' (Maton, 2010) rather than an epistemic one. The use of the theoretical framework suggests that this may be a factor of PBL as an approach to learning and by promoting the context specific, application of knowledge PBL legitimizes horizontal discourse. However, because horizontal discourse is localized, it is not transferable to settings other than where the features of the workplace are similar (Bernstein, 2000). Access to specialist knowledge that transcends different settings is important since as Wheelahan (2010, p. 99) notes it provides students with the collective representations about a disciplinary field that is "not always accessible through direct experience (or problem-based learning)." Therefore, PBL by its very design may focus students' attention on isolated examples of content rather than the broader specialist discourse that they also require.

Limitations of the study

The use of interviews as a data collection tool may be a drawback of the research design. The interviews provided a means to gain an understanding of students' experiences of PBL, but to some extent their accounts were retrospective and relied on the students' memory. That said the focus of the interview questions and the interview structure did provide the spur for some rich descriptions of the students' educational experiences. Since the research was intent on discovering whether PBL influenced the students' views of knowledge, in hindsight, the findings may

have been strengthened through the use of other data collection methods by, for example, observing PBL groups. The research was also limited in scope by locating the study in one university setting with a sample of 20 students, it is not possible to make statistical inferences that can be generalized to other contexts — other PBL programmes. However, the concept of generalization is considered differently in qualitative research to quantitative research. As Coffey & Atkinson, (1996) point out, qualitative data when analyzed in detail should be used to develop theoretical ideas, social processes, and themes that have relevance beyond the locale. The findings from this research do have relevance beyond its context because even though PBL programmes vary in the nuances of their delivery and their design, the ideological principles (e.g., andragogy and constructivism) upon which PBL is grounded remain constant.

Conclusion

The findings from this research support the notion that students' perceive PBL as means to develop skills such as problem solving, research, and critical analysis appropriate to a workplace that is in constant flux. It also seems to furnish students with the necessary team working skills that are needed for flexible service delivery in, for example, health and social care settings. In other words, PBL appears to offer students the opportunity to develop the capital and lifelong learning skills that will sustain them throughout their careers. However, in this research whilst the students were able to recognize the skills that had developed through engaging in PBL, they were unable to identify the specialist knowledge that separates their practice, in this case, occupational science, from others. The contextualization of knowledge is a universal principle of PBL and PBL curricula are designed to encourage students to relate knowledge to specific cases which, in itself, would seem to inhibit the acquisition of specialist knowledge(s) or vertical discourse. Although this research was undertaken in one setting, it is recommended that where PBL students are expected to learn specialist knowledge that this is transparent within PBL curricula. Moreover, educators who favour the use of PBL as a means to delivering professional programmes such as occupational therapy could consider using PBL alongside 'taught' components (lectures etc) that explicitly focus on knowledge acquisition.

Acknowledgement

I wish to thank all the occupational therapy students who participated in this research.

References

- Antepohl, W., Domeij, E., Forberg, P., & Ludvigsson, J. (2003). A follow-up of medical graduates of a problem-based learning curriculum. *Medical Education*, 66, 155–162.
- Barrett, T. (2010). The problem-based learning process as finding and being in flow. *Innovations in Education and Teaching International*, 47(2), 165–174.
- Barrows, H.S. (1994). *Practice-based learning: Problem-based learning applied to medical education*. New York: Springer.
- Bernstein, B. (2000). *Pedagogy, symbolic control and identity, theory, research, critique*. Oxford: Rowman and Littlefield Publishers.
- Bourdieu, P. (1990). *In other words: Essays towards a reflexive sociology*. Translated by Matthew Adamson. Stanford: Stanford University Press.
- Coffey, A., & Atkinson, P. (1996). *Making sense of qualitative data: Complementary research strategies*. London: Sage.
- College of Occupational Therapists, (2008). *College of Occupational Therapists Standards for Education: Pre-registration education standards, (3rd Edition)*. London: College of Occupational Therapists.
- Colliver, J. A. (2000). Effectiveness of problem-based learning curricula: Research and theory. *Academic Medicine*, 75(3), 159–266.
- Creek, J. (2003). *Occupational therapy defined as a complex intervention*. London: College of Occupational Therapists.
- Distlehorst, L.H., & Robbs, R.S. (1998). A comparison of problem-based learning and standard curriculum students: Three years of retrospective data. *Teaching and Learning Medicine*, 10, 131–137.
- Finlay, L. (2002). Negotiating the swamp: The opportunity and challenge of reflexivity in research practice. *Qualitative Research*, 2(2), 209–230.
- Hendry, G. D., Frommer, M., & Walker, R. A. (1999). Constructivism and problem-based learning. *Journal of Further and Higher Education*, 23(3), 359–371.
- Hyry-Honka, O., Maatta, K., & Uusiautti, S. (2012). The role of health capital in health promotion. *International Journal of Health Promotion and Education*, 50(3), 125–134.
- Knowles, M. S., Holton, E. F., & Swanson, A. (2005). *The adult learner* (6th ed.). Houston: Gulf Publishing Company.
- Margetson, D. (1994). Current educational reform and the significance of problem-based learning. *Studies in Higher Education*, 19(1), 5–19.

- Maton, K. (2010). Analysing knowledge claims and practices: Languages of legitimation. In K. Maton, & R. Moore (Eds.), *Social realism, knowledge and the sociology of education, coalitions of the mind*, (pp. 35–60). London: Continuum International Publishing Group.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). London: Sage.
- Newble, D. I., & Entwistle, N. J. (1986). Learning styles and approaches: Implications for medical education. *Medical Education*, 20, 162–175.
- Pollard, N, Sakellariou, D, & Lawson-Porter, A. (2010). Will occupational science, facilitate or divide the practice of occupational therapy? *International Journal of Therapy and Rehabilitation*, 17(1), 648–654.
- Putman, R. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon and Schuster.
- Richardson, J. T. E., Dawson, L., Sadlo, G., Jenkins, V. & Mcinnes, J. (2007). Perceived academic quality and approaches to studying in the health professions. *Medical Teacher*, 29(5), 108–116.
- Riley J., & Whitcombe S.W. (2010). Problem-based learning and the development of capital. In T. J. Clouston, L. Westcott, S. W. Whitcombe, J. Riley, & R. Matheson (Eds.), *Problem-based learning in health and social care* (pp.139–146). London: Wiley-Blackwell.
- Rubin, R., Kerrell, R, & Roberts, G. W. (2011). Appreciative inquiry in occupational therapy education. *British Journal of Occupational Therapy*, 75(5), 233–240.
- Savin-Baden, M. (2000). *Problem-based learning in higher education: Untold stories*. Buckingham: Society for Research into Higher Education and the Open University Press.
- Schular, C., & Finchman, A. (2001). To admit or not to admit? That is the question. In P. Schwartz, S. Merion, & G. Webb (Eds.), *Problem-based learning, case studies, experience and practice* (pp. 2–20). London: Kogan Page.
- Soloman, P., Binkley, J. M., & Stratford, P. W. (1996). A Comparative study of learning processes and outcomes in two problem-based curriculum designs. *Journal of Physical Therapy Education*, 10, 72–76.
- Tyldesley, B. (1999). The Casson Memorial Lecture 1999. Reflections upon a remarkable lady and a pioneer of occupational therapy. *British Journal of Occupational Therapy*, 62(9), 359–366.
- Wheelahan, L. (2010). Competency-based training, powerful knowledge and the working class. In K. Maton & R. Moore (Eds.), *Social realism, knowledge and the sociology of education: Coalitions of the mind* (pp. 93–109). London: Continuum International Publishing Group.
- Wilcock, A. A. (2001). Occupational science: The key to broadening horizons. *British Journal of Occupational Therapy*, 64(8), 412–417.

- Williams, S. M. (1992). Putting case-based instruction into context. Examples from legal and medical education. *Journal of the Learning Sciences*, 2, 364–427.
- Yerxa, E., Clark, F., Jackson, J., Parham, D., Pierce, D., & Stein, C. (1989). An introduction to occupational science: A foundation for occupational therapy in the 21st century. *Occupational Therapy in Health Care*, 6(4), 1–117.

Author's profile

Dr. Steven Whitcombe is a Lecturer in the School of Healthcare Studies at Cardiff University, United Kingdom. Steven has worked in higher education for the past twelve years, previous to this he was employed as an occupational therapist working with people with mental health needs. His main teaching responsibilities include the delivery of research modules for healthcare students at both undergraduate and post-graduate level. His research interests centre firmly on pedagogical issues, especially students' experiences of learning and healthcare students' educational and professional identities. Steven has a particular interest in problem-based learning as an educational approach; he has published a number of articles and co-edited a book on this topic.