CONSTRUCTIVISM AND PROBLEM-BASED LEARNING

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The paper will explore the conceptual underpinnings of constructivism as a learning theory in connection with PBL as an approach to teaching. Terms such as "student-centred learning" and teaching methods such as "group-work" are commonly represented as constructivist and presented in juxtaposition with a transmission view of teaching and learning. This paper will investigate the origins of these notions in constructivism, drawing on different learning theorists, and the possibilities for constructivism as a referent to analyse teaching and learning in the PBL context. Firstly, the discussion will centre on constructivism as a theory and how it has influenced teaching approaches commonly adopted in PBL settings. Secondly, constructivism as a practice will be discussed. Finally, the implications of constructivism in the PBL setting will be discussed.

INTRODUCTION

When thinking about implementing PBL in our teaching contexts, the words of Marincovich (2000) provide a pertinent perspective on the differences between PBL and traditional classrooms and the implications for us as teachers:

> it is easy to overlook the many ways in which PBL goes against the grain of faculty and postsecondary educational life. While faculty are devoted to their discipline, eager to dispense knowledge, and content-oriented, PBL asks them to be student-centred, guiding rather than directive, and process-oriented (p. 3).

It is easy to conjure up images of traditional classrooms with tables and chairs in rows, and the teacher at the front of the classroom "dispensing knowledge". But Marincovich reminds us that perhaps the image we have we think about PBL is, or should be, different. The notion of being "student centred", "guiding rather than directive", and "process-oriented" arise from research into learning and learning theories. The roots can be found in a learning theory broadly labeled "constructivism". Although the conceptual links between constructivism and

PBL are rarely discussed in the literature, examining constructivism more closely may reveal some insights into some origins of the practice of PBL.

I believe that constructivism might provide a theoretical framework for lecturers who subscribe to the tenets of PBL. Through this theoretical framework, lecturers may be able to better understand how they conceive of teaching and how they understand pedagogy. Constructivist thinking has been very influential in teaching generally, although these influences are rarely made explicit to PBL practitioners. This paper will discuss, firstly, constructivism as a theory and how it has influenced teaching practice. Secondly, the implications of constructivism in the PBL setting will be discussed.

CONSTRUCTIVISM AS A THEORY

The term constructivism is often used to describe different theories. Broadly conceived, constructivism refers to the theory that human knowledge is constructed by individuals and within social communities, and that the disciplines, or bodies of knowledge, are also human constructions (Phillips, 1995).

The varied representations of constructivism emerge from responses to two major issues. The first arises from the basis of constructivism; adopting constructivist beliefs implies a rejection of the position that knowledge is "discovered" by humans and is passively absorbed. However, this epistemological position presents the first point of divergence amongst constructivists and centres on debate about the extent of commitment to the notion that knowledge is either made (humans create new knowledge) or that it is discovered (knowledge comes from nature, and is external to us). The second area of contention centres around the extent to which there is a focus of attention on the individual learner, and cognitive processes associated with the construction of an individual's own knowledge or, instead, a focus on how human knowledge in general is constructed (Phillips, 1997; Prawat & Floden, 1994; von Glasersfeld, 1984). Different forms of constructivism can be represented as adhering to different positions on these issues, hence distilling a single description of constructivism as a learning theory is a difficult and contentious task.

Phillips' (1997) division of the wide domain of constructivism into two different groups labelled "social constructivism" and "psychological constructivism" provides a succinct categorisation in a complex and diverse area. Both categories, social and psychological constructivism, make the assumption that meaning or knowledge is created, or constructed, by individuals. However, social constructivism focuses attention on the economic, social and political arena within which the knowledge has been created. In contrast, psychological constructivism is more concerned with the creation of meaning at an individual level and how meaning develops as formal knowledge *within* groups (Richardson, 2003).

CONSTRUCTIVISM AS A PRACTICE

The use of the term "constructivism" has proliferated in the literature on teaching and teacher education and its ubiquity is a measure of its popularity as a view of learning, and teaching.

Constructivism has struck a resonant chord with teachers and teacher educators, for whom the general principles seem to cohere with experience and understanding.

The writings of von Glasersfeld (1984) have been particularly influential in the science and mathematics education arena where his version of constructivism, from roots in Piaget, "radical constructivism", prevails. According to the preceding categorizations by Phillips (1997) radical constructivism would be subsumed under psychological constructivism. In other areas, "social constructivists", whose work derives predominantly from Vygotsky (Wertsch, 1985) have made substantial contributions (Brophy, 2002)[1]. These two major constructivist approaches are linked to variations in the goals of teaching:

> Piagetian constructivism is aligned with an emphasis on education for individual cognitive development while forms of Vygotskian constructivism are aligned with an emphasis on education for social transformation (Vadeboncoeur, 1997, p. 15).

However, these two different emphases, one on individual cognitive processes, and the other on the social construction of knowledge, result in different conceptualizations of "constructivist teaching". To escape this dilemma other authors propose a hybrid approach which synthesizes both emphases, focusing on knowledge as both personally constructed and socially mediated (Tobin & Tippins, 1993). This approach attempts to overcome one of the criticisms of psychological constructivism which is that it does not sufficiently take into account social influences. It also mitigates the main criticism of social constructivism by conceding that individual cognition must also be considered. However, this type of synthesis is problematic as it is not immediately clear that the inconsistencies inherent in a hybrid are easily overcome.

This theoretical argument becomes important because ultimately it has an impact on teachers and teaching. It is important to remember that constructivism is a theory that describes learning, not a method of teaching. Although a teacher may make decisions, and may base actions on beliefs that are consistent with constructivism, as a theory, constructivism does not suggest how an individual should learn but offers an account of how learners construct knowledge. What constructivist principles do not do, regardless of the form, is automatically provide a prescription for principles of teaching. Despite this, constructivism is frequently commandeered as prescribing rules for teaching, and is often represented in juxtaposition with a transmission view of teaching and learning. In this juxtaposition, "constructivist teaching" is often represented as desirable and "transmission" approaches to teaching inevitably carry pejorative overtones. The result is that terms such as "student-centred" learning and teaching methods such as "group-work" are represented as constructivist, and therefore, by association, represent "good teaching". Tobin and Tippins (1993) avoid this tendency, seeing constructivism more as a referent to analyse teaching and learning, and caution against labeling particular methods of teaching as being "constructivist". Rather, they claim that constructivism is more properly used to investigate particular situations for their learning potential.

Richardson (2003) also reinforces this view by discussing common elements of constructivist pedagogy as "imperatives" rather than specific practices. These "imperatives" could be

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[1] Some authors argue that Vygotsky is part of psychological constructivism. However, as this is a common representation within the literature, it serves a useful purpose in the context of this paper.

described as being "student-centred", purposeful group-dialogue, using different modes of instruction, creating opportunities for learners to change understandings, and developing learners' awareness of metacognition (p. 1626).

IMPLICATIONS OF CONSTRUCTIVISM IN THE PBL SETTING

In my view, Richardson's (2003) view of "imperatives" connects with the tenets of PBL as a method of teaching and this has particular implications in the PBL setting. Being "student-centred" in PBL involves negotiating with learners, focusing on the starting point that each student brings to the PBL process, and allowing greater control by the student in terms of the direction and content of learning. With this in mind, it is evident that different types of tasks place different emphases on these aspects.

Gilbert and Foster (1998), drawing on the work of other authors, document different types of PBL tasks including "problem explanation task", "study task", "discussion task", and "action tasks" ("field, strategy, simulation/role-play") (p. 245). Differences are evident in the way in which the task represents a different learning opportunity for students. For example, the "study task" which requires "students to compare and combine their individual knowledge, beliefs and attitudes to focus on one or more specific problems often involving values or societal norms" presents a different learning opportunity to the "problem explanation task" which asks "students to plan and execute out-of-group study activities to discover underlying processes, structures or reasons for problem(s)" (Gilbert & Foster, 1998 p. 245).

Tasks usually involve group work and the use of group work is a particular feature of the PBL method. The imperative of "purposeful group dialogue" means that lecturers and students are both involved in ensuring the quality of the dialogue so that it enhances learning. Savin-Baden and Major (2004) describe different types of teams (or groups) which are common in PBL including the "tutor-guided learning team", the "collaborative learning team", "the reflexive team", "the cooperative team", and "the action learning team" (p. 71).

Savin-Baden and Major (2004) note the presence of different types of models of team learning in the literature and include constructivism:

> The social constructivist model is based in theories of social constructivism; in which learners construct knowledge through discourse with other members of the community, including the tutor. Learning is produced by the team, and not reproduced from disciplinary authority.

They then highlight some areas which are necessary for teams that are effective from a learning perspective; "positive interdependence", "promotive interactions", "individual accountability", "teamwork and social skills", and "team processing" (p. 77). The latter one, team processing, refers to the reflection on the learning by the team and appears to connect to Richardson's (2003) imperative of "developing learner awareness of meta-cognition". But "team processing" extends this notion further to include not just metacognition from the individual perspective, but also from the team perspective.

Another implication of constructivism in the PBL setting is that, as a lecturer, making a decision to adopt a PBL method of teaching involves both explicit and implicit commitments. Explicit commitments could be described in terms of particular stages used, roles of students

and lecturers, formation of groups, adoption of particular assessment methods, and so on. Implicit commitments include what counts as knowledge, and views about the goals of teaching and where learning occurs.

The first commitment concerns what counts as knowledge which goes with the world views that individuals hold. These worldviews will determine the extent to which an individual believes that knowledge is made (humans create new knowledge) or the extent to which it is discovered (knowledge comes from nature, and is external to us). Dixon (2000) illustrates an example of the changes required in the following quote where he is referring to the implications for teaching and learning in the field of medicine:

> 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 (p. 39)

To draw an analogy with teaching: if teaching were to be approached from a constructivist point of view, which appears to be suggested when PBL is adopted, then teachers would:

- Make the social context of the classroom a central concern
- Accept that other teachers, and students, may have different views of the world
- Accept that the teacher is part of the equation, and not all of the equation
- Value student understanding more than transmitting information

These commitments highlight the importance of teacher understanding of what the goals of teaching are in that particular context. In a PBL context, the goals of teaching relate directly to the last point in the analogy above, "value student understanding more than transmitting information". If the goal of teaching is to promote student understanding, rather than transmit information, usually asserted as a cornerstone of PBL, this has particular implications for teacher practice. Goals of "covering the curriculum" seem to be at odds with this thinking. It confuses "covering" with understanding and "covering the curriculum" is inherently bound within a conception of "transmitting information". This is not to imply that a certain pre-specified curriculum is undesirable. However, continuing to "cover" material when it is obvious that students do not understand the material would appear to be a fruitless activity, and not consistent with a goal of "student understanding".

These commitments also refer to where, as teachers, we believe student learning to occur. If we believe that student learning can only occur in face-to-face teaching situations (particularly those where the teacher is active, and the student is passive) then this will have ramifications for the learning situations offered to students. PBL strongly supports the use of self-directed learning and learning from others, including peers (Wee & Kek, 2002), all of

which can be achieved in situations which might be very different from face-to-face teaching situations. Therefore, in learning to teach, it is necessary to learn how to create different types of teaching situations that enhance student learning, and choose how these can be adapted to suit different classes in different subjects at different year levels. The ability to adapt based on contextually specific factors is a skill that teachers working in PBL contexts require.

The preceding discussion highlights the importance of clarifying the conceptual underpinnings of PBL. Teaching methods, such as Problem-based Learning, that appear to draw upon the principles of constructivism need to resolve fundamental theoretical differences because of the implications for practice. Whether teaching is underpinned by a psychological constructivist approach, a social constructivist approach, or a hybrid approach, there will be implications for the goals of teaching. As mentioned earlier, goals of individual cognitive development are usually associated with Piagetian-inspired approaches, and goals of social transformation are more likely to connect with social constructivism. For example, the educational import of psychological constructivism, that is, accepting that the locus of knowledge is in the individual, would be a consideration of the existing conceptual understanding of the individual learner. The educational implications arising out of social constructivism could be the adoption of apprenticeship learning models (Prawat, 1996).

In the absence of conceptual clarity, there is a risk that teachers will pursue constructivist pedagogies such as PBL "as an end in themselves" (Holt-Reynolds, 2000 p. 21), losing sight of the context and purpose of a particular teaching activity. This indicates that teachers should be aware of the constructivist philosophical underpinnings, not because it gives them a prescriptive approach to teaching but because it helps provide them with a referent to analyse those approaches.

CONCLUSION

Having an understanding of the constructivist underpinnings of PBL methods enables teachers to reflect on the goals of teaching, how the classroom is organized, and the pedagogical strategies and methods adopted to promote learning. By using constructivism as a learning theory which acts as a referent to analyse teaching and learning it is possible to closely examine teaching and learning situations for their learning potential. Ultimately, as teachers, it is the learning potential and the learning that takes place that is central to our practice. An understanding of constructivism aids in recognizing this when adopting PBL methods in a classroom situation.

REFERENCES

Brophy, J. (Ed.). (2002). *Social constructivist teaching: affordances and constraints* (Vol. 9). Oxford, UK: Elsevier Science Ltd.

Dixon, A. (2000). *Problem-based learning: old wine in new bottles?* Paper presented at the 2nd Asia-Pacific Conference on Problem-Based Learning, Singapore.

Gilbert, A., & Foster, S. F. (1998). Experiences with Problem-based Learning in Business and Management. In D. Boud & G. Feletti (Eds.), *The challenge of Problem-based Learning*. London: Kogan Page.

Holt-Reynolds, D. (2000). What does the teacher do? Constructivist pedagogies and prospective teachers' beliefs about the role of a teacher. *Teaching and Teacher Education, 16*, 21-32.

Marincovich, M. (2000). Problems and Promises in Problem-Based Learning. in O.S. Tan, P. Little, S.Y. Hee, and J. Conway, (Eds). *Problem-Based Learning: Educational Innovation Across Disciplines*. Singapore: Temasek Centre for Problem-based Learning.

Phillips, D. C. (1995). The good, the bad, and the ugly: the many faces of constructivism. *Educational Researcher, 24*(7), 5-12.

Phillips, D. C. (1997). How, why, what, when and where: perspectives on constructivism in psychology and education. *Issues in Education, 3*(2), 151-194.

Prawat, R. S. (1996). Constructivisms, modern and postmodern. *Educational Psychologist, 31*(3/4), 215-225.

Prawat, R. S., & Floden, R. E. (1994). Philosophical perspectives on constructivist views of learning. *Educational Psychology, 29*(1), 37-48.

Richardson, V. (2003). Constructivist pedagogy. *Teachers College Record, 105*(9), 1623-1640.

Savin-Baden, M., & Major, C. H. (2004). *Foundations of Problem-based Learning*. Maidenhead, England: Society for Research into Higher Education & Open University Press.

Tobin, K., & Tippins, D. (1993). Constructivism as a referent for teaching and learning. In K. Tobin (Ed.), *The Practice of Constructivism in Science Education* (pp. 3-21). New Jersey: Lawrence Erlbaum Associates.

Vadeboncoeur, J. A. (1997). Child development and the purpose of education: a historical context for constructivism in teacher education. In V. Richardson (Ed.), *Constructivist Teacher Education: Building New Understandings* (pp. 15-37). London: RoutledgeFalmer.

von Glasersfeld, E. (1984). An introduction to radical constructivism. In P. Watzlawick (Ed.), *The Invented Reality: How Do We Know What We Believe We Know?* (pp. 17-40). New York: Norton.

Wee, K. N. L., & Kek, Y. C. M. (2002). *Authentic Problem-based Learning: rewriting business education*. Singapore: Prentice Hall.

Wertsch, J. V. (1985). *Vygotsky and the social formation of mind*. Cambridge, MA: Harvard University Press.