

## TWELVE TIPS

# Twelve tips for incorporating educational theory into teaching practices

REG DENNICK

University of Nottingham, UK

## Abstract

**Background:** Although there is no single overarching theory of learning, there is a group of learning theories that shares some common elements which can provide useful guidance on a range of teaching and learning practices.

**Aim:** This article aims to describe Constructivist, Experiential and Humanistic learning theories, to explain how these three theories are fundamentally related and to demonstrate how each of them suggests teaching and learning practices.

**Conclusion:** Common educational theories can be combined to provide 12 practical tips for teachers and facilitators. This demonstrates how theoretical ideas lead to practical consequences.

## Introduction

A scientific theory, formed from empirically tested hypotheses and possibly expressed as a mathematical formula, can be used to predict the outcome of an experimental intervention or to model a section of reality. It assumes an objective world where effects follow specific causes and where variables can be isolated and controlled. An educational theory, on the other hand, is much less well defined. It is unlikely to be expressed as a mathematical formula and although it might attempt to be a generalisation concerning reality the notions of cause and effect and even of reality itself are seen as subjective and open to question and interpretation. Educational theories are not necessarily produced from experimental manipulations of controlled variables using hypothetico-deductive reasoning in the scientific tradition. Educational theories are often derived from observing and evaluating teaching practice and learning situations using a more inductive approach. Although attempts are being made to identify 'best evidence' for specific educational interventions, the combined empirical results of such endeavours, so far, do not lead to an overarching theoretical framework.

Nevertheless, a variety of educational theories do exist forming a patchwork of related ideas, concepts, frameworks and rules of thumb from a variety of disciplines including psychology, sociology and neuroscience. Educational theories are usually situated in a particular teaching and learning environment and may be focused on a specific set of learners with few attempts made to generalise across other domains. Therefore, the range of educational theories is quite large and they tend to persist once proposed since they are not subject to the more ruthless critical and refutational processes found in the scientific disciplines. A website specialising in educational theories lists over 50 named theories (<http://tip.psychology.org/>).

It would be impossible to derive '12 Tips' from all of these educational theories but in this article, I have attempted to identify a series of key educational recommendations that apply to health professional education and which derive from three areas of educational theory, namely Constructivist theory, Experiential Learning theory (ELT) and Humanistic theory. A wider and more detailed analysis can be found in Dennick (2008). These frameworks have been found to be the most useful in teaching health professionals, the principles of education in over a decade of teaching medical educators at Masters level. The American social psychologist Kurt Lewin famously said 'There is nothing so practical as a good theory', hence I hope that the ones I have chosen will be seen to have a practical utility since they tell the teacher what to do in a specific educational situation and they can be used to suggest pedagogical interventions. Each set of 'tips' will be introduced with a brief explanation of the theoretical position from which they are derived.

## Constructivist tips for teaching

As the name implies, the constructivist view of learning is concerned with how learners *construct* an understanding of the world. The theory proposes that meaning and understanding are built up in a process that depends on the existing knowledge foundations and cognitive operations of each individual and the learning activities they engage in. Sensory stimuli and experience must be filtered through the learners' own personal knowledge constructs, to be assimilated into their conceptual frameworks in a process that enables the individual to find meaning in the world. Crucially, this process also involves modifying, demolishing and accommodating mental frameworks that are no longer meaningful. Implicit in the theory is that genuine understanding cannot be simply

*Correspondence:* R. Dennick, Medical Education Unit, Medical School, University of Nottingham, Nottingham NG7 2UH, UK. Tel: (44) 0115 823 0013; fax: (44) 0115 823 0014; email: Reg.dennick@nottingham.ac.uk

transmitted or copied from one brain to another without the receiving brain actively engaging in the process.

Constructivist theory is associated with an evolutionary perspective that sees learning and the creation of mental models as an adaptation to the environment (Bower & Morow 1990; Plotkin 1994). From a philosophical point of view, Constructivism can be traced to Kantian epistemology where Empiricism and Rationalism are synthesised (Kant 1983; Kelly 1986). Its psychological basis can be found in the study of Piaget (Flavell 1963; Chapman 1988) who used the previously mentioned concepts of assimilation and accommodation to underpin his theory of cognitive development. Another strand in the origins of constructivist theory derives from the writings of Dewey (1938) who stressed the importance of the learner's active involvement in the learning process and proposed that learners should be 'actors' rather than 'spectators'. Bruner (1960) stressed the importance of learning as an active social process but also introduced the idea of the 'spiral' curriculum where learners revisit previously learned material and build on it.

The theory has conventionally been divided into 'cognitive constructivism' which concentrates on the mental constructs of the individual and 'social constructivism' which stresses the importance of social and interpersonal interactions in building up mental frameworks. Some, including Piaget, would argue that the individual constructs a model of reality and works out the rules of an objective world (Kelley 1955; Driver 1983). Others assert that our constructed models are entirely subjective and relative (von Glaserfeld 1984). Furthermore social constructivists argue that our constructs are not necessarily located in our own brains but are distributed across society in language and other cultural and social tools (Wertsch 1985; Solomon 1994; Gergen 1995). In addition, there is an ontological dimension to the varieties of constructivism: is knowledge made or discovered? (Philips 1995). Useful general references for exploring Constructivist theory are Waltzlawick (1984), Tobin (1993), Fensham et al. (1994), Philips (1995), Steffe and Gale (1995), Fosnot (2005), Tobias and Duffy (2009) and Pritchard and Woollard, (2010) (a comprehensive Constructivist website can be found at [http://carbon.cudenver.edu/~mryder/itc\\_data/constructivism.html](http://carbon.cudenver.edu/~mryder/itc_data/constructivism.html)).

Some have criticised Constructivism as merely an epistemological position that does not necessarily lead to a pedagogical method (Colliver 2002). Quartz and Sejnowski (1997) have argued that constructivism is underpinned by mainstream theories of cognitive neuroscience: it is how our brains work when we are learning. It is my belief that as well as being an epistemological theory of how we learn it also directly leads to a range of specific pedagogical interventions with practical 'tips' that enhance learning, which are outlined below.

## Tip 1

Ascertain and activate prior knowledge

If learning is about building on existing knowledge then an effective teacher needs to be aware of the background knowledge of their students. This may be found out from an

overall familiarity with the curriculum and from knowledge of pre-requisite qualifications for a course. It is also readily uncovered by good questioning technique at the beginning of a teaching session.

Students may have prior knowledge but could be unaware of it or have forgotten it. An effective teacher activates students' prior knowledge at the beginning of a teaching session by reviewing previous work or by asking pertinent questions. This process brings relevant knowledge to the surface and places it on the 'mental desktop'. It is an important implication of the constructivist approach to recognise that activating prior knowledge may bring *incorrect* conceptual understanding to the surface, which will have to be dealt with and maybe challenged later.

An important principle of adult learning is that the prior knowledge and experience of individuals can become a valuable educational resource used, for example, by a group of learners. Ascertaining, activating and acknowledging prior learning enables the teacher to begin the process of relating to learners by demonstrating empathy and respect, an important attribute of Humanistic learning theory to be described later.

## Tip 2

Build on existing knowledge and challenge misconceptions

The acquisition of new knowledge can only be mediated by existing knowledge; the unknown can only be made sense of in terms of the known. Therefore, it is essential that teachers introduce and explain new concepts using knowledge that students already possess and by using analogy and metaphor to help build scaffolding and bridges to new understanding. In this respect, the context and 'situation' of learning is extremely important. Teachers should not only make cognitive connections to new learning but the importance and relevance of the learning should also be emphasised to ensure that personal and affective connections are made.

Dewey asserted that some of the most powerful learning occurs when students are in a state of uncertainty. This leads to 'cognitive dissonance' and a desire to resolve conflict and achieve a sense of mental equilibrium (Festinger 1957). Challenge should lead to curiosity and investigation. Teachers should structure learning situations in such a way that erroneous or out-moded conceptions are challenged and confronted by empirical evidence, demonstrations or alternative frameworks with greater explanatory power. Students should be given specifically designed problems or scenarios, as in Problem-Based Learning, that force them to question, abandon, elaborate or refine their existing understanding.

## Tip 3

Facilitate the social construction of meanings using group work. Stress the context and the 'situation'

The work of Vygotsky (Wertsch 1985) and of the later Piaget (Richardson 1998) stressed the importance of the interpersonal and social nature of learning. By means of social interaction

and the use of language learners develop and elaborate their cognitive skills and their knowledge base. Learners can be helped to build across the 'zone of proximal development' where they are helped in achieving a higher level of understanding by the mental scaffolding provided by a 'more knowledgeable other', a teacher or facilitator.

The social context of learning is therefore of great importance. Bandura (1977) stressed that learning is a function of the interaction between the individual, other people and the environment. He emphasised the importance of role models for learners and the opportunities for vicarious learning by observing the behaviour of others.

This implies that individual understanding, making sense of the world and searching for meaning, is facilitated by interpersonal communication and learning together in groups. Students should therefore be given oral tasks that encourage them to use new terminology and concepts in group situations, elaborating and refining their conceptual understanding by critically exploring the views of others. Teachers and mentors need to model appropriate behaviour and learners need to be allowed to participate in authentic learning activities situated in the culture to which they will eventually become members (Lave & Wenger 1991).

## Tip 4

### Use active learning techniques

The activation of prior learning by means of questioning, the generation of cognitive dissonance and its resolution by investigation, the importance of group work, social interaction and discussion all point in the direction of active learning techniques. Constructivist theory implies that effective learning should be learning by doing, applying knowledge and problem solving. Clearly, there are occasions when information might need to be given in a more formal or didactic way but constructivist theory suggests that it should then be handled and used. There is no better way than by ensuring that new knowledge is applied in authentic problem solving activities. It is here that the vertical integration of the medical curriculum becomes important so that all learning can be clinically contextualised.

## Tip 5

### Encourage learners to think about how they learn and give learners responsibility for their learning

The construction of understanding is facilitated by reflecting on the process of learning itself, a task known as 'metacognition'. By encouraging students to become aware of how they construct their own learning they can identify the environmental, social and personality factors that influence their learning. This might involve students taking a number of psychometric tests to identify their preferred 'learning style' although caution needs to be taken with the validity of some of these instruments (Coffield et al. 2004).

Ausubel (1968) famously stated that 'the most important factor influencing learning is what the learner already knows'.

Not only is this statement a succinct encapsulation of the main principle of Constructivism it also implies that the learner is at the heart of learning. If effective learning involves personal construction then learners must take responsibility for this fundamental process. This is essentially the most important 'metacognitive' concept that learners need to accept, hence they should abandon a passive, 'spoon-feeding' attitude and adopt a more collaborative, active approach to learning with their teachers. For teachers, Ausubel's statement implies 'learner centeredness' and suggests that they should be sensitive to the background knowledge of the student and should build on this as previously described.

## Educational tips from ELT

ELT developed by Kolb (1984) attempts to provide a mechanism for how experience can be transformed into knowledge, skills and attitudes. If Constructivism is a general theory of learning then ELT provides a mechanism for how learning takes place in environments where deliberate teaching and instruction are not necessarily taking place. For example, ELT is very useful in making sense of how learning occurs in professional working environments where learners are working or shadowing and engaged in an educational programme at the same time. Therefore, ELT is ideally suited to clinical experiential learning environments where students and trainees are embedded in a working environment filled with many important and relevant experiences. It has to be said that Kolb's ELT is often misunderstood and badly explained in the literature. Simplistic and even false descriptions of the 'cycle' are often given without any attempt to describe and explain the deeper, non-cyclical attributes of the theory. Useful works exploring the nature of experiential learning are Moon (2004), Beard and Wilson (2006), Dorman (2006), Jarvis (2006), Davies (2008) and Illeris (2011).

Kolb traces the origins of ELT to the ideas of Dewey, Lewin and Piaget, but he also acknowledges influences from Carl Jung, Carl Rogers, Ivan Illich, Paulo Friere and Lev Vygotsky. Dewey put forward a theory of learning that emphasised the fundamental role of 'inner experience' and activity. Lewin's (1951) work on group dynamics, action research and organisational behaviour was based on his pioneering involvement with 'T-groups' in which he developed small group teaching methods to confront and challenge groups of learners in order to make them experience conflict and the tension between theory and practice. The cyclical representation of ELT, the 'Kolb Cycle' was in fact created by Lewin.

The major influence on Kolb's ELT theory was the Constructivism of Piaget, some of whose ideas have been mentioned previously. From Piaget, Kolb incorporated the idea that intelligence itself is shaped by experience, arising from the interaction between individuals and their environment. Learning starts from interactions with the immediate concrete environment but abstract reasoning and symbol manipulation arise later. It is often overlooked that Kolb cited the work of Carl Rogers in client-centred therapy and Abraham Maslow in self-actualisation psychology to emphasise the importance of the affective or emotional aspects of experience. Similarly, Kolb was also aware of Lev Vygotsky's work on the

importance of social and interpersonal interactions in experiential learning. Finally, for Kolb ELT was also about the possibility of social action and change citing Illich's (1972) assertion that education is a system of social control in an oppressive capitalist society. He also advocated Friere's (1973) conception that 'knowledge is a process, not a product' and that education should be about developing 'critical consciousness'. Kolb stressed that ELT can be 'critical' and liberating and clearly there is a direct connection to Mezirov's (1991) 'Transformative' learning theory.

The 'classic' cyclical interpretation of Kolb is that learning is associated with four 'learning modes' and is initiated with 'concrete experience' which is transformed into 'abstract conceptualisation' by a process of 'reflective observation' and 'active experimentation'. Kolb emphasises the parallels with the assimilation and accommodation elements of the constructivist theory of learning as well as the process of hypothetico-deductive reasoning in scientific thinking. Although the dynamic 'Kolb cycle' is the one most frequently described, implying an iterative and cyclical model of learning, it is important to acknowledge a deeper structure which is frequently ignored in many accounts of his work. Kolb emphasised that all four learning modes are present to the individual *simultaneously*. The learner can choose to focus on the outer world of raw experience or their inner world of mental representations; they can choose to reflect or act on either of these sources of experience. Thus, according to Kolb, effective learning requires the integration of these four abilities; the learner must constantly move between the concrete or the abstract and between activity or reflection at any moment.

Thus, Kolb sees learning as an ever changing process rather than content acquisition and storage. Each act of understanding is a process of continual construction and invention. Consequently, ELT underpins many areas associated with other theoretical frameworks, such as adult learning, social cognitive theory, transformative learning, situated learning and learning in communities of practice. Kolb was well aware of the social nature of learning including the importance of social and cultural knowledge and the effects of interpersonal communication and feedback. Nevertheless, the practical use of ELT has been mainly orientated towards individuals in working environments or engaging in vocational work attachments and rotations, field work, work experience, apprenticeships, and self-directed study and research. Learning from experience 'out there' in the world has a primacy that cannot be matched by formal teaching.

Kolb's work is not without its critics. As Jarvis (2006) has pointed out some individuals simply do not learn from experience! However, the vast majority of learners in medical education probably would not fall into this category and if they did they would hopefully be rapidly culled by the examination system. Nevertheless, we do need to be aware of the barriers that individuals might erect, for one reason or another, against experience and reflection. Others have criticised Kolb for allegedly focusing on the individual learner and ignoring the social and 'situated' nature of experiential learning. Swanwick (2005) for example declares that for Kolb 'the mind is assumed to be functioning independently of its social context'.

However, as mentioned above, a closer reading of Kolb reveals that not only does he describe the world of experience as a 'social context' but he asserts that experiential learning is shaped by the cultural system of social knowledge (Kolb 1984). Newman (1999) criticises the cycle for being 'too ordered, too regular and too predictable' but once gain this ignores Kolb's emphasis that the four modes of representation are present to the learner simultaneously.

A number of practical suggestions and 'tips', orientated towards experiential learners, are provided below and exemplify ways in which the ETL of Kolb can be incorporated into common teaching and learning situations.

## Tip 6

Ensure learners get the experiences they need

Individuals need to ensure they get the experiences they need either individually or as part of communities of practice. There may be educational structures that enable this process or the individual might need to exercise autonomy and assertiveness in ensuring that appropriate experiences are obtained. Useful experiences should be authentic and challenging and should generate problems, questions and possibly cognitive dissonance (see Tip 2). Experiences could be enhanced by social interaction, activity and discussion. Some experiences are entirely cognitive but they can also involve practical skills, feelings and emotions. Some experiential learning is collaborative and participative and hence takes place through social interaction.

## Tip 7

Reflection is helped by log-books, portfolios and feedback

Possibly one of the most important aspects of ELT is its emphasis on reflection. Experience is transformed into learning by reflection which may take place in the individual either unconsciously or consciously. This process can importantly be enhanced by interacting with another individual such as a facilitator, teacher, mentor, master or expert. Reflection can also be enhanced by writing, leading to the development of diaries and portfolios. The importance of reflection is further explored in Moon (1999), Kember (2001) and Hillier (2002). Encouraging reflection leads to the development of Reflective Practice which is an important component of professionalism (Schön 1983). The ubiquitous educational method of using portfolio-based learning coupled to appraisal and mentoring can be traced directly to the work of David Kolb as it follows from the cyclical mode of ELT. Formal mechanisms, such as regular appraisal or supervisory meetings with a mentor or trainer, where a portfolio or reflective diary can be discussed and future actions discussed and planned, is a major component of professional development programmes.

Reflection is fundamentally enhanced by feedback, which can be seen as a type of formative assessment. Ensuring that learners have opportunities to receive constructive feedback from a trained mentor or supervisor is an important feature of

experiential learning environments. Feedback can enable the learner to analyse their actions and their understanding and to plan for future learning. Methods of providing feedback have been described by Pendleton et al. (2003), Silverman et al. (1996) and Chowdhury and Kalu (2006).

Learners can often be 'lost' in experiential learning environments if left to their own devices without supervision. However, they can be supported by having a log-book that defines a core set of experiences or procedures that should be engaged in. Portfolios can be used to record evidence of experience and reflections on those experiences. The contents of a portfolio can be used as trigger for further discussion and feedback from a mentor or appraiser.

## Tip 8

Build up mental models, practical skills and attitudes

It is important to recognise that not only are mental models constructed by reflection on experience but so are practical skills and attitudes. There should be adequate opportunities for learners to map their experiences onto the experiences of others recorded in text-books and the 'literature'. Learners should acknowledge that their own mental frameworks are socially connected to the external world of recorded knowledge which they are attempting to internalise.

## Tip 9

Allow learners to engage in hypothesis testing and action planning

Learners need opportunities to test out and question their growing body of knowledge, skills and attitudes. They need to talk and debate with facilitators and other learners. They may need to be able to test out their ideas and hypotheses in practical environments. They may need to create action plans for future experiences and may require advice and support from facilitators and mentors.

Educational tips from humanistic learning theory

Abandoning both the psychodynamic theorising of Freudian psychoanalysis and the mindless mechanisms of the behaviourists Abraham Maslow and Carl Rogers in their own ways developed a 'humanistic' or 'person centred' theory of the individual which provides a useful framework for dealing with individual learners and their educational environments. As a theory of the individual humanistic theory is relatively value free, our 'nature' is whoever we are and however we have created ourselves with our own personal knowledge and values. As such, it provides a useful model of the individual which is compatible with a constructivist theory of learning.

Maslow (1968) emphasised the concept of 'self-actualisation', the idea that we wish to become the best that we can possibly be. In this respect, one of his most important ideas, described in the 'tips' below, was to suggest that in order to achieve our full potential various lower level needs must be satisfied. Carl Rogers' psychotherapeutic approach was to

acknowledge and empathise with the patient's own view of themselves which was transformed into a person or student-centred educational framework (Rogers 1983). Like Maslow, Rogers acknowledged that individuals have a self-actualising tendency towards the achievement of their own potential. In addition, he suggested they have a unique self-concept, need positive self-regard and should be trusted to self-actualise. He stressed the importance of the teacher-student relationship arguing that teachers should become 'facilitators' of learning rather than didactic transmitters of information. He is reputed to have begun a plenary presentation at an international conference by simply saying 'Any questions?'

The humanistic theories of Maslow and Rogers are the foundations for what we now call 'student-centred' or 'learner centred' education. Their fundamental starting point is the individual's own view of the world, their personal frameworks and mental models. Hence, there is a direct theoretical connection to the constructivist model of learning and to ELT. The constructivist model emphasises that what the student knows is at the heart of learning; student centredness is a fundamental principle of constructivist teaching practice. The process for this building process is experiential learning.

Criticisms that have been levelled at humanistic theories include the lack of any 'scientific' evidence for Maslow's self-actualising process and the fact that despite physical and psychological deprivations many individuals do learn and achieve at least some of their potential. Carl Rogers has been criticised for the practical impossibility of maintaining positive self-regard and trust towards all learners.

## Tip 10

Respect learners and acknowledge who they are and where they are coming from

Adult learners, in particular, bring their own learning resources with them in the form of their educational background, life experiences and personal biography. Teachers and facilitators should acknowledge, respect and utilise this resource in their teaching and learning activities. Within a defined curriculum framework, learners should be allowed to explore and follow their own interests as much as possible encouraging curiosity and investigation. Facilitators should demonstrate empathy, trust and respect towards their students and be personally genuine. They should encourage students to take responsibility for their own learning.

## Tip 11

Ensure physical, psychological and emotional needs are taken care of

Students will not be motivated to learn if their physiological and psychological needs have not been satisfactorily dealt with. Ensure that physiological needs such as thirst, hunger and warmth are satisfied. Ensure teaching rooms have a comfortable environment. Ensure that anxiety levels are reduced and that students have psychological shelter and security. If students feel isolated and not part of the group this

may inhibit their learning so ensure that interpersonal needs such as 'belonging' and being part of the group are met. Finally encourage self-esteem, self-efficacy and self-actualisation by giving positive feedback, reinforcement and praise.

## Tip 12

Teaching and learning is a relationship

Learning is facilitated by a relationship between the learner and the teacher/facilitator. Teachers should learn and use students' names, take an interest in their personal as well as educational development and should be willing to take on a pastoral role in dealing with student problems. Learning environments should also be democratic places where learners and facilitators collaborate to promote individual growth and development. Learners should be members of curriculum and teaching committees.

## Conclusions

I have attempted to show how concepts within three important and well-known educational theories lead to quite specific pedagogical recommendations that can be easily followed by all teachers and facilitators, demonstrating the relationship between theory and practice. In addition, I hope I have shown that there are fundamental relationships between these theories in terms of how learning is actively constructed in an individual who, at the same time, is in social and interpersonal relationships with other learners, teachers and facilitators.

## Notes on contributor

REG DENNICK, BSc, PhD, MEd, FHEA, is a Professor of Medical Education in the University of Nottingham. He is an Assistant Director of Medical Education and Course Director for the University of Nottingham's Masters in Medical Education.

**Declaration of interest:** The author reports no conflicts of interest and is the sole author of this article.

## References

Ausubel DP. 1968. Educational psychology: A cognitive view. New York: Holt, Reinhart, and Winston.

Bandura A. 1977. Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.

Beard C, Wilson JP. 2006. Experiential learning. 2nd ed. London: Kogan Page.

Bower GH, Morow DG. 1990. Mental models in narrative comprehension. *Science* 247:44–48.

Bruner J. 1960. The process of education. Cambridge, MA: Harvard University Press.

Chapman M. 1988. Constructive evolution. Cambridge: Cambridge University Press.

Chowdhury RR, Kalu G. 2006. Learning to give feedback in medical education. *Obstet Gynaecol* 6:243–247.

Coffield F, Moseley D, Hall E, Ecclestone K. 2004. Should we be using learning styles? What research has to say to practice. London: Learning and Skills Research Centre, LSDA.

Colliver JA. 2002. Constructivism: The view of knowledge that ended philosophy or a theory of learning and instruction? *Teach Learn Med* 14(1):49–51.

Davies L. 2008. Informal learning: A new model for making sense of experience. Aldershot: Gower Publishing Ltd.

Dennick RG. 2008. Theories of learning: Constructive experience. In: Matheson D, editor. An introduction to the study of education. 3rd ed. London: Routledge.

Dewey J. 1938. Logic: The theory of inquiry. New York: Holt.

Dornan T. 2006. Experience based learning: Learning clinical medicine in workplaces. Maastricht: University of Maastricht.

Driver R. 1983. The pupil as scientist. Milton Keynes: Open University Press.

Fensham P, Gunstone R, White R. 1994. The content of science: A constructivist approach to its teaching and learning. London: The Falmer Press.

Festinger L. 1957. A theory of cognitive dissonance. Stanford: Stanford University Press.

Flavell JH. 1963. The developmental psychology of Jean Piaget. New York: Van Nostrand Reinhold Company.

Fosnot CT. (ed.). 2005. Constructivism: Theory, perspectives and practice. 2nd ed. New York: Teachers College Press.

Friere P. 1973. Education for critical consciousness. New York: Continuum.

Gergen KJ. 1995. Social construction and the education process. In: Steffe LP, Gale J, editors. Constructivism in education. Mahwah, NJ: Lawrence Erlbaum. pp 17–39.

Hillier Y. 2002. Reflective teaching in further and adult education. London: Continuum.

Illeris K. 2011. The fundamentals of workplace learning. London: Routledge.

Illich I. 1972. Deschooling society. New York: Harrow Books.

Jarvis P. 2006. Towards a comprehensive theory of human learning. London: Routledge.

Kant I. 1983. Critique of pure reason. London: Longmans, Green (Transl. by Thomas Kingsmith Abbott).

Kelley GA. 1955. The psychology of personal constructs. New York: Norton.

Kelly AV. 1986. Knowledge and curriculum planning. London: Harper & Row.

Kember D. (ed.). 2001. Reflective teaching and learning in the health professions. London: Blackwell Science.

Kolb DA. 1984. Experiential learning. Englewood Cliffs, NJ: Prentice-Hall.

Lave J, Wenger E. 1991. Situated learning: Legitimate peripheral participation. Cambridge: Cambridge University Press.

Lewin K. 1951. Field theory in social science. New York: Harper & Row.

Maslow AH. 1968. Toward a psychology of being. New York: Van Nostrand Reinhold.

Mezirow J. 1991. Transformative dimensions of adult learning. San Francisco, CA: Jossey-Bass.

Moon JA. 1999. Reflection in learning and professional development. London: Kogan Page.

Moon JA. 2004. A handbook of reflective and experiential learning: Theory and practice. London: Routledge Falmer.

Newman M. 1999. Maeler's regard: Images of adult learning. [Published 2007 January]. [www.michaelnewman.info](http://www.michaelnewman.info) (Originally published 1999).

Pendleton D, Schofield T, Tate P, Havelock P. 2003. The New Consultation: Developing doctor-patient communication. Oxford: Oxford University Press.

Philips DC. 1995. The good, the bad and the ugly: The many faces of constructivism. *Educ Research* 24:5–12.

Plotkin H. 1994. Darwin machines and the nature of knowledge. London: Penguin.

Pritchard A, Woollard J. 2010. Constructivism and social learning. London: Routledge.

Quartz SR, Sejnowski TJ. 1997. The Neural basis of cognitive development: A constructivist manifesto. *Behav Brain Sci* 20:537–596.

Richardson K. 1998. Models of cognitive development. Hove: Psychology Press.

Rogers C. 1983. Freedom to learn for the 80s. New York: Merrill.

- Schön D. 1983. *The reflective practitioner: How professionals think in practice*. New York: Basic Books.
- Silverman JD, Draper J, Kurtz SM. 1996. The Calgary-Cambridge approach in communication skills teaching 1: Agenda-led outcome-based analysis of the consultation. *Educ Gen Pract* 7:288–299.
- Solomon J. 1994. The rise and fall of constructivism. *Stud Sci Educ* 23:1–19.
- Steffe LP, Gale J. (ed.). 1995. *Constructivism in education*. Hillsdale, NJ: Lawrence Erlbaum.
- Swanwick T. 2005. Informal learning in postgraduate medical education: from cognitivism to 'culturism'. *Med Educ* 39:859–865.
- Tobias S, Duffy TM. 2009. *Constructivist instruction: Success of failure?*. London: Routledge.
- Tobin K. (ed.). 1993. *The practice of constructivism in science education*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Von Glasersfeld E. 1993. Questions and answers about radical constructivism. In: Tobin K, editor. *The practice of constructivism in science education*. Hillsdale, NJ: Lawrence Erlbaum. pp 23–38.
- Waltzlawick P. (ed.). 1984. *The invented reality*. New York: Norton.
- Wertsch JV. 1985. *Vygotsky and the social formation of mind*. Cambridge, MA: Harvard University Press.