

Teaching and learning in medical education: how theory can inform practice

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KEY MESSAGES

- Understanding theory can enhance the use of effective teaching and learning strategies.
- The learner is an active contributor in the learning process.
- Learners interact actively with the curriculum, patients and teachers in a complex, changing environment.
- The entire context of learning is important, rather than any single variable, and includes interactions of all the variables.
- Values, attitudes and the culture of the profession are often learned implicitly and without explicit teaching or awareness of learning.
- Learning is enhanced when it is relevant, particularly to the solution and understanding of real-life problems and practice.
- Individuals' past experience and knowledge are critical to how they learn.
- Learning has an emotional aspect to it that is often under-recognised and can influence the learning significantly.
- Individual learners are capable of self-regulation, that is, setting goals, planning strategies and monitoring their progress.
- The ability to reflect on one's practice (performance) is critical to lifelong, self-directed learning.



Introduction

How can educational theory inform our practice? Several writers have described a gap between theory and practice. Indeed, this perception has led practitioners in many professions to conclude that theory is in an ivory tower, not useful or relevant to those in practice. Educators are no exception.(1) However, as professional practice is better understood, it is clear that theory has the potential both to inform practice and to be informed by it.

Our purpose in this chapter is to describe eight selected approaches to education theory and explore their implications for the practice of medical education. We use the term 'theory' in a general sense, that is, as a set of assumptions and ideas that help to explain some phenomenon. Knowles(2) put this succinctly more than 25 years ago, defining a theory as: 'a comprehensive, coherent, and internally consistent system of ideas about a set of phenomena'.

Each of the theoretical approaches we describe is consistent with Knowles' definition. The eight theoretical approaches discussed are:

- adult learning principles(3)
- social cognitive theory(4)
- reflective practice(5)
- transformative learning(6)
- self-directed learning(7)
- experiential learning(8)
- situated learning(9)
- learning in communities of practice.(10)

We selected these because we believe them to be particularly useful in the context of the issues facing medical education today. We will describe each theoretical formulation, highlighting its major constructs, and present implications of the theory for educational practice, followed by a specific example drawn from medical education. We will conclude with a consideration of the connections and commonalities among the eight theories, so that readers may make these connections within their own practice.

Adult Learning Principles

The purpose of adult education has been the subject of a number of typologies.(11–15) Generally, these accord with a list proposed by Darkenwald and Merriam,(15) namely:

- cultivation of the intellect
- individual self-actualisation

- personal and social improvement
- social transformation
- organisational effectiveness.

A number of theoretical frameworks have developed around these functions, which Merriam(16) has grouped into three categories. The first category is based on *adult learning characteristics*, in which the best-known framework is 'andragogy'.(3) Also in this group is Cross'(17) 'Characteristics of Adults as Learners' model, based on differences between adults and children across personal and situational characteristics.

The second category emphasises the *adult's life situation*. Two theories have been proposed in this category, Knox's Proficiency Theory(18) and McClusky's Theory of Margin.(19) The third category focuses on *changes in consciousness*. Several models in this category emphasise reflection upon experience and environment. Mezirow's Perspective Transformation(20) (discussed later) and Freire's Theory of Conscientization(21) are the best-developed models in this category.

Merriam and Caffarella(22) have provided an excellent summary of the various theory-building efforts in adult learning. They conclude that no single theory fares well when judged by the criteria of comprehensiveness (i.e. includes all types of learning), practicality and universality of its application. They also assert that a phenomenon as complex as adult learning will probably never be adequately explained by a single theory. Although these theoretical frameworks provide implications for practice, few have actually been applied widely in adult education practice. Knowles'(3) andragogy is the exception. The remainder of this section focuses on andragogy, its implications for practice and an example of its use in undergraduate medical education.

Andragogy

Malcolm Knowles(3) first introduced the term 'andragogy' to North America, defining it as 'the art and science of helping adults learn'. Knowles did not present andragogy as an empirically based theory, but simply as a set of four assumptions,(3) to which a fifth was later added (see Box 2.1).(23)

Andragogy has its roots in humanistic psychology through the work of Maslow(24) and Rogers.(25) The core basis of andragogy is that the attainment of adulthood is marked by adults coming to view themselves as self-directed individuals. Knowles' 'model of assumptions' has given adult education a 'badge of identity' that distinguishes the field from other areas of education, for example, childhood schooling.(26) Bard(27) has asserted that andragogy 'probably more than any other force, has changed the role of the learner in adult education and in human resource development' (p. xi). However, it has also caused enormous controversy, debate and criticism. The early

BOX 2.1 Andragogical assumptions(3,23)

- 1 As a person matures, their self-concept moves from that of a dependent personality towards one of a self-directing human being. Adults are capable of determining their own learning needs, and of finding the means to meet them.
- 2 An adult accumulates a growing reservoir of experience, which is a rich resource for learning. This experience can be brought to bear on new learning, and enhance the new learning significantly. It can also provide an effective context for the acquisition of new knowledge and skills.
- 3 The readiness of an adult to learn is closely related to the developmental tasks of their social role. Adults value learning that integrates with the demands placed on them in their everyday life.
- 4 There is a change in time perspective as people mature, from future application of knowledge to immediacy of application. Thus an adult is more problem centred than subject centred in learning. Generally, adults value learning that can be applied to authentic problems that they encounter in everyday life.
- 5 Adults are more motivated to learn by internal factors rather than external ones. The internal desire to succeed, the satisfaction of learning and the presence of personal goals have a greater effect on *maintaining* [italics added] motivation than external incentives and rewards.

criticism led Knowles to later modify his model by describing andragogy and pedagogy as a continuum, and suggesting that the use of both teaching methods is appropriate at different times in different situations, regardless of the learner's age.(23)

It is widely accepted that andragogy is not really a theory of *how* adults learn, the assumptions being merely descriptions of the adult learner.(28) Furthermore, even the assumptions have been questioned as prescriptions for practice.

Others argue that andragogy may in time become a theory, but through empirical studies of the assumptions. At least, andragogy captures general characteristics of adult learners and offers guidelines for planning instruction with learners who tend to be at least somewhat independent and self-directed (29).

Implications for educational practice

There are several implications for practice that can be derived from the theories of adult learning which have at their heart the fact that an adult's life situation is quite different from that of a child. Merriam and Caffarella(22) discuss these differences in three areas: context, learner and learning process.

Context

Children are dependent on others for their well-being, while adults have assumed responsibility for managing their own lives. Typically, being a learner is only one of several roles played concurrently by adults. Additionally, the principles that have guided approaches to teaching children, and which have been applied to learners of all ages, have focused on generalised learning in the school setting.(30) In contrast, adults generally learn and function in settings where situation-specific skills are required to resolve relevant problems.

Learner

As Knowles has described,(3) there are significant differences between adults and children that must be addressed in the learning process. These include the need of adults to be self-directing, their large reservoir of experience, the relationship of their readiness to learn to their social role, their desire for knowledge that can be immediately applied to current relevant problems and their internal motivation to learn.

Learning process

Three non-cognitive factors have been shown to affect adult learning:

- pacing (e.g. through deadlines for assignments or adhering to a schedule)
- meaningfulness
- motivation.(22)

Pacing of learning through deadlines or other pressures may adversely affect learning, since adults have many competing demands. Also, adults tend to perform poorly on learning tasks that are not meaningful, or which do not fall within their domain of interest.

The ideas presented thus far can be formulated as a set of principles to guide adult learning activities. Several writers have proposed principles or 'tips' for practitioners.(23,31) Knowles(23) himself drew seven principles from the assumptions of andragogy, which are presented here (see Box 2.2).

Social Cognitive Theory

Social cognitive theory(4), formerly social learning theory(32), acknowledges the social (interactive) aspect of learning and unites two approaches to understanding learning. These are the behaviourist approach, which emphasises the influence of the environment on our actions, and the cognitive approach, which emphasises the importance of cognition in mediating our learning and functioning.

These two approaches are united in a basic tenet of social cognitive theory, which posits that our actions, learning and functioning are the result of a continuous,

BOX 2.2 Principles of adult learning(23)

- 1 An effective learning climate should be established. Learners should be comfortable, both physically and emotionally. They should feel safe and free to express themselves without judgement or ridicule.
- 2 Learners should be involved in mutual planning of methods and curricular directions. Involvement will help assure that collaboration occurs in the content and learning process. It will also increase the relevance to the learners' needs.
- 3 Learners should be involved in diagnosing their own learning needs. Once again, this will help to ensure meaningfulness and will trigger learners' internal (intrinsic) motivation. It will also promote self-assessment and reflection, and effective integration of learning.
- 4 Learners should be encouraged to formulate their own learning objectives. The rationale for this is the same as for 3, above. Learners are thus encouraged to take control of their learning.
- 5 Learners should be encouraged to identify resources and to devise strategies for using them to accomplish their objectives. This principle connects adult learning needs to practical resources for meeting their objectives, and also provides motivation for using such resources for a specific and focused purpose.
- 6 Learners should be helped to carry out their learning plans. One of the key elements of motivation is expectancy of success. Learners will become discouraged and lose their motivation if a learning task is too difficult. Also, too much pressure without support can lead to a decrement in learning.
- 7 Learners should be involved in evaluating their own learning. This is an essential step in a self-directed learning process that requires critical reflection on experience, a specific example of which(5) is discussed later in this paper.

dynamic, reciprocal interaction among three sets of determinants: personal, environmental (situational) and behavioural. Personal factors include the individual's attitudes, perceptions, values, goals, knowledge and all previous experience. Environmental factors encompass all those influences that may reward or hinder actions and the achievement of goals. Bandura notes explicitly that 'personal and environmental factors do not function as independent determinants; rather, they determine each other. People create, alter and destroy environments. The changes they produce in environmental conditions, in turn, affect their behaviour and the nature of future life' (p. 23).(4) Bandura further states that behaviour, rather than being a 'detached by-product' of persons and situations, is itself an interacting determinant in the process.

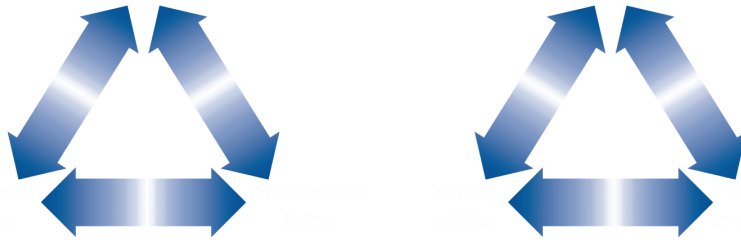


Figure 2.1 Diagrammatic representation of (a) reciprocal interaction among personal, situational and behavioural factors; (b) the same factors using a medical education example.

Figure 2.1 shows the interactions schematically and how these might apply to medical education.

Bandura asserts that the relative influences exerted by each of the three sets of factors will vary for different activities, different individuals and different circumstances. For example, when environmental conditions exert a powerful influence they will prevail. In a medical education example, when trainees are thrust into the busy environment of a clinical ward they will do what is required to get the job done and to meet expectations. In other cases, the behaviour and its feedback will be a major influence. For instance, when students are learning and practising a new skill, the feedback from this will have a strong influence. Finally, in those instances where situational influences are relatively weak, personal factors will exert the strongest regulatory influence. To complete our example, when not pressed by powerful environmental forces students may choose to learn a new skill or to learn more about talking with patients. These choices will be affected by the student's own values, perceived needs and individual goals. There may also be interaction within each factor as they exert an influence on each other. The simple example provided here is not intended to convey lack of complexity; rather, it is to emphasise the ongoing, dynamic nature of our interaction with our environment.

Environmental influences can affect people in ways other than their behaviour, as when thoughts and feelings are modified through observing others' behaviour (modelling), teaching or social persuasion. Thoughts do not arise in a vacuum. Individual perceptions and understandings are developed and verified through both direct and vicarious experience, judgements of others and by inference from what is already known.⁽⁴⁾ (p. 27).

Basic human capabilities

Bandura views humans as possessing five basic capabilities that underpin our learning and functioning in all situations.

Symbolising capability

Almost every aspect of our lives is touched by our remarkable ability to use symbols to transform our experience into a form that can be internalised and serve as a guide to future actions. This ability enables us, when confronted with a new problem, to test possible solutions symbolically, rather than laboriously trying out each alternative.

Forethought capability

Most of our behaviour is regulated by thought. We anticipate the likely outcomes of our actions and plan goals for ourselves and courses of action to maximise the likelihood of obtaining them. Also, as noted, images of desirable future events can become motivators of our current behaviour.

Vicarious capability

If learning occurred only through performing actions and experiencing their effects, learning and development would be slow, tedious and enormously inefficient. Fortunately, much learning that can be acquired through direct experience can also be acquired or facilitated vicariously through observation of other people's actions and their consequences. This applies to social development, especially where, in some situations, new behaviours can only be conveyed effectively by modelling. Even if learning can occur in other ways, the ability to learn vicariously distinctly shortens the process.

Self-regulatory capability

In social cognitive theory, the capability for self-regulation is central. Much of our behaviour is regulated primarily by our internal standards and our evaluative reactions to our own actions. Any discrepancies between our actions and those standards activate a self-evaluation, which will influence our subsequent behaviour. Self-evaluation is our personal guidance system for action. We exercise self-regulation or self-directedness by arranging facilitative environmental

conditions using our images of future events as guides and creating incentives for our efforts.

Self-reflective capability

Perhaps the most distinctive is the capability for self-reflection, whereby we can analyse our experiences and think about our thought processes. Cognitive theorists refer to this as metacognitive capability. Through self-reflection we gain understanding about ourselves, our behaviour and the world around us.

A central concept in social cognitive theory is *self-efficacy*; the individual's judgement about his or her ability to carry out a specific task or activity (see Box 2.3).

BOX 2.3 Focus on: Self-efficacy(33)



According to Bandura, a central type of thought that affects action is people's judgements of their capabilities to deal with different realities, or their *self-efficacy*. This judgement influences what people choose to do, how much effort they invest in activities, how long they persist in the face of disappointment and whether tasks are approached anxiously or assuredly. Judgements about our personal efficacy, whether accurate or faulty, arise from four main information sources.

- Performance attainments – our own performance is the most influential source of efficacy because it is based on authentic experience of mastery. Successes raise our efficacy appraisals; failures generally have a lowering effect, especially if they occur early in the learning and they do not reflect lack of effort or difficult situations. Once strong positive efficacy perceptions are developed, occasional failures do not have a marked effect. Feelings of capability are generally task-specific, though they can generalise to other, similar tasks.
- Vicarious experience – observing other similar people perform successfully can raise our own beliefs that we can perform similar tasks. This source of information is particularly effective when people are encountering new tasks and have little experience on which to base their perceptions.
- Verbal persuasion – we have all had the experience of trying to convince people that they possess capabilities that will enable them to achieve what they seek. If the heightened efficacy that the persuasion is attempting to achieve is realistic, it can be influential, particularly in affecting the amount of effort individuals put into a task.
- Physiological state – people often judge their capability based on the messages received about their physiological states. We frequently interpret arousal in taxing situations as an ominous sign of vulnerability, and tend to expect more success when we are not tense and aroused.

Implications for educational practice

Understanding the concepts of ongoing dynamic interactions, basic human capabilities and how people form their conceptions of their abilities allows us to plan a learning environment that is most conducive to maximising each individual's development. We will consider some implications of this theory for effective teaching and learning; in particular, five learning processes (that build on the basic capabilities) that can be brought to bear in medical education:

- modelling or demonstration
- a clear objective, goal or desired outcome
- provision of task-relevant knowledge
- guided practice and feedback
- opportunities for learners to reflect on their learning.

Modelling or demonstration of the desired process or skill facilitates vicarious learning through observation. This opportunity not only shortens the learning process, it is often essential when new skills are being acquired. Demonstration can help students to form an image of the desired skill/behaviour, which can be used as a guide for action and as a standard of performance against which to monitor their personal progress. Finally, learner perceptions of efficacy are increased by observing someone else perform successfully.

A *clear objective*, goal or image of the desired outcome enhances learning. It builds on our capability for forethought, providing a guidepost for monitoring and directing our progress appropriately. Awareness of the goal also increases expenditure of energy and effort and stimulates the development of strategies to reach the goal.

Learners require *task-relevant knowledge*. They must have the basic building blocks to use as a foundation for newly acquired knowledge and skills. It maybe knowledge related to content or process, but it must be relevant to the individual's prior knowledge and skills, and to the current goal. Further, learners may need stimulation and assistance to activate prior knowledge, to relate it to the new learning. This knowledge promotes students' views of themselves as capable of the task. Otherwise, their perceptions of their efficacy are likely to be low, which will affect both developing efficacy perceptions and their future performance.

Guided practice of a new skill with feedback allows learners to develop positive efficacy perceptions about the task, and to experience successes rather than failures in that crucial early learning period. Practice promotes the internalisation of personal standards, which can then be used in self-regulation and self-evaluation. Corrective feedback is integral to effective learning. Without feedback, the level of performance achieved is lower. Similarly, feedback is less effective in improving performance when it is not related to a goal or desired level of achievement.(33)

Finally, and arguably most critically, learners require *opportunities to reflect* on their learning, to consider their strategies, to determine whether new approaches are required to achieve their goal and to draw lessons for future learning. Reflection also allows the integration of new experiences into existing experience and knowledge. Finally, it allows the learner to build accurate and positive perceptions of efficacy, based on their experience.

In summary, social cognitive theory provides us with several important constructs that may inform our educational practice. They include the concept that learners are constantly interacting with their environment and their actions and consequences. Many of the characteristics that we seek are present as basic capabilities common to all. Rather than creating these characteristics, learning opportunities can be created to develop and build on them. Finally, we can have some confidence that people are inherently self-directed. Given the appropriate conditions and support, they will set goals, develop strategies to attain them and monitor their progress regularly.

Reflection and Reflective Practice

The concepts of *reflection* and the *reflective practitioner* are at the centre of the epistemology of professional practice. They borrow from and link three previously well-established epistemologies: positivism, interpretive theory and critical theory.(5,34) The positivistic view of science assumes that theory is a scholarly pursuit that may be unrelated to practice. It is only the predictive value of theory that is of practical value. Reflection in professional practice extends this view by proposing that theory and practice inform each other.

As knowledge is embedded in practice, practitioners are positioned to test and revise theories through practice. They do so by reflection and action. The reflective process, as such, serves as a bridge in the theory–practice relationship.

It ties the reflection to the interpretive model. The interpretive epistemology proposes that theory is interpreted in light of personal current and past experiences. Theory guides or enlightens action and understanding. Lastly, the concept of reflective practice shares with critical theory the observation that theory is intimately linked to practice through a process of critical thinking and examination. This process permits professionals to break free from established paradigms and reformulate the ways in which practice, problems and problem solving are viewed. This reframing is part of learning and change. It is how practice helps organise theory.(5,35) Reflective practice then becomes a vehicle for learning effectively.

Al-Shehri *et al.*(35) and Moon(36) reviewed definitions and approaches to reflection and reflective practice found in the educational literature. Clift *et al.*(37)

analysed issues and programmes that encourage reflective practice in education. But it is Schön who has perhaps been most influential in our understanding of reflective practice. Schön(5,38) summarises the need for a new scholarship that recognises knowing-in-action, on-the-spot experimentation (reflection-in-action) and action research.

Principles of reflective practice

Schön's works(5,38,39) are based on the study of a range of practice professions. Schön argues that formal theoretical knowledge, such as that acquired in the course of professional preparation, is often not useful to the solution of the messy, indeterminate problems of real-life practice. Central to his premise is the need for professional scholarship and the recognition of an epistemology of professional practice. The reflective practitioner incorporates these principles by relating professional knowledge to practical competence and professional activity. By linking theory to practice, both can inform each other.

Professionals develop zones of mastery around areas of competence. They practise within these areas as if automatic. Schön terms this a professional's 'knowing-in-action'. Indeed, practising one's profession has been likened to riding a bicycle. Occasionally the bicycle skids.(40) This occurs in response to a surprise or the unexpected. Two types of reflection are triggered at this time: 'reflection-in-action' and 'reflection-on-action'.(5)

Reflection-in-action involves the three activities of

- reframing and reworking the problem from different perspectives
- establishing where the problem fits into learned schema (i.e. already existing knowledge and expertise)
- understanding the elements and implications present in the problem, its solution and consequences.

Reflection-on-action, which occurs later, is a process of thinking back on what has happened in the situation to determine what may have contributed to the unexpected, and how this situation may affect future practice.

Both are iterative processes whereby insights and learning from one experience may be incorporated into future 'knowing-in-action'.(5,38)

Other approaches to reflection and learning from experience have also been influential.(40–42) Boud *et al.*(43) also outline an iterative process comprising three main phases, beginning with the *experience*. The second phase involves returning to the experience and, through reflective processes, dealing with both negative and positive feelings about it, and re-evaluating it. The last aspect of the process Boud *et al.* labelled 'outcomes', in which new perspectives on experience can lead to a change in behaviour and a readiness for application and commitment to action. These authors

view reflection as the key to learning effectively. They also emphasise the importance of recognising the emotional aspects of experience that accompany effective learning from experience.

Moon(36) views reflection as the catalyst that moves surface learning to deep learning. Deep learning can be integrated with current experience and knowledge, resulting in rich cognitive networks that the individual can draw on in practice.

Similar characteristics are found across a number of reflective models.

- They describe reflection as a series of iterative steps or levels.
- They generally define levels of reflection, from superficial, descriptive levels to deeper levels.
- Generally, the deeper reflective levels are regarded as more difficult to achieve, although they hold greater potential for learning and growth.

There also appears to be a dynamic relationship between reflective practice and self-assessment, both explicitly and implicitly. The ability to self-assess depends on the ability to reflect accurately on one's practice, and the ability to reflect effectively relies heavily on accurate self-assessment.(44)

In the workplace, true professionals are known for their ability for on-the-spot experimentation and improvisation, their commitment to ongoing practice-based learning and their self-directed reflective learning skills. It is these collective skills that permit professionals to continually and subtly learn from practice, adapt to change and maintain their competence. The core capabilities of professionals are tied to a number of essential skills. Professionals recognise and value the traditional form of knowledge, that is, that gained in school or in study, as well as experiential knowledge, that is, that gained through experience and practice. In the context of their practice, they use both these forms of knowledge to continually reshape their approach to problems, solutions, actions and outcomes. This creative process, sometimes called wisdom or artistry, occurs in response to new meanings, insights and perspectives gained through reflection on current and past experiences. It leads to continued learning and ongoing competence within a profession.(5)

Reflection has frequently been viewed as an individual professional activity. In some cases, reflecting inadequately or inaccurately on one's performance can lead to circular, 'single-loop' learning, which can often lead to confirmation of current behaviours rather than to questioning and identifying areas for learning.(45) For this reason, reflection is increasingly suggested as a collective activity whereby individuals can share individual insights and reflections, and increase their collective and individual learning.(46) The evidence surrounding reflective practice is summarised in Box 2.4.

BOX 2.4 Where's the evidence: Reflective practice



Despite the observation that reflection has been described in several different fields, and much has been written about it in the respective literatures, the research literature in the field is relatively early in its development. A review(41) of the research across medicine, nursing and other health professions suggests the following.

- Reflective thinking is seen in practising professionals and in students across a variety of health professions, including nursing, dentistry, medicine and health sciences.
- Reflection appears to serve a number of purposes. In medicine, it appears to occur most naturally in response to complex and new problems.(42) However, it is also demonstrated in anticipation of challenging situations.(47)
- The phenomenon of reflection is not unitary. Several elements and aspects of reflection have been demonstrated. The tendency to reflect and reflective ability vary across individuals and across situations.
- Attempts to measure and classify reflective thinking have resulted in validated instruments which demonstrate the differences exist and are measurable. Generally, it seems that deeper levels of reflection are achieved less often and are more difficult to achieve.
- It appears that reflective ability can be developed. Strategies associated with reported changes in reflective ability used small group resources and activities such as portfolio and journal keeping.
- Several factors appear to constantly influence reflection both negatively and positively. These include environment, time, maturity, effective guidance and supervision, and the organisational culture.
- Reflective practice appears to be linked to learning, particularly to deep learning, the development of self-regulated learning and the development of professional identity.(36)

Implications for educational practice

Reflective practitioners are able to assess a situation from the perspectives of both theoretical background and practical experience. They must be able to bridge successfully the theory–practice gap and apply both aspects of learning while examining the situation from all perspectives. Reflectivity in practice is a learned skill of critical thinking and situation analysis.

As reflection, practice-based learning and action based on these are all skills to be learned and applied, opportunities to acquire them must be available.

The mentor or teacher models, shares and fosters this creative process in the presence of future and current practitioners. The skills required for reflection

must be developed in professional courses within our undergraduate, graduate, clinical and continuing medical education areas. Initially, the mentor or teacher models, shares and demonstrates the skills. He or she facilitates the learners' abilities to perceive options and alternatives, to frame and reframe problems. He or she also assists the learners to reflect on the actions and options they chose, and on what knowledge and values may have influenced their choice. Finally, teachers assist students to consider critically what they have learned and integrate it into their existing knowledge.

Once the learner has gained sufficient experience and insight into the profession, the teacher's role becomes one of facilitating systematic experiential learning, on-the-spot experimentation, and reflection on process, action and outcomes. Teachers observe and comment positively on situations in which the learner's reframing has occurred.(40) This helps the learner to become consciously aware of the process of reflection.

A dilemma in incorporating reflective practices into our educational programmes is to select those strategies that will facilitate its active development, and to select activities that are relevant to practice. Some literature has addressed this issue when considering the merits of journals and portfolios. However, there has been a move to incorporate more critically reflective activities across the continuum.

Several authors(35,48–53) have linked reflective practice to adult learning theory, self-directed learning, curriculum development, and effective professional education and knowledge translation.

Slotnick(41) linked Schön's work to how physicians learn in practice. He emphasised the importance of thinking while solving problems (reflection-in-action) and thinking after problem solving (reflection-on-action). These two activities are required for clinicians to gain new insights and perspectives around practice-based problems, problem solving and practice itself. Ongoing learning, maintenance of competence and improved practice will result.

Slotnick(41) outlined related principles and implications for learners and teachers in practice. Parboosingh(54) adopted the Schön model to assist in understanding how practitioners change and develop professionally. According to Parboosingh, to remain current, physicians require both an understanding of their areas of competence (mastery) and the ability to think reflectively. These two concepts are embedded in the epistemology of professional practice.

Shapiro and Talbot,(40), like Slotnick(41) and Parboosingh(52,54), reinforced the importance of practice context. They proposed that an understanding of artistry within the process of practice is required, and adopted Schön's model(38) to aid in this understanding. Specifically, Shapiro and Talbot(40) applied the reflective practice model to family medicine. The

authors described how to teach professional artistry. They proposed that open learning environments encourage a continual reshaping of practice-based learning, along with the development of continuous competence.

Lockyer *et al.*(46) explored how reflection could be used in both classrooms and practice, to enhance the integration of knowledge and its translation into professional practice.

Palmer *et al.*(47) addressed curriculum design issues specific to professional education and reflection. Using the nursing profession as the context, they described roles for lecture-practitioners, mentors (coaches) and mentees. To define the content or skill-set for a reflective curriculum, they borrowed from Atkins and Murphy.(44) They identified five skills as essential to partake in reflection:

- self-awareness
- description
- critical analysis
- synthesis
- evaluation.

Palmer *et al.*(47) also provided guidance specific to assessing reflective learning.

Crandall(42) notes the value of using Schön's model for all levels of the medical education continuum. She outlines how clinical teachers can use it to assist learners, and provides evidence through clinical teacher interviews that stages of Schön's model occur during effective clinical learning events. Specific evidence is provided for all five stages that Schön recommends:

- 1 knowing-in-action
- 2 surprise
- 3 reflection-in-action
- 4 experimentation
- 5 reflection-on-action.

Crandall offers strategies for implementing the reflective practice across the medical education continuum, and provides possible advantages for this.

Al-Shehri *et al.*(35) described two roles for providers of continuing medical education in fostering self-directed experiential learning, in which reflection is core; to sustain motivation for such an approach in established practitioners and to 'devise ways of sharing individual experience which both interpret and enhance learning' (p. 251). The authors make a number of suggestions as to how these tasks may be accomplished. Westberg and Jason(55) also offer practical approaches for fostering reflection in medical education, before, during and following experience. They emphasise the importance of the learning environment in effectively fostering reflection.

Lastly, Moon(56) proposes a process of reflection to promote transfer of new learning to practice. She describes this four-phase framework in the context of continuing education workshops and short courses, wherein participants are helped to address four questions.

Transformative Learning

Mezirow's concept of transformative learning has developed over 20 years into a comprehensive and complex theory.(6,48,51) Transformative learning theory defines learning as the social process of constructing and internalising a new or revised interpretation of the meaning of one's experience as a guide to action. In other words, transformative learning involves helping adults to elaborate, create and transform their meaning schemes (beliefs, feelings, interpretations, decisions) through reflection on their content, the process by which they were learned and their premises (social context, history and consequences).(51) Transformative learning can be contrasted with conventional learning that simply elaborates the learner's existing paradigm, systems of thinking, feeling or doing, relative to the topic. Although learning is increased, the learner's fundamental structure is maintained. Transformative learning changes the learner's paradigm so radically that, although it may retain the old perspective, it is actually a new creation. Critical reflection and rational discourse are the primary processes used in learning. The core of transformative learning in Mezirow's(51) view is the uncovering of distorted assumptions or errors in learning.

Empowerment of learners is both a goal and a condition for transformative learning. An empowered learner is able to participate fully and freely in critical discourse and the resulting action. This requires freedom and equality, as well as the ability to assess evidence and engage in critical reflection.(48) Reflection is a key concept in transformative learning theory. Mezirow(51) defines it as the process of critically assessing the content, process or premises of our efforts to interpret and give meaning to an experience. He distinguishes among three types of reflection:

- *content reflection* – an examination of the content or description of a problem
- *process reflection* – examination of the problem-solving strategies being used
- *premise reflection* – questioning the problem itself, which may lead to a transformation of belief systems.

Perspective transformation may be the result of a major event in one's life, or the cumulative result of related transformations in concepts, beliefs, judgments or feelings. The most significant learning involves critical reflection around premises about oneself. This kind of learning is triggered by a disorienting dilemma that invokes self-examination and a critical assessment of assumptions. Through a process of exploring options for new roles, relationships and actions, new knowledge and skills are acquired. This leads to planning and implementing a new course of action, provisionally trying new roles, renegotiating relationships and forming new ones, and building competence and self-confidence.

Mezirow(6) explains that discourse is a crucial process, and refers to a special kind of dialogue in which the focus is on content and attempting to justify beliefs by giving and defending reasons, and by examining the evidence for and against competing viewpoints.

Transformative learning is a complicated, emotional process requiring significant knowledge and skill to implement effectively.(53) A new paradigm emerges only after the old one becomes dysfunctional, and it is the task of the transformative educator to challenge the learner's current perspective. A paradigm shift will occur only if the learner perceives the existing paradigm to be significantly inadequate in explaining his or her experience. However, the new paradigm appears only after a period of disorientation during which no clear paradigm remains. It is typical for the learner to resist letting go of the old paradigm and beginning the transition to the new one. During this process, the teacher-learner relationship may intensify enormously because the learner may begin to resent the teacher or feel anger towards him or her. Often learners feel a complex love-hate for the teacher who intentionally assisted in the collapse of their existing paradigm.

Successful transformative learning questions assumptions (this is a key to the process), provides support from others in a safe environment, provides challenge, examines alternative perspectives and provides feedback. New assumptions are tested in the authentic settings or in discussion with others.

Implications for educational practice

How can educators promote and support transformative learning? First, educators need to take a reformist perspective, rather than a subject-centred or consumer-oriented perspective.(57) In a subject-centred perspective, the educator is the expert authority figure and designer of instruction. In a consumer-oriented perspective, the educator is a facilitator and resource person. In a reformist perspective, essential to transformative learning, the educator is a co-learner and provocateur; they challenge, stimulate and provoke critical thinking.(53) Box 2.5 illustrates Cranton's(53) stages before, during and following transformative learning.

Cranton(53) provides the following guidelines for transformative educators.

- Promote rational discourse. Remember that rational discourse is a fundamental component of transformative learning and part of the process of empowering learners.
- Promote equal participation in discourse. This can be done by stimulating discussion through a provocative incident or controversial statement.
- Develop discourse procedures (e.g. stay on topic, summarise) and avoid using own position to make dismissive statements.

BOX 2.5 Stages of change in transformative learning(53)

Stage of change	Through
Initial learner development	Freedom to participate Comfort Learner decision making
Learner critical self-reflection	Questioning assumptions Consciousness raising Challenging assumptions
Transformative learning	Revision of assumptions Educator support Learner networks Action
Increased empowerment	Critical self-reflection Transformative learning Autonomy

- Develop group facilitation skills (e.g. dominant participant, silent participant).
- Encourage decision making by learners. This can be done by making the process open and explicit.
- Encourage critical self-reflection. This can be accomplished by challenging learners, asking critical questions and proposing discrepancies between learners' experiences and new or conflicting information. To be successful here, a climate of openness and supportiveness needs to be established.
- Consider individual differences among learners. Learners should be assisted in becoming more aware of their own learning styles and preferences. The educator needs to develop a strong awareness of how learners vary in the way they think, act, feel and see possibilities.
- Employ various teaching/learning strategies. Many strategies are effective, for example: role playing (with skilful debriefing), simulations and games, life histories or biographies, exposure to new knowledge, journal writing (with self or others' feedback) and critical incidents arising in the practice setting.

Self-directed Learning

Self-directed, lifelong learning (SDL) is increasingly essential in the development and maintenance of professional competence and is a hallmark of best practice.

Those responsible for professional education, including that of physicians, are challenged to create curricula that ensure the development of these skills and the evaluation methods needed to ascertain their achievement.

The literature on SDL has developed along two overlapping pathways. The first has framed self-

direction as a goal towards which individuals strive, reflecting a humanistic orientation such as that described by Maslow(58) and Brockett and Hiemstra.(59) These models imply achievement of a level of self-actualisation, along with the acceptance of personal responsibility for learning, personal autonomy and individual choice.

The second line of development has framed SDL as a method of organising learning and instruction, with the tasks of learning left primarily in the learners' control. Early development included linear models, where learners moved through a series of steps to reach their learning goals (e.g. Knowles(60)). Later models have described the self-directed learning process as more interactive, involving opportunities in the environment, the personal characteristics of learners, cognitive processes, the context of learning and opportunities to validate and confirm self-directed learning collaboratively. Examples of this are seen in several models clearly described by Merriam and Caffarella.(61) This line of development also includes models of instruction such as those of Grow(62) and Hammond and Collins,(63) which present frameworks for integrating self-directed learning into formal educational settings.

Candy(7) has clarified the field of SDL significantly, bringing educators closer to understanding the specific characteristics to identify, develop and evaluate in the self-directed learner. Candy(7) identified approximately 100 traits associated with self-direction, clustered around four dimensions:

- self-directedness, including personal autonomy
- self-management in learning
- learner control of instruction
- the independent pursuit of learning.

Self-directed learning is an integral aspect of several theoretical approaches, including the cognitive, social learning, humanist and constructivist. As noted earlier, the social learning approach views individuals as inherently self-regulating, with self-direction as a natural activity. The humanist approach views self-direction as evidence of higher levels of individual development.

The cognitive perspective recognises the need to build rich, interconnecting knowledge structures, based on existing knowledge, which allow continuing incorporation of new learning. The constructivist perspective recognises the unique personal and social construction of knowledge that occurs in different learners. Self-directed learning elements can also be seen in the ability to learn from experience through critical reflection, which allows learners to identify their personal learning needs and to be aware of, monitor and direct the growth of their knowledge, skills and expertise.

Generally, self-direction is a natural human process that can occur inside or outside of formal settings. SDL does not exclude formal activities such as lectures or

courses. It is the learner's choice of activities to meet and manage a particular learning goal that denotes self-direction. A number of factors in the learner and in the environment will affect the learner's ability to be self-directing.

- The learners' view of themselves as learners is also an influencing factor. Learners who view themselves as competent, with the skills to learn in a variety of situations, are more likely to be self-directed and independent.
- Sometimes the demands of the learning situation influence the capacity for self-direction. Where the situation demands that certain (particular) knowledge and skills are non-negotiable, or where the situation requires the learner to reproduce exactly what has been taught, the capacity for self-direction may be obscured.
- Self-direction is, to some degree, a function of subject matter mastery. As the learner builds a base of relevant knowledge and skills, the capacity to be self-directed is enhanced. This basic knowledge is held by some to be essential for effective SDL. For others who promote learning based on activation of prior knowledge, there are few learning situations where the learner is completely lacking relevant knowledge to engage a learning task.
- Much of professional learning is situated learning; that is, the learning is inseparable from the situation in which the knowledge is used. Similarly, professional knowledge and acumen become embedded in practice, and part of the professional's 'knowing-in-action'.(38) Learners may require a cognitive guide and opportunities to participate in their community of practice and the knowledge embedded in it.(60,61)
- Knowledge is also socially constructed, in that it is built from mutually understood perceptions and assumptions. Learners' participation in the social construction of knowledge through discussion and participation provides a cultural basis for their self-direction.
- Knowledge is dependent on context for its meaning, its structure in memory and its availability. Understanding and experience of a broad range of discipline-relevant contexts encourage self-direction in transferring knowledge to other appropriate contexts.

Comprehensive measures of self-directedness are few. Two scales have been used sufficiently to have achieved validation.(64,65) The Self-Directed Learning Readiness Scale (SDLRS) was developed by Gugliemino(64) as a tool to assess the degree to which people perceive themselves as possessing the skills and attitudes conventionally associated with SDL. The Oddi(65) Continuing Learning Inventory is a 26-item scale that purports to identify clusters of personality characteristics that relate to initiative and persistence

in learning over time, through a variety of learning modes.

The ability to self-assess is critical to effective self-directed learning. To properly direct one's ongoing learning, and to assess where and what learning is required, the individual must be able to assess his or her current practice with reasonable accuracy. A recent review of the self-assessment literature suggests that our current understanding of self-assessment is insufficient and that our ability to assess our own performance is limited. Eva and Regehr(66) suggest that accurate self-assessment requires a knowledge of appropriate performance, and of the criteria by which to judge it. They further suggest that several sources of information may be necessary for accurate self-assessment, including feedback from others about one's performance. It is also important to better understand the cognitive, affective and psychomotor bases of self-assessment to effectively promote the development of self-assessment capacity.

A more detailed look at self-assessment and self-regulated learning is provided elsewhere in this book.

Implications for educational practice

There are a number of important implications for curricula, teaching and learning in medical education, all of which are facilitated by the creation of a supportive learning environment where learners feel safe to ask questions and to admit to not understanding. Learners must have the opportunity to develop and practise skills that directly enhance effective SDL. These include competency at asking questions and a critical appraisal of new information.

Learners also need to acquire multiple approaches to learning, along with the ability to decide when each is appropriate. For ongoing SDL, however, *deep learning* skills,(67) which involve understanding principles and concepts, and elaborating the relationships among them, are most likely to support self-direction. Making use of learners' existing knowledge structures, and assisting them to add to and enrich those structures and understand similarities and dissimilarities, encourages the individual to understand his or her knowledge base and to identify gaps. A fundamental skill in self-direction is that of critical reflection on one's own learning and experience. Learners must practise and develop skills at reflecting on all aspects of their learning to determine additional learning needs and to set goals accordingly. Miflin *et al.*(68) describe an attempt to introduce SDL into graduate medical education in a university in Australia. Lack of clarity of what constitutes self-direction forced a reconsideration of the curriculum.

Critical to the achievement of both explicit and implicit curriculum goals is congruence between the goals and the assessment methods.(19) Assessment will invariably drive learning and give the strongest messages to learners about the real goals of the cur-

riculum. Although there are genuine attempts to do otherwise, too frequently assessment methods reward teacher-directed, fact-oriented learning, and do not reward or evaluate the learners' achievement of self-directed learning.

Experiential Learning

Kolb's experiential learning theory(8) is derived from the work of Kurt Lewin,(69) John Dewey(70) and Jean Piaget.(71) Lewin's(69) work in social psychology, group dynamics and action research concluded that learning is best achieved in an environment that considers both concrete experiences and conceptual models.

Dewey(70) constructed guidelines for programmes of experiential learning in higher education. He noted the necessity of integrating the processes of actual experience and education in learning. Piaget's(71) research regarding cognitive development processes constituted the theory of how experience is used to model intelligence. Abstract thinking, including the use of symbols, is closely linked to learners' adaptation to their environment. Thus, Kolb's experiential learning theory is a model of learning based on research in social, educational and cognitive psychology and education.

Kolb's theory can be used as a framework in interpreting and diagnosing individual learners, as well as designing learning environments.(72) Kolb's four learning environments are

- affectively oriented (feeling)
- symbolically oriented (thinking)
- perceptually oriented (watching)
- behaviourally oriented (doing).(73)

Within these environments, grasping and transforming experiences are the two constituent activities of learning tasks.(74) There are two components of the grasping phenomena: concrete experience, which filters directly through the senses, and abstract conceptualisation, which is indirect and symbolic. The transforming experience also consists of two processes: reflection and action. One, or a combination of the four activities (concrete experience, abstract conceptualisation, reflection and action) may be used in learning.(8) Learning is enhanced if students are encouraged to use all four components (see Figure 2.2).

This section explores Kolb's learning environments in more depth by presenting practical implications for planners of educational programmes, teachers and learners. Educational formats for delivering experiential learning activities are also included.

Implications for educational practice Programme planners

There are three major guideposts for directing experiential instructional activities.(75) First, experiential

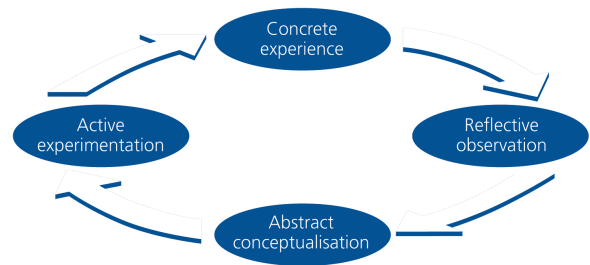


Figure 2.2 Kolb learning cycle.

learning methods and procedures are bridges connecting a learner's existing level of understanding, philosophies, affective characteristics and experiences with a new set of knowledge, abilities, beliefs and values. Second, in experiential learning the learner adopts a more assertive role in assuming responsibility for his or her own learning. This leads to a shift in the power structure from the traditional relationship between teacher and learner. Last, experiential learning involves the transfer of learning from an academic mode to one that involves more practical content.

More specifically, in the affectively oriented environment, learners experience activities as though they were professional practitioners.(8,74) The learner's present values and experience generate information. In the symbolically oriented environment, the learner uses experiences to develop skills or concepts that can provide the right answer or the best solution to a problem.(8,74) The source of information is primarily conceptual. In the perceptually oriented environment, the learner views concepts and relationships from different perspectives.(8,9)

Behaviourally oriented activities focus on specific problems or practices to which learners apply their competencies.(8,76)

Teachers

The roles and actions of teachers depend on the particular learning context.(8,76) In the affectively oriented environment they act as role models and relate to the learner as friendly advisors. They deliver information quickly and tailor it to the needs and objectives of individual learners. Teachers monitor progress by encouraging ongoing discussion and critique without constricting guidelines to inhibit students.

In the symbolically oriented environment: 'The teacher is accepted as a body of knowledge, as well as a timekeeper, taskmaster, and enforcer of events',(8) in order for the learner to reach a solution or a goal.(8,76) Success is compared against the correct or best solution by objective criteria. The teacher provides guidelines regarding terminology and rules.

In the perceptually oriented environment, teachers act as process facilitators, emphasising process rather than solution. They also direct and outline connections between discussions. Learners evaluate answers and

define concepts individually. Performance is not measured against rigid criteria but by how well learners use predetermined professional criteria.

In the behaviourally oriented environment, teachers act as mentors and reflect on their background when giving counsel. There are a few guidelines. Learners manage their own time and focus on 'doing'.(8,76) It is essential that the learner complete the task using professional standards.

Learners

In the affectively oriented environment the learner must work with people, be perceptive to encompassing values and feelings, and become engaged in a learning group in a concrete experience.

In the symbolically oriented environment learners study quantitative data to test their theories and postulations.(74,76) Using unique ideas and action plans, learners develop and conceptualise their experiences and models. This relates to the experience of abstract conceptualisation.

The perceptually oriented environment encourages the learner to analyse and manage data with an open mind.(74,76) The learner must learn to see things with a broad point of view, compose complete plans of action and conjecture about the implications of ambiguous circumstances. The learner undergoes the transformative experience of reflective observation by openly approaching the learning activity.

In the behaviourally oriented environment learners must make their own choices in order to locate and exploit potential opportunities, committing themselves to meet predetermined goals and objectives. They are encouraged to adapt to uncertainty and shifting circumstances, and to guide others. This relates to the transforming experience of active experimentation.

Caffarella(75) describes a number of formats for experiential learning activities in medical education in a variety of settings, from practical clinical environments to strictly academic arenas. Depending on the format, the teacher may form a strict regimental relationship with the learner or may foster a caring bond.

Learners along the medical educational continuum use various experiential learning methods. These may include apprenticeship, internship or practicum, mentoring, clinical supervision, on-the-job training, clinics and case study research.

Situated Learning

Situated learning belongs to those theories of learning that have a socio-cultural basis, which view learning and development as occurring via transformation through participation in community activities. Learners transform their understanding, roles and responsibilities as they participate.(9,76,77)

In contrast to some of the theoretical models already discussed, where learning is a one-sided process in which either the teacher or the learner is responsible, situated learning is about *participation*. Learning occurs through collaboration with other learners and more senior community members in carrying out activities with purposes connected explicitly with the history and current practices of the community.(78) New learners enter the community of practice and learn through a process of legitimate peripheral participation in which they perform the less vital tasks of the community. As they take on more responsibility learners move towards the centre. As they participate increasingly in the community's practice they come to understand the particular knowledge that distinguishes that community from others.

A central tenet of situated learning is then that learning occurs through social interaction. Learners acquire knowledge from talk of the community. They also learn to talk to and participate in the community. The community offers a variety of relationships and exemplars from whom to learn, including masters, more advanced apprentices and finished products. Learners learn how masters walk, talk and conduct their lives; observe what other learners are doing and what is needed to become part of the community. Through this participation they learn about the values and shared knowledge and practices of the community. They learn how people in the community 'collaborate, collude and collide, and what they enjoy, dislike, respect and admire'.(78)

For Lave and Wenger, the opportunity to learn around relationships with other apprentices and to observe the masters' (senior practitioners) practice creates the curriculum in the broadest sense. Learners can develop a view of what the whole enterprise is about, and what there is to learn. 'Engaging in practice, rather than its object, may be a condition for the effectiveness of learning'.(78)

What is the *relationship of situated learning to other learning theories*? Situated learning allows a broad view of learning that relates to several other conceptions of learning, both long-standing and more recent.

Situated learning shares with social cognitive theory(4) the view that learning occurs in a dynamic interaction between the learner and the environment. Situated learning suggests that learning is not separate from social influences. The context in which teaching and learning occur is critical to learning itself, and learning is culturally and contextually specific.(79) Learning occurs within social relations and the practices that occur there.

Situated learning also holds that some knowledge related to a task is only present in the context or location of the task. Brown *et al.*(80) described situated cognition and emphasised the idea of cognitive apprenticeship. Cognitive apprenticeship supports learning in a domain by enabling students to acquire,

develop and use cognitive tools in authentic domain activity. This happens in practice as teachers guide learners through processes of framing problems and applying disciplinary knowledge to their solution. In the process, teachers provide a scaffold for the learner's development, which can be withdrawn gradually as the learner gains more knowledge and experience.

Situated learning as described by Lave and Wenger(9) extends beyond the acquisition of concepts and structures by the individual and includes all of the learning in the learning environment. It views the community and learning opportunities as a way of structuring learning resources, with pedagogical activity (teaching) as only one resource among many.

Situated learning theory was originally a means for studying the learning that occurs through apprenticeship.(9) Traditionally, apprenticeship has been viewed as a relationship between the master or senior practitioner and the novice or learner. Through apprenticeship, the learner comes to understand the content and process of professional practice. Situated learning provides a way of understanding the process whereby apprentices acquire knowledge and skills through following and attempting to be like the master. In the situated learning model, the apprenticeship is actually to the whole community, and much of the learning occurs in the relationships between people, rather than inside the individual learner's head.

Situated learning also relates closely to notions of informal learning. According to Eraut,(81) informal learning is a significant dimension of the learning that occurs in the course of our work. He suggests that it is implicit, unintended, opportunistic and unstructured, and often occurs in the absence of a teacher. Learning about how things are done, exposure to a variety of different approaches and practical approaches to problems occur daily. There is still much to understand about it; however, the evidence that informal learning and learning from others in the workplace occurs is convincing. This is in contrast to the image of independent learners that is embedded in much of formal medical education.

Informal learning with its corollaries of implicit learning – 'the acquisition of knowledge independent of conscious attempts to learn and in the absence of explicit knowledge about what was learned'(82) – and tacit knowledge – 'that which we know but cannot tell'(83) – will be covered in more detail in the context of the medical apprentice elsewhere in this book.

Situated learning also relates to experiential learning, or learning by doing. Experiential learning has as its goal the integration of conceptual models and concrete experience,(8) and of actual experience and education. Again, situated learning extends the concept to include the experiential learning as occurring within a context. It also extends the notion of experiential learn-

ing beyond the individual learner, as it views the learner as contributing to, and participating in, the shared experience of the community.

In addition to all the above theoretical relationships, situated learning is entirely in keeping with constructivism. Constructivism views learning as a process of active participation in problem solving and critical thinking. Through these processes, learners construct their own knowledge and understanding of the world based on their previous knowledge and experience. Knowledge is integrated into previously existing concepts and schemata, which gradually become richer and more connected.

Postmodern constructivist approaches do not view the locus of knowledge as in the individual. Rather they view learning as a social constructivist process. Learning and understanding are social; cultural activities and tools are essential to conceptual development that will allow learners to develop the skills and standards that are valued by the community.(79) In the context of situated learning, knowledge may be constructed not only individually, but jointly by communities and the individuals who are members.

Implications for educational practice

Situated learning is relevant to medical education in many ways and at all levels of the continuum of education. Apprenticeship remains a pervasive teaching and learning method in physician learning. Learners in undergraduate and postgraduate medical education programmes are assigned to various clinical and community sites where they are immersed, to a greater or lesser degree, in the work of the community, performing minor tasks and striving to learn from the more advanced learners and mentors in the community.

Increasingly, medical and health professional educations are recognised as a process of professional socialisation. Hafferty and Franks (84) articulated the notion of three levels of curriculum as including formal, informal and hidden. The *formal curriculum* represents that which is stated. The *informal curriculum* may include both explicit and serendipitous goals, and is found in the interaction between teachers and learners, and clinical environments, other students, personal interests and goals. Part of the informal curriculum may also be what Hafferty termed the *hidden curriculum*, which may be seen in the practices and routines of the community, particularly in relation to coping and thriving. The hidden curriculum often teaches values and moral judgements, and may be found especially in the institutional policies, language, assessment strategies and allocation of resources of an institution. Clearly, these curricula all exist and are enacted in the context of situated learning in medicine. Not all messages of the hidden curriculum are negative. Both negative and positive aspects have been described. Often these are unintentionally imparted through actions, discussions and relationships among

members of the community. This relates the notion of situated learning closely to role modelling, as the senior members of the community enact through their behaviours, both tacitly and explicitly, how problems of the discipline are approached, how colleagues are regarded and how knowledge is built.

When learners are involved in clinical placements, participation in the actual daily round of activities is important in enhancing the effectiveness of their learning. Clearly, the longer the engagement in a community, the greater the opportunity to participate meaningfully. Where attachments are short, learners may remain at the periphery and feel little participation in the community. Special attention may be needed to identify how their participation can be secured and enhanced.

Faculty (teachers) enact several roles concurrently. As in the perspective of social learning theory, they are modelling skills, knowledge, values and attitudes that learners observe, along with how those actions are received in the community.

Beyond role modelling, faculty are also demonstrating how knowledge is built, understood and how practices evolve. This aspect of talk offers both challenges and advantages.

Learners who participate in and listen to the talk of the community are able to learn in a contextualised way. However, the nature and content of the talk become important considerations. As teachers, we need to be mindful of our talk, and open to reflecting on it with learners. Learning through observation is also vulnerable to misunderstanding, as learners will interpret what they observe in light of their current experience and understanding.(85) It is important to find opportunities and demonstrate willingness to discuss and reflect on experience with learners.

Participation in the work of the clinical site or community is a key to this understanding of learning. Situated learning suggests that all members of the community are involved. In the case of medical education this means that more senior learners and other health professionals can all enhance the learners' participation.

Different fields of medicine have distinct knowledge and skill bases. However, there will still be some aspects that are common to all, including communication with patients, ethical approaches and grounding of actions, basic clinical skills, etc., in which learners can participate across their fields of experience. As faculty, we need to think carefully about how we can promote participation among learners.

Building on the advantage of situated learning, we have the opportunity to rethink our students' experience and consider all the ways we have available to promote their learning. However, this involves thinking of learners as part of our learning environment, rather than as temporary adjuncts to it.

Communities of Practice

Lave and Wenger(9) first proposed the term *community of practice* (CoP) to capture the importance of activity in integrating individuals within a community, and of a community in legitimising individual practices. Within this context, they described a trajectory in which learners move from legitimate peripheral participant to full participation in the CoP. The concept of legitimate peripheral participation means that access to a CoP, its resources and activities provides a means for newcomers to learn through observation and gradually deepen their relationship to the CoP. Barab *et al.*(86) defined a CoP as 'a persistent, sustaining social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise'.

Wenger(10) proposed three constituent parts of a CoP: *mutual engagement*, *joint enterprise* and a *shared repertoire*. Mutual engagement involves both work-related and socio-cultural activities, achieved by interaction, shared tasks and opportunities for peripheral participation. Joint enterprise refers to the need for the group to respond to a mandate for itself, and not simply an external mandate. Finally, a shared repertoire involves the 'routines, words, tools, ways of doing things, stories, gestures, symbols, genres, actions or concepts that the community has adopted in the course of its existence'.(10) Wenger(10) summarised his conceptual framework for a social theory of learning comprising four components that are 'deeply interconnected and mutually defining'. All of these should be present in a true CoP. The components include the following:

- *Meaning* – learning as experience. Members talk about their experience and create shared meaning.
- *Practice* – learning as doing. Members talk about the shared ideas and resources that can sustain action.
- *Community* – learning as belonging. Members talk about the community process and how they are learning and developing competence.
- *Identity* – learning as becoming. Members talk about how learning changes who they are.

Therefore, we can see that the concept of a CoP is complex and multidimensional, serving multiple purposes both for individuals and the subcommunities that participate in the full community.

The primary purpose of CoPs is knowledge translation. Knowledge translation has been defined as 'the exchange, synthesis and ethically sound application of knowledge – within a complex system of interactions among researchers and users – to accelerate the capture of the benefits of research ... through improved health, more effective services and products, and a strengthened health care system'(87) .

More recently, other terms have been proposed for essentially the same broad concept. These terms include knowledge mobilisation,(88) knowledge utili-

sation,(89) knowledge exchange,(90) knowledge management(91) and knowledge brokering,(92) all of which involve an active exchange of information among various stakeholders, such as researchers, healthcare providers, policy makers, administrators, private sector organisations, patient groups and the general public. Partnerships are at the heart of all knowledge translation activity,(87) and effective knowledge translation is dependent on meaningful exchanges among network members for the purpose of using the most timely and relevant evidence-based, or experience-based, information for practice or decision making.

In the field of continuing medical education, the limitations of traditional workshop/presentation models are becoming apparent.(93) It is now recognised that there is a need for continuous learning to occur in the context of the workplace, and for reflection-in-practice and reflection-on-practice to be supported.(5) Knowledge translation is essential to shortening the path from evidence to application of that evidence in practice, and CoPs provide an opportunity to embed learning within a clinical context. A highly effective way to learn about complex issues is through experience, application and discussion with mentors and peers in the same or similar contexts. Relevant learning occurs when the participants in the CoP raise questions or perceive a need for new knowledge. Using Internet technology enables these discussions to occur in a timely manner, and records of these can be archived for later review or by those who missed the discussion.

There are a number of key factors that influence the development, functioning and maintenance of CoPs.(94) The legitimacy of the initial membership is important. Commitment to the desired goals of the CoP, relevance to members and enthusiasm about the potential of the CoP to have an impact on practice are also key. On the practical side, a strong infrastructure and resources, such as good information technology, useful library resources, databases and human support, are essential attributes.

Skill in accessing and appraising the knowledge sources is important, as is the skill in bridging this knowledge to practice. Providing the above-mentioned key factors requires strong, committed and flexible leaders who can help guide the natural evolution of the CoP. If professional learning is to flourish, it is critical that a blame-free culture is established in which community members can learn from positive and negative experiences.(95)

Some writers have outlined some key questions to address in establishing a CoP.(96)

- How will the community be formed and evolve?
- How and when will members join?
- What do members do and how will they interact?
- How will the CoP be supported by the members' organisation(s)?

- What value will members and their organisations receive?

Others have suggested principles for cultivating CoPs.(97) CoPs are dynamic entities and need to be designed for adaptability and large growth. They should combine the perspectives of both insider members and outsider participants, and all members should be valued regardless of their level of participation. Both public and private spaces are necessary and need to be related. A critical principle is that the CoP must provide value to its members, otherwise participation will be minimal or absent. Although familiarity is important, challenge and excitement need to be provided to keep the energy high. Finally, CoPs have a rhythm they need to settle into, one that works for its members (*see* Box 2.6).

Virtual communities of practice

Virtual (online) communities play a socialisation role to the same extent as real communities do.(98) The theoretical foundation of virtual communities is based on social cognitive theory and situated learning. Henri and Pudelko(98) have proposed three components of the social context of activity in virtual communities – the goal of the community, the methods of initial group creation, and the temporal evolution of both the goals and the methods of the group – leading to the development of four different types of community. Figure 2.3 illustrates that a CoP requires a highly cohesive group with a clear goal.

Box 2.7 dissects the characteristics of these four types of community further. It demonstrates that although many types of virtual community can exist, they may not be true CoPs. The virtual CoP generally arises from an existing, face-to-face CoP in which professional practice is developed through sharing

BOX 2.6 Factors for success of a community of practice

Lave and Wenger(9) suggest that the success of community of practice depends on five factors:

- the existence and sharing by the community of a common goal
- the existence and use of knowledge to achieve that goal
- the nature and importance of relationships formed among community members
- the relationships between the community and those outside it
- the relationship between the work of the community and the value of the activity

Wenger(10) later added the idea that achieving the shared goals of the community requires a shared repertoire of common resources, e.g. language, stories and practices.

knowledge among members. Through this interaction, new practices may be developed and identification with the community can occur.

Some writers have distinguished ‘soft’ from ‘hard’ knowledge.(99) Soft knowledge can be gathered in a domain through sharing solutions to a particularly difficult problem, describing idiosyncrasies of particular tools, equipment or processes, and recounting and reflecting on challenging events (i.e. recounting war stories). This refers to the implicit or tacit knowledge in a domain. CoPs are central to the creation and maintenance of soft knowledge. Hard knowledge, in contrast, is stored in databases and documents. It is highly explicit and codified. A key question is whether a virtual CoP can effectively share soft knowledge, which tends to be situated in specific contexts. This is a question that requires further research.

Virtual CoPs are a recent phenomenon, and studies on their effectiveness to enhance learning have not yet

been carried out. Parboosingh(100) advocates conducting evaluation studies that focus on how the CoP takes advantage of the technology, rather than how the technology affects the CoP.

Implications for educational practice

This chapter integrates the concepts of knowledge translation and CoPs. These ideas have many obvious applications in the medical education arena, and a number of these CoPs are emerging in various specialties. The application outlined in this section is a CoP for palliative care practitioners and students. This is an excellent application because palliative care is a truly interdisciplinary field that involves subcommunities of various specialties, including oncologists, family physicians, nurses and social workers. These subcommunities need to interact in CoPs, but the various professional groups also need to interact with each other around specific topics and cases. This provides an excellent model for continuing medical education, and also provides an environment for training residents, interns and medical students. Since many participants are acquiring and applying new knowledge in this field, scaffolding learners through an evolving continuum from simulation to participation to codetermined interactions is an effective instructional approach.(101) For example, family physicians, residents and nurses who have trained with oncology specialists may begin with simulated cases. They then learn to participate in real cases supported by learning materials and/or clinicians until they are able to operate as full participants. The scaffolding process proposed here uses a staged approach for bridging from a learner (knowledge) identity to a participant (practitioner) identity. This approach is consistent with the constructivist(102) view of learning that espouses the learner as central in the educational process. The advantages of the situated learning

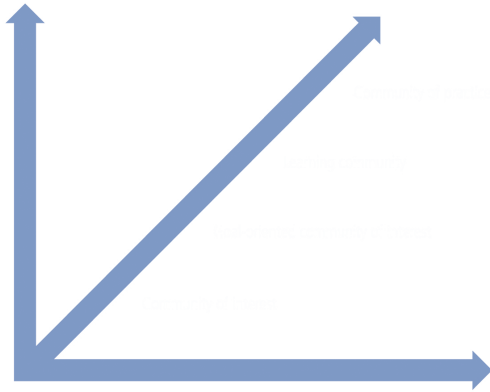


Figure 2.3 Different forms of virtual communities of practice according to their context of emergence. Adapted from Henri and Pudelko(98) (p. 476).

BOX 2.7 Principal descriptors of the four types of virtual communities (adapted from Henri and Pudelko)(98, p. 485)

	Community of interest	Goal-oriented community	Learning community	Community of practice
Purpose	Gathering around a common topic of interest	Created to carry out a specific task	Pedagogical activity proposed by the instructor	Stems from an existing, real community
Activity	Information exchange	Sharing of diverse perspectives and production of objects commissioned by the mandate	Participation in discussions of collective topics	Professional practice development through sharing knowledge among members
Learning	Knowledge construction for individual use	Knowledge construction from diverse knowledge systems towards collective use	Knowledge construction by carrying out social situated activities	Appropriation of new practices and development of involvement

approach over the traditional didactic approach are discussed above in the section on situated learning.

A CoP implemented in a community-based learning environment could include specialist and non-specialist practitioners in palliative care, as well as residents and medical students (clerks). It would aspire to achieve a number of different aims, based on the challenges by Richardson and Cooper.(103)

- Engage all trainees in a research culture (i.e. encourage evidence-based practice).
- Provide an opportunity for participants to identify with their peers and supervisors.
- Encourage cross-site discussion to explore shared theory, methodological and practical issues.
- Provide a forum for discussion and a recognised channel for communication and collaboration.
- Facilitate high-quality supervision to ensure adequate access to teaching and learning for all practitioners.
- Foster scholarly interaction and good supervisory practice to stimulate dialogue among students and supervisors across sites.

We are asserting that linking medical students, their community preceptors and medical school specialists in an online CoP can greatly enhance the learning and practice experience of all participants. A recent study(104) demonstrated that students assigned to community practices for their paediatric clerkship perform as well as, or better than, students assigned to academic medical centres in written examinations. An online CoP approach can build on this positive finding and perhaps provide an even more effective community experience for medical students. A side benefit could be the improvement in teaching and supervisory methods used by their preceptors.

Connections

In this paper, we have presented eight theoretical approaches to learning, each of which has the potential to inform our practice as educators. For each theoretical approach we have set out the underlying framework and principles and provided examples of its application. The application of educational theory to practice has always been somewhat eclectic. This is not unusual in applied sciences such as education. To make this exposition of theory as useful as possible to our educational practice, it is helpful to consider the relationships among the theoretical frameworks, and the consistency of messages and themes that can be drawn from all of them to inform teaching and learning. Some of these common themes are presented here.

All theoretical frameworks view the learner as an active contributor in the learning process. In each of the theoretical approaches discussed here the learner actively interacts with a changing, complex environment. The curriculum can no longer be viewed as something that

is transmitted to, or acts upon, the students, be they undergraduate, postgraduate or practising physicians. There is an important element of human agency. Moreover, in practice, the physician-learner is stimulated to learn through interactions in the practice environment.

The entire context of learning is more important than any one variable alone. The learning environment is complex. It includes learners, faculty, patients, colleagues, resources and other workers. It is both the interacting and the independent effect of all these variables that result in the learning environment, whatever the level of learner. Learning is accomplished both through direct experience and vicariously, and from many interactions in this complex system. Consequently, we must analyse as many factors in the environment as possible when planning, implementing and evaluating our educational programmes. In learning from practice, physicians solve complex problems that occur in the environment of the patient, family, physician and community. All of these influence the effectiveness, nature and outcomes of learning.

Learning is integrally related to the solution and understanding of real-life problems. For adult learners, learning is most effective and motivating when it is relevant to the solution of real-life needs or problems. This is obvious in the learning that occurs in reflective practice, where the new learning is triggered by the surprise encountered in a problem in practice. Experiential learning in real-life problems leads to ongoing mastery and competence. Similarly, learning around clinical problems, both in the clinic and in the classroom, represents learning to solve the authentic tasks of the profession and of future professional practice.

Individuals' past experience and knowledge are critical in learning, in actions and in acquiring new knowledge. At all levels, learning must be connected to relevant experience, or compatible with the learner's existing knowledge. Past experience and knowledge will affect perceptions of self-efficacy, which will, in turn, affect the choice of new experiences and goals. Learners' past experience is important in providing a framework for acquisition of new knowledge. In practice, the new learning opportunities identified will depend substantially on the individual's existing experience and knowledge.

Learners' values, attitudes and beliefs influence their learning and actions, and building learners' self-awareness in this area is important for their development. These values, attitudes and beliefs are central to learners' willingness to attempt new actions. They affect virtually everything that learners think, as well as their interactions with mentors, peers and patients. Various processes exist to modify these, such as reflective observation, perspective transformation, role modelling and feedback on action.

Individuals as learners are capable of self-regulation, that is, of setting goals, planning strategies and evaluating their

progress. Adult learners are viewed as self-motivated and directed, pursuing those learning objectives relevant to personal goals. They are inherently self-regulating, and the process of reflection implies a learning that arises directly out of experience. In planning learning experiences we must regard these not as skills we have to teach students, but as skills and abilities that need to be developed and enhanced.

The ability to reflect on one's practice (performance) is critical to lifelong, self-directed learning. At the heart of all these theoretical approaches is the belief that we can learn from our experience, incorporating it into our existing knowledge and skills. This opportunity for reflection requires an early introduction to a systematic approach to facilitate reflection. Reflection is not merely description of experience, but analysis of it. It is not a natural and intuitive ability, and it must be developed through practice. It is critical to becoming an effective lifelong learner, as it also enables learners to develop and apply standards to their performance, decide what further learning needs to occur, and continue their learning over a professional lifetime.

Applying these theories to medical education requires practice. Medical educators need to acquire and study relevant literature to better understand these theories, and to participate in a community of peers who have a common interest in this area. Through the process of practising the application of each theory, receiving feedback from learners and peer observers, and reflecting-on-practice, medical educators will continue to improve in their teaching role.

Acknowledgement

We would like to acknowledge Dr Penny Jennett in the Faculty of Medicine of the University of Calgary for her co-authorship of a previous ASME monograph on which this chapter is based.

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