Learning and cognition

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The concepts of cognition and learning

The concept of cognition has always had a central position in psychology and not least in relation to the psychology of learning. Cognition is a broad term including everything that has to do with knowledge, thinking, reason and understanding, and is traditionally placed in opposition to the other elements of the mind: the affective, which has to do with feelings and emotions, and the conative, which has to do with volition (e.g. Hilgard, 1980).

Linguistically the word comes from the Latin, cognitus, which means knowledge in a broad sense. Thus, the famous statement by the French philosopher René Descartes (1596–1660), cogito, ergo sum (1967 [1637]), is usually translated into ‘I think, therefore I am’. But this translation has often been disputed and, according to the well-known Norwegian historian of philosophy Arne Næss (1912–2009), cogito in this connection rather means ‘I experience’ or ‘I am somewhat aware’ (Næss, 1963 [1962]: 143). This is not unimportant in the present connection, partly because it indicates that cognition in relation to learning can be much more than just the acquisition of knowledge – in modern terms it is ultimately about making meaning of what we experience (Bruner, 1990; Mezirow, 2000), and partly because the statement of Descartes is often regarded as the foundation of the separation between the mental and the bodily, which for centuries has been so significant in Western philosophy and mentality and has, among many other things, derailed and confused the basic understanding of human learning by also separating the cognitive from the social and the emotional. I shall return to this in the following.

As to the understanding of ‘learning’, there are also many and widely differing understandings. I shall here stick to the very comprehensive definition that learning is ‘any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing’ (Illeris, 2007: 3). This implies, among other things, that such processes as socialization, qualification, competence development and therapy are regarded as special types of learning processes or as special angles for perceiving learning.

Early learning research and behaviourism

Originally, learning research and learning theory were concentrated on very simple learning processes, and there was an underlying idea that a kind of learning mechanism could be discovered
which would be the basic unit or ‘atom’ of all learning (Madsen, 1967: 64ff). The conception of learning was also limited to the cognitive field, including simple processes that can hardly be called anything but basic, especially when the learning of animals was studied. Two early examples, in brief, are as follows:

- First, at the end of the nineteenth century the German learning researcher Hermann Ebbinghaus (1850–1909) studied the learning of meaningless syllables such as nug, mok, ket, rop, etc., because such learning could be measured exactly and any distorting influence from the meaning of the learning content could be avoided (Ebbinghaus, 1964 [1885]). Today, this must be regarded as a derailment, as precisely the meaning of what is learnt is seen as a crucial quality.

- Second, during the early years of the twentieth century the Russian physiologist and Nobel Prize winner Ivan Pavlov (1849–1936) studied how a dog could learn by conditioning: he let a bell ring immediately before the dog was fed, and soon he could observe that it started to produce saliva whenever the bell rang. Later he performed a lot of experiments about the effects of various conditions in this connection (Pavlov, 1927).

Then, in 1913 the American John Watson (1878–1958) introduced the approach of behaviourism (Watson, 1930), which became dominant, especially in American and British learning psychology, right up to the 1980s. This implied that the study of learning was concentrated very much on cognitive and rather simple learning processes. Most important were probably the contributions of Edward Lee Thorndike (1874–1949) about trial-and-error learning, which led to the ‘law-of-effect’, stating that reactions implying a satisfying effect will be learned (Thorndike, 1931), and of B.F. Skinner (1904–90), who exceeded the cognitive domain by claiming that all learning is conditioned, including the learning of capacities such as independence and creativity, and that education should therefore be practised as teaching technology (Skinner, 1968: 1971).

Other classical cognitive learning approaches

However, parallel to the behaviourist dominance in the English-speaking countries, other and much broader approaches to cognitive learning were developed elsewhere. In Germany the Gestalt psychology, claiming that the mind is an indivisible whole, focused on learning as the acquisition of insight and pointed to problem solving as the way to do so (Köhler, 1925 [1917]; Duncker, 1945 [1935]) – the approach that Kurt Lewin (1890–1947) later developed into his ‘field theory’, experimental social psychology and the ‘T-groups’ (training groups) as a method to promote social learning (Lewin, 1976).

Of the greatest importance were, however, the two approaches that were made respectively by the Swiss biologist and epistemologist Jean Piaget (1896–1980) and the Russian psychologist Lev Vygotsky (1896–1934) and others of the so-called cultural historical school. Both these approaches are in their essence truly cognitive, although they also both clearly indicate that emotional and motivational factors play an important role in learning, and a collection of lectures by Piaget on this topic has been published in English since his death (Piaget, 1981).

Piaget is best known for his work on the development through several stages of intelligence in the child, but, in relation to learning, his understanding of assimilation and accommodation as two collaborating and equilibrating ways of learning (Piaget, 1952 [1936]) has been a very fruitful contribution to which I shall return later. Another important insight by Piaget was that all learning happens by new impulses being related to the results of prior learning in a way that changes both (which has later been further elaborated by the American David Ausuble: ‘The most important single factor influencing learning is what the learner already knows’ – Ausuble, 1968: vi).
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The Russian cultural historical approach emphasizes that mankind’s fundamental psychological structures have developed in interaction with the development of culture, and that the human capacity of learning and ‘higher psychological functions’ can only be understood in this perspective. The most important kinds of cultural activity are play, learning and labour and they are all dependent on our abilities to think and to speak (Leontjev, 1981 [1959]).

Vygotsky’s conception of learning is mainly related to children’s learning in school and problem solving guided by adults or more capable peers. In this connection, special attention is given to what he called learning in ‘the zone of proximal development’, indicating that teachers lead their activities into the zone where such developmental learning can take place (Vygotsky, 1978, 1986 [1934]). This approach has later been further elaborated by American researchers such as Michael Cole (1996): who has emphasized that this kind of learning should be ‘a dialogue between the child and his future […] not between the child and an adult’s past’ (Griffin and Cole, 1984: 62) – and not least by Finnish Yrjö Engeström, who has transferred the ideas into adult and workplace learning (Engeström, 1987, 2009).

Both Piaget’s and the cultural historical approaches referred to learning in general, but were certainly predominantly thought and used in relation to the cognitive dimension of learning and may still be said to be the two most important contributions to the understanding of cognitive learning.

Newer cognitive approaches

During the 1960s and 1970s the above-mentioned approaches, and especially those of Piaget and Vygotsky, began to achieve influence in the USA and, together with influence from the new computer technology, this led to what has been called ‘the cognitive revolution’, which gradually reduced the influence of behaviourism. On the one hand, this resulted in the emergence of ‘cognitive science’, which treated learning and thinking as information processing and celebrated artificial intelligence (e.g. Calvo and Gomila, 2008) – but this trend has by and large disappeared because of its inability to include such human capabilities as intention and meaning making (Dreyfus and Dreyfus, 1986). On the other hand, it released a new wave of approaches to cognitive learning.

A first name to mention in this connection is that of the American psychologist Jerome Bruner. Right back in the 1940s he started his long career with cognitive studies that increasingly challenged traditional behaviourism. Later he was a central figure in relation to the so-called science-centred curriculum, which was a response to the ‘sputnik-shock’ in 1957 when the Russians sent the first satellite into space. In 1990 he published the book Acts of Meaning, which, in open opposition to behaviourism, introduced meaning as a central element of human learning and understanding. And in 1996 his publication of The Culture of Education was a clear dissociation from both behaviourism and cognitive science and a devoted pleading for the understanding of learning as a human and cultural process reaching far beyond the cognitive area (Bruner, 1990, 1996).

Another American psychologist to mention here is David Kolb. In his Experiential Learning from 1984 he takes his point of departure from the ‘founding fathers’, John Dewey, Piaget and Lewin, and comes to the conclusion that all learning is experiential and follows a specific circular pattern from concrete experience via reflective observation and abstract conceptualization to active experimentation and then back to new concrete experience (Kolb, 1984). Although this learning cycle is rather rigid in relation to the diversity of human learning, and once again predominantly is thought and used in relation to the cognitive area, Kolb’s thinking was, no doubt, an important contribution to the establishment of a more differentiated understanding of learning.

The organizational learning theory of the American psychologists Chris Argyris and Donald Schön (1930–97) is also relevant in this connection, especially because of the distinction between single-loop learning, which remains within, and double-loop learning, which exceeds the existing frames of understanding (Argyris and Schön, 1978, 1996), and further for Schön’s exploration of ‘the reflective
practitioner’ and ‘reflection-in-action’ (Schön, 1983, 1987). These are all contributions that help to understand cognitive learning in working life.

Finally, the work of the American psychologist Jack Mezirow on transformative learning is mainly cognitive as it is about changes in meaning structures, meaning perspectives and habits of mind (Mezirow, 1978, 1991, 2000).

**Personal development – crossing the boundaries of cognitive learning**

Whereas all the approaches mentioned up till now have been totally or predominantly cognitive in their content and perspectives, the most important development in the understanding of human learning since about 1990 has been that learning is never and by no means only a cognitive matter – which implies that pure cognitive learning does not take place in normal human beings and that cognitive learning theories deal only with a special side of human learning. This has, since the middle of the twentieth century, been claimed by a few learning theorists, but during the last two decades this understanding has rapidly gained ground and has also been clearly confirmed by modern brain research (especially Damasio, 1994). Thus, the concept of cognitive learning is a kind of illusion – as it must also somehow have appeared to the famous German philosopher Immanuel Kant (1724–1804), as he wrote his *Critique of Pure Reason* in 1781 (Kant, 2002 [1781]).

Actually, the first researcher who discovered this in practice can be said to be Sigmund Freud (1856–1939), who as early as 1895 described the phenomenon of ‘catharsis’, which is the mental breakthrough that can take place in psychoanalysis and psychotherapy (Freud and Breuer, 1956 [1895]). But Freud and his age did not think of this as learning and certainly not cognition – although it is firmly within the definition of learning that is used in this chapter.

However, half a century later another psychotherapist, the American Carl Rogers (1902–87), realized this connection and developed the concept of ‘significant learning’ for such learning that involves a change in the organization of the self (Rogers, 1951, 1969). Rogers also launched the issue of ‘encounter groups’, a special shaping of Lewin’s ‘T-groups’, to promote significant learning and personal development (Rogers 1970). This strongly helped to see personal development as a kind of learning, which of course includes the cognitive dimension, but only as a part of a much wider totality.

Another contribution in this direction was delivered at the same time by the German-American psychoanalyst Erik H. Erikson (1902–94), who described the life course as a succession of stages connected by crises-like transitions, which can also be interpreted as periods of intensive personal learning (Erikson 1968: 1994).

**The social dimension of learning**

However, seeing personal development as a kind of learning did not at this time really affect the conception of learning as a cognitive matter, probably because these ideas were so different; the serious challenge came when learning began also to be considered to have important and specific social and emotional dimensions.

The concept of social learning was first established in earnest by the American social psychologist Albert Bandura in the 1960s. It primarily concerned model learning and learning through imitation – phenomena that had often been dealt with before, not least by Piaget (1951 [1945]) – which Bandura and his work associates studied in a traditional behaviouristic fashion (Bandura and Walters, 1963; Bandura, 1977), which implied certain limitations.

A quite different approach at the same time was the sociological theories of socialization, which is the process through which the individual acquires current societal norms and structures, thus becoming
part of the society in question. This was primarily taken up by the German-American ‘Frankfurt School’ which combined a Freudian and a Marxist approach into what was called ‘Critical Theory’. Important names from this school are Max Horkheimer (1895–1973), Theodor Adorno (1903–69), Herbert Marcuse (1898–1979) and Jürgen Habermas, but, in relation to socialization learning, the later branch-off in Hanover became more important, especially through the works of Peter Brückner (1922–82), Alfred Lorenzer (1922–2002), Oskar Negt, Thomas Leithäuser and Thomas Ziehe. The central issue in all this is that the young generation mainly unconsciously comes to learn the culture and forms of consciousness and also cognition of its society, but at the same time develops defence and resistance towards societal elements which it dislikes (Brückner, 1972; Lorenzer, 1972; Negt, 1971; Leithäuser, 1976, 1998; Ziehe 2009).

However, the real breakthrough of the understanding of all learning having a social dimension was not established until the early 1990s. Most significant was the claim in 1991 by the American anthropologist Jean Lave and the Swiss-American computer scientist Etienne Wenger that all learning is ‘situated’: it takes place in a specific situation and this situation does not only influence the learning but actually is part of it (Lave and Wenger, 1991), and later the book by Wenger on Communities of Practice (Wenger, 1998).

The broader movement of ‘social constructionism’ also strongly advocated the social inbeddedness of psychological processes, sometimes so strongly that the individual nature of the processes was denied (Gergen, 1991, 1994; Burr 1995). Also the biographical approach, seeing learning in the perspective of the personal life story, should be mentioned in this connection (Alheit, 1994, 2009).

The emotional dimension of learning

To some extent the emotional dimension was included in the personal development approach to learning, but this was not in any way emphasized or set out explicitly. It has also already been mentioned that both Piaget and Vygotsky pointed to this dimension without really integrating it in their predominantly cognitive theories. So when the Briton John Heron in 1992 launched this approach in his Feeling and Personhood it was certainly received as Psychology in Another Key as it was termed in the subtitle of his book.

However, a more widespread acceptance of viewing the emotional as part of learning in general was in the following years probably promoted to a higher extent by the American Daniel Goleman’s more popular book on Emotional Intelligence (Goleman, 1995) and, as already mentioned, new discoveries and understandings from the rapidly expanding area of brain research (Damasio, 1994).

Finally, it should be mentioned here that the first publication to give the social and the emotional a position that is fully equal to the cognitive was my own, The Three Dimensions of Learning (Illeris, 2002 [1999]). Other contemporary authors who, more indirectly, include the non-cognitive dimensions as general features of human learning are the American Robert Kegan (1994, 2009 [2000]) and the Briton Peter Jarvis (2006, 2009).

Cognitive learning as an integrated learning dimension

Thus, the development of the understanding of human learning has during the latest decades gradually led to an overall conception that all learning includes three dimensions – the cognitive or content dimension, the emotional or incentive dimension, and the social or interaction dimension – which are equal in the sense that each of them always play a role and no full understanding, analysis or planning of learning processes can omit any of these dimensions (Illeris, 2002, 2007, 2009). This can be illustrated by the ‘learning triangle’.
The two double arrows inside the triangle depict the two different processes that are involved in any learning. The vertical double arrow shows the interaction process between the individual and what is exposed or happening in his or her environment. This process is going on all the time when we are awake, and whenever something that is new to the individual turns up there is a possibility of learning. However, learning only takes place if there is also an active process of acquisition going on, as in the figure depicted by the horizontal double arrow. This acquisition takes place in the individual’s brain and central nervous system and includes two poles or elements: the content and the incentive. The content may be identical with the cognitive, but may also include skills and personality qualities. It is obvious that any learning must have a content, as to learn without learning something is nonsense. But neither can it be imagined that there can be any learning without an incentive in the form of a mobilization of mental energy. All mental processes demand energy, and modern brain research has estimated that we spend about 20 per cent of our energy supply on such processes (Andreasen, 2005). This mobilization is fundamentally emotional and, in relation to learning, usually referred to as motivation.

Figure 2.1 The three dimensions of learning
These fundamental features constitute the three learning dimensions as in the figure depicted by the learning triangle, and learning always takes place in a specific place and situation, which are finally societally constituted and in the figure depicted by the outer circle.

Seen in relation to cognition, the figure indicates that the cognitive element or dimension of learning is always part of a more complex structure, which also includes the emotional and the social, or, to be more precise, that the acquisition of cognitive learning content, such as knowledge, recognition, understanding or insight, is always integrated with and dependent on the learner’s active interaction with the environment and mobilization of an incentive to drive the process. So both the learning process and the result or outcome always include all these three dimensions. For example, an unclear interaction and/or an ambivalent or unengaged incentive will tend to lead to an imprecise or week learning outcome which can only be recalled in situations that are strongly resembling the learning situation, and if it is not reinforced it will soon be blurred or forgotten.

**The types of learning**

As illustrated above, it is ultimately not possible or appropriate to speak in isolation of cognitive, emotional or social learning, as all learning to some extent includes all of these. This insight is especially important in relation to schools and education, as learning in these institutions is very often thought and spoken of only in terms of the cognitive, academic or professional content. This then leads in the direction of a one-sided focus on what is or should be learnt at the expense of how it is learnt and of which engagement or motivation is involved, and thereby of the learning quality, which may be seen in relation to when the learning can be recalled, what it can be used for and how soon it will be forgotten.

However, a quite different and more relevant kind of learning can be established by taking as the point of departure how the new elements are connected to what has already been acquired, i.e. to the mental schemes that are the results of prior learning and always include all three learning dimensions. This was actually the approach that was introduced by Jean Piaget who, as already mentioned, was the first to realize that new learning is always acquired or taken in by relating it to what has already been learnt, in which process both the old and the new are changed (e.g. Piaget, 1952 [1936]). Piaget distinguished between assimilative and accommodative learning, but later contributions have made it possible to divide each of these into two, which makes four learning types, of which the two first may be understood as learning by addition and the two last as learning by reconstruction (Illeris, 2007).

The first learning type in this typology was pointed out by the Danish psychologist Thomas Nissen, who named it ‘cumulation’ (Nissen, 1970). This is learning that starts up a new mental scheme because the content cannot be related to any existing scheme. This happens quite often in our first years, but already by the age of two it becomes more scarce and after the age of about six years it is used only when we have to learn something by heart, e.g. a pin code. Cumulation is the kind of learning that we use for training animals and which was in the early days of behaviourism studied as simple conditioning. The main character of what is learnt in this way is that it can only be recalled in situations that subjectively are experienced as identical with the original learning situation.

After this comes ‘assimilation’ as the learning type that we use in usual everyday learning and also in most school learning and training. This takes place simply by adding a new element to an already existing mental scheme; it is not very demanding, and we all do it again and again by noticing what is new in a situation, finding a subjectively relevant existing scheme and elaborating the new element into this scheme.

The learning type that Piaget termed ‘accommodation’ is only commanded by humans and in very limited forms by the most developed animals. We use it whenever we are confronted with information or come into situations in which we cannot subjectively immediately relate or add what we experience to any existing scheme. In such cases we have the possibility to break down (part of) one or more schemes and reconstruct them such that the new impulses can fit in. This results in qualitatively new learning; we so to
speak exceed our own boundaries and acquire a new understanding or way of behaving or experiencing. In traditional German psychology this was termed an ‘aha-experience’, and it often implies a feeling of relief. But it also demands much more mental energy than assimilation, and we therefore tend to only mobilize for this type of learning when we are really engaged. If not, we have the possibility of just avoiding learning or make a ‘distorted assimilation’ by reducing the new into something that is already known or familiar, a matter of course or a prejudice.

Finally, we can learn by ‘transformation’, which is actually precisely what Carl Rogers described as significant learning. This implies the reconstruction of several schemes, including the scheme of our self or identity. It has also been termed by Yrjö Engeström expansive learning (Engeström, 1987) and by Alheit transitory learning (Alheit, 1994) – whereas Mezirow’s term of transformative learning is not always transformational in this sense, because it need not involve the self. Anyway, it is a very demanding kind of learning that we only resort to when we can find no other way out of a locked situation or position. But it is worth noticing that, as society becomes ever more complex and its changes ever more widespread, transformative learning is no longer a field that professionally is reserved for psychotherapy, but it is also quite often required in relation to youth and adult education and training, for example when people are referred to reschooling because they are unemployed and their qualifications are no longer marketable.

It should here be emphasized that this typology has been developed from Piaget’s concepts, which are mainly related to the cognitive field, but can be fully applied to all of the three dimensions of the learning triangle.

Learning barriers

As a last point, barriers to learning shall be taken up as a topic that is of rapidly growing importance as societies and existence become more and more complex and changes become more and more frequent. So the traditional cognitively oriented types of barriers such as misunderstandings, insufficient prior learning, lack of concentration, or inappropriate communication have to a growing extent been surpassed by barriers related mainly to the two other learning dimensions (Illeris, 2007).

Learning defence in particular has since the middle of the twentieth century expanded into something that we all have to develop to counter the enormous growth in the amount of information and influence that we constantly meet, and which often is of a manipulative or persuasive character. According to Thomas Leithäuser (1976) this has forced all of us to necessarily develop what he has called an ‘everyday consciousness’ that blocks or distorts possible learning, usually unconsciously, because we cannot even manage to consciously administrate which of the many influences to take in and which to reject. And gradually the defence against the amount of influences has been supplemented by defence against certain kinds of influence and also often by a genuine defence of one’s identity.

Finally, an older but not so common barrier is that of learning resistance towards what the individual finds truly unacceptable. This involves a very strong mobilization of mental energy and therefore opens the individual for profound accommodative and transformative learning, often in opposition to what has been intended. If people are asked when they have learnt something that has really been of importance to them they will very often refer to situations of learning resistance (Illeris, 2007).

In today’s ‘learning society’ it is obvious that learning barriers are a very important issue that contributes strongly to emphasizing that the cognitive side of learning is heavily and inseparably influenced by and integrated with non-cognitive processes.

References


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