INTRODUCTION

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Learning and Learning Theory from a Cultural-Historical Point of View

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CULTURAL EVOLUTION AND THE TRANSFORMATION OF LEARNING

Over the past century, social scientists have become increasingly sensitive to the cultural nature of human development. The human mind especially has been gradually acknowledged as a contextualised phenomenon, leading to the concept of the social mind. In their historical overview, van der Veer and Valsiner (2000) have demonstrated that this notion of "the social mind" has various roots that go back into the history of European thinking of (at least) the nineteenth century. The works of Vygotsky, Lurija, and Leont'ev on the cultural historical theory of human development, as well as Dewey's work on thinking and education, have played significant roles in the development of this point of view. Still, many scholars in psychology, education, anthropology, and sociology oriented to the cultural-historical (or sociocultural) tradition are putting much effort into elaborating this point of view and discovering its dynamics and mechanisms.

There is much consensus nowadays that culture influences the content and course of development and learning. Rogoff (2003, pp. 3–4) has specified the relationship between culture and development: "People develop as participants in cultural communities. Their development can be understood only in the light of the cultural practices and circumstances of their communities – which also change." Communities are defined as "groups of people who have some common and continuing organization, values, understanding, history and practices" (p. 80). From this point of view, Rogoff demonstrates that human behaviour and habits vary considerably among cultural communities and between historical periods. This regards table manners, child-rearing practices, and schooling, but also the ways of emotional expression, such as loving and grieving. In a similar way, Gauvain (2001) points

out that sociocultural contexts (including their deliberately organised routines and practices, as well as their more or less fixed patterns embodied in playthings, tools, physical structures, power structures, and even social languages; see Bourdieu, 1991) play decisive roles in creating opportunities for development.

There is much empirical and theoretical evidence that, indeed, individual developmental courses may differ enormously depending on the system (or "developmental niche"; see Super & Harkness, 1986) in which they are positioned. These systems function like ecological environments, balancing patterns of mutually influencing factors. However, this is not a mechanistically functioning deterministic system. The ideas and theories that the participants in this system have about the system and its crucial elements are not the least influential determinants of the dynamics of the system (see also Bronfenbrenner, 1979). By the same token, educators' interactions with children are directly based upon their belief systems and theories about the nature of children, child development, knowledge, society, pedagogy, and so on. And different interactions tend to result in different developmental outcomes.

Hence, there is much empirical and theoretical support for the claim that development depends on culture, and varies with cultural-historical settings. Or is it just the forms of expression (of development) that change over time and place? Is all development not intrinsically related to learning and other fundamental structural changes that basically remain the same over the centuries? And what about learning? Is learning perhaps basically an invariant process? Or will it be transformed in accordance with changing cultural and historical settings? Is the learning process essentially different under different interactive conditions? In order to find answers to these questions let us turn to the history of learning itself.

THE HISTORY OF LEARNING THEORIES

Because learning has been central to the evolution of humanity, it is no surprise that so many scholars have reflected on the nature of learning. We can read treatments on learning in Plato and Aristotle, and they were probably not the first intellectuals who were interested in learning. Their views on the matter have significantly influenced many later theories of learning across Western cultural history. Plato's view on learning, as we can find in his *Politics*, is primarily didactical and focuses on learning processes that can be managed for cultural and political aims. Aristotle's ideas about learning more clearly describe a learning theory, as we can read in his *Nicomachean Ethics*, where

he writes, for example, "For the things we have to learn before we can do, we learn by doing, e.g. men become builders by building and lyre players by playing the lyre; so too we become just by doing just acts, temperate by doing temperate acts, brave by doing brave acts" (book II, 1103a, 32–1103b, 2).

Aristotle obviously advocates a theory of learning that we would call today "learning by doing." This theory still echoes more than two millennia later in the works of John Dewey and remains a popular view on learning.

Many more lines of development could be depicted with regard to theories of learning over the centuries. Van der Veer and Valsiner (2000) already pointed out that the development of theoretical points of view is based on *interdependent processes*: theories react on other theories, borrow concepts from other theories, and emerge in a cultural context, employing the currently available imaginations and tools. Theories always form a *history of theories*. Similarly we can talk about the history of learning theories.

Most theories of learning agree with the definition that learning is "a relatively permanent change in behaviour which occurs as a function of practice" (see, e.g., Saltz, 1971, p. 5), but the mechanisms they postulate for the explanation and analytic description of learning differ between theories. The choice of the mechanisms and the nature of the explanations furthermore depend on fundamental epistemological and anthropological points of view. As an example, we can refer to the famous computer metaphor that dominated theories of learning in the middle of the twentieth century. The belief in the analogy of computer functioning and human thought and learning was strongly related to epistemological conceptions of "knowledge" as a collection of units that could be processed mechanically with the help of symbols and production mechanisms (like if–then rules). We can expect that future theories of learning will also try to cope with the demands of the knowledge society and view learning as a process of coding, retrieving, and exchanging information about conceptual artefacts and cultural ideas. A powerful version of such a theory was recently published by Carl Bereiter (2002), and he is also very explicit about his epistemological starting points (e.g., the Popperian World III interpretation of knowledge).

The history of learning theories is rich and populated with many more or less closely related theories. It is obvious that the description of the learning process changes over time. Another issue, however, should also be addressed with regard to the understanding of learning. In what sense can we talk about the *transformation of learning*? Is it really learning that is transformed or is it just the theories of learning? In addressing this issue here, I try to show in what way learning can be seen as a historically transforming phenomenon.

CAN LEARNING BE TRANSFORMED?

The idea that learning is essentially a universal process is strongly reinforced by developments in neurobiology. Neurobiologists have demonstrated that changes in behaviour can become permanent because they are stored in the organism's body at a molecular level in the neural system. As a result of acting, special parts of the brain and nervous system are activated and repeated actions enhance the efficacy of the synapses between the neurons involved in that action. This phenomenon is named long-term potentiation (LTP) and is widely discussed and often accepted as a mechanism that is involved in the explanation of memory and learning (see Shors & Matzel, 1997, for a critical overview). The effects of LTP can last from hours to days and can eventually be everlasting when the correlated actions are practiced regularly. Recent neurobiological research discovered that often antagonistic processes (like long-term depression) can also be involved in remembering and learning. Although neurobiologists still do not completely understand the mechanisms of long-term potentiation and long-term depression (LTD), it is generally believed that mechanisms like these are involved in remembering and learning.

As a result of these chemical changes at the microlevel of neurons (especially in the hippocampus, cortex, cerebellum, and amygdala), the organism will remember and execute these actions easily when evoked by appropriate stimuli. There is reason to believe that these mechanisms are universal, occurring in both animal and human beings, and stable over the evolution of organisms. In this view, further understanding of the mechanisms of LTP and correlated biochemical mechanisms should provide final insights into the molecular basis of learning and memory in vertebrates. In that sense, there seems to be no transformation of learning: learning is always basically the same process of LTP or LTD.

Research has shown that LTP can be aroused or blocked by different causes. Drugs or genetic manipulations can block hippocampal LTP and impair performances on particular tasks (see again Shors & Matzel, 1997). So they lead to more or less permanent changes in behaviour but not as a result of (repeated) practice. It is important to see that such changes in long-term potentiation cannot be called a result of learning (in the ordinary psychological sense of that word). Learning is always related to actions (material, perceptual, verbal, or mental) performed by the learning person. As was demonstrated by several psychologists (e.g., Reber, 1993; van Parreren, 1951), the actions do not need to be intentional in order to evoke learning processes: unintentional, subconscious, or object-driven actions (like those, e.g., in perceptual processes)

can also result in permanent changes of behaviour, that is, in learning. Their learning effect will also result from the impact that they have at the molecular level. It is evident that all actions may result in changes at the cell-molecular level (called LTP or LTD). *Actions are essential in the learning process.* If we exclude causes like drugs and genetic manipulation, we can conclude that, without actions, the neurological system will not be specifically affected and will not lead to sustained performance of those actions.

The conclusion that actions of some kind must always be involved in learning processes has important theoretical consequences. Notwithstanding the essential relevance of molecular processes in learning, it is obvious now that learning cannot be identified with its neurobiological processes at the molecular level. Conceiving of learning as identical with LTP is committing a *pars-pro-toto* mistake, comparable to defining a car by its engine (or steering wheel) or a human being by its brain. Learning is indissolubly connected to both acting and bioneurological processes.

THE CULTURAL DIMENSION OF LEARNING

The assumption that acting plays an essential role in learning processes has far-reaching consequences for the theory of learning. Different actions will affect different parts of the brain and will result in different locations of LTP or LTD and even (slightly) different neuronal networks. The idea of the plasticity of the brain and its dependence on human action is an important tenet of modern developmental neuropsychology (see, e.g., Johnson, 2005; see also Luria, 1973). This insight, however, also essentially leads to the basic conclusion of the cultural nature of learning. Different cultures and generations will get their children and pupils involved in different types of actions, depending on the educators' worldview, epistemological beliefs, and image of the child and of a future society. In this sense we can maintain that learning is indeed transformed during cultural history in accordance with the prevailing psychological, epistemological, and scientific points of view, in accordance with pedagogical, sociological, and cultural views on the child and its position in the world. So it is not only the descriptions that change but also the process of learning itself.

TRANSFORMATION OF LEARNING

Over the past fifty years educators' and teachers' views have radically changed regarding how children should be involved in learning. In the early twentieth century, learning was almost exclusively based on pupils' copying actions of

the teacher and repeating these actions until they could be performed automatically and independently. These drill-and-practice methods of teaching have gradually evolved into forms of meaningful learning based on intentional and guided problem solving by the pupils. Both types of learning start out from different types of actions, triggering different regions of the brain. In many domains of cultural learning, the learning processes have been radically transformed from drill-and-practice learning into negotiation of meanings (see, e.g., Bruner, 1990, 1997). Although the final molecular processes may be similar in some abstract sense, the nature of learning as a human activity has radically changed. We only have to look at the classrooms of the 1950s and today's classrooms, for example, in the domain of mathematics learning. The rote learning of arithmetical sums based on endlessly digesting rows of sums has changed into a classroom where pupils are involved in solving meaningful problems on the basis of analysis of problem situations, planning of activities, discussion of different solutions, reflection on outcomes, and the like. The types of learning actions are radically different, although both approaches may end up with classrooms of pupils mastering the ordinary calculations.

Many examples could be given from other subject areas. It should be clear, however, that the transformation of the learning processes is a cultural process that is not taking place everywhere at the same time. Some areas of learning are still based on the same processes as centuries ago. The way people transmit cultural narratives in families or in some communities of practice is still more or less the same as a hundred years ago (see, e.g., Rogoff, 2003; Wertsch, 2002). The way people learn depends on the culture they live in.

TRANSFORMATION BY LEARNING

The view on learning that emerged from Vygotsky's thinking was always strongly based on the belief of the cultural nature of learning. Vygotsky called his approach the cultural-historical theory of human development, and he tried to show that development and learning both depend on the ways pupils and educators interact and learn to share cultural tools. The structure and the meaning of the tool in a community, in particular, strongly influence the actions that people accomplish, and as such the cultural tool is a strong semiotic determinant of the learning process (see, e.g., Wertsch, 1998, for further explanation). On the other hand, Vygotsky (1984, p. 258) also emphasised the changing nature of the contexts of development in his notion of the social situation of development. When the social situation of

development changes, the course of development and learning will change as well.

In his elaboration of the cultural-historical activity theory, Leont'ev (1975) has demonstrated that different levels of analysis should be distinguished. He demonstrated that most actions (*dejstvie*) are basically a moment in the realisation of a certain activity (*dejatel'nost'*), at a certain time and in a certain place. Activities can be accomplished only in specific actions. Extending these distinctions to the level of learning, we can see that learning to participate in activities requires particular actions and can even produce new actions through collaborative reflection on the meaning of different actions within the activity. This calls for a type of learning that is based on negotiations of meaning, exchange and construction of new meanings, and similar actions. Although the discursive actions involved may be common practice in the context of scientific communities, they can be seen as a revolutionary transformation of learning in school practices over the past decades. It is based on the cultural belief in the developmental potentials of pupils and on the belief in the educational value of interaction and participation.

It is still a matter of dispute how precisely the activities should be organised, and how the participation should be regulated, in order to promote understanding and deep learning. Most chapters of the present book are focused on questions related to this particular issue. The diversity of relevant aspects and possible solutions is immense, but the authors in all the chapters are basically dealing with this underlying problem of the transformation of learning through meaningful cultural activities.

But with regard to *actions*, we can also distinguish specific types of learning processes. In these cases, the regulation of the performance of pupils' actions is often focussed on mastery of these actions, or the building of automatic operations. At first sight, it may seem that the learning is not transformed in these cases, as learning is still based on execution and repetition of actions. However, in order to make the automatisation process meaningful, it is important to build on meaningful actions and to transform the actions stepwise, as was demonstrated in the works of Gal'perin (see also Arievitch in this volume). Research by Gal'perin and his students has demonstrated that this can be achieved only when the learning actions are performed reflectively and in combination with anticipatory actions that predict the outcomes of the actions performed (see, e.g., Šabel'nikov, 1982). This approach results in completely different action patterns leading eventually to automatisation. As a result of psychological research (e.g., that of Šabel'nikov), the actions that underlie this type of learning have been transformed from practicing prefixed actions to anticipatory actions. The strong reflective and anticipatory

basis of automatisation processes will probably result in molecular processes in different locations of the brain from what would be the case in the drill-and-practice approach to automatisation. The final result may be the same, but the learning as a human performance is definitely transformed.

THE DIVERSITY OF LEARNING GOALS

All chapters in this book contribute to the argument of transformed learning.[1] In particular, the authors of the chapters try to show the starting points and the various solutions to the process of meaningful learning in cultural contexts. Some chapters focus on the assumptions and basic tenets of this approach to learning (Section I), others focus on specific problems and how they can be addressed from this activity point of view (Sections II and III).

The different chapters dwell on different domains of culture or adopt different educational goals. The goals of learning especially can have decisive influence on how the actions are organised and regulated and what strategies are selected for the accomplishment of one's goals. As such, the learning goals may also have an impact on the process of transformation of learning.

Different general goals can be distinguished in the different chapters of this book:

- *Learning to perform*: These learning processes aim at appropriation of specific meaningful actions within a particular cultural context. Most of the time educators carefully guide these learning processes. Reflection, anticipation, and feedback are important elements in the organisation of these action patterns. Motor and perceptual learning are examples of this type of learning processes.
- *Learning to make meaning*: These learning processes aim at the distribution and improvement of the contents (subject matter) of learning. This learning is basically discursive: meanings are explained, discussed, transformed, and shared through collective codes (like inscriptions). Important examples of this type of learning can be found in the areas of conceptual and subject matter learning.
- *Learning to participate*: This form of learning focuses on the genres of acting in social contexts; the learner is assisted to appropriate the rules and tools of the community in order to participate independently, critically, and creatively within the borders of the community's practices.

[1] For summaries of all the chapters, see the introductions to the different sections of the book.

Learning to be: This type of learning addresses the learner's identity by focussing on the learner's motives, ambitions, and moral and aesthetical values. The actions to be performed here start out from the learner's personal sense and are constantly evaluated with the help of personal values and norms.

The book discusses the transformation of learning that has occurred as a result of cultural-historical studies of human behaviour and development. The different chapters present diverse solutions to problems that emerge when applying this paradigm. The different aims of learning presented here can be used as a speculative classification system for the reading of the chapters and summarising the conclusions in the pursuit of a new structured paradigm of learning.

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