About Learning: The Discourses on Learning Revisited from an Educational Perspective

Sabine Gerhartz & Ilse Schrittesser

Department of Teacher Education and School Research
University of Innsbruck
Innrain 52d
6020 Innsbruck
Austria
Sabine.Gerhartz@uibk.ac.at
Ilse.Schrittesser@uibk.ac.at

Ilse Schrittesser is a Professor for Teaching and Learning Research and Head of the Department of Teacher Education and School Research at the University of Innsbruck. Her main research interest is in professionalism, teacher education and teaching and learning.
Sabine Gerhartz is a Research Assistant (pre-doctorate) and Senior Lecturer at the Department of Teacher Education and School Research at the University of Innsbruck. Her main fields of research are learning, innovative learning environments and early school leaving.

ABSTRACT (100-200 words)

The topic of learning is beginning to play an increasingly important role not only in scientific but also in everyday discourse. Just how important the issue of learning has become for society is demonstrated by the intense discourse between researchers, politicians, teachers and parents as well as in the media. An educationist perspective, however, has to look beyond the established learning concepts coined by educational psychology and identify a theoretical framework for the learning process which reconceptualises current ideas about learning from the teaching perspective. In doing so, we must ask how learning is initiated. In this article, we argue that it is always a situation of crisis, bewilderment and/or surprise which initiates learning and turns it into a transformative experience. It is through such experiences that learners gain knowledge and deep understanding of the world and, consequently, grow and mature as human beings. Accordingly, teachers would be expected to offer such experiences to their students.

Current learning theories are discussed from the above mentioned perspective and a critique of the established theories is offered from an educational standpoint based on what is known about learning. Finally, some suggestions for educational practices in school and for teacher education are put forward .

Research status: What do we know about learning?

We talk about learning in school, life-long learning, formal and informal learning, and we think about how we can turn people into so-called self-organised life-long learners. The majority of educationists, however, are focused on teaching and have long failed to pay attention to learning as a central concept of pedagogical interest and educational research. It is only recently that we have seen a number of publications dealing with learning from an educational point of view instead of the traditional or educational psychology perspectives. This raises an interesting question, namely which aspects of the learning process will be unveiled by taking a genuinely educational standpoint, bearing educational practices in mind. Such a perspective emphasises a notion perhaps best described by the German term *Bildung*, which encompasses an ongoing process of both personal and cultural maturation and understands learning not just as an

accumulation of skills – although skills are a necessary prerequisite for this process – but as a transformative experience.
Fostering learning in this sense at as early a stage as possible should be one of the main goals of education and is one of the main tasks of the teaching profession.

With the cognitive turn, behaviourist concepts of learning as a stimulus-response process whose internal "goings on" remain a black box for researchers have taken a backseat. They have not, however, fully lost their impact – the emphasis on learning outcomes in European higher education as well as in large scale tests such as PISA (Programme for International Student Assessment) still carries strong traces of behaviourist theory. Yet it is cognitive science – and more recently also the neurosciences – which now primarily set the tone of the mainstream debate on learning.
For both cognitivists and neuroscientists alike, learning is closely linked to concepts of motivation and to the retention and recall functions in the brain. Brain activity is regarded as solitary *ab initio* – even if social context and "relatedness" do play a role in the theoretical cognitivist framework (cf. Winch, 1998). Curiosity and interest are considered to be important facets of human motivation and development and as stimuli for learning (cf. Silvia, 2008, Ryan & Deci, 2000, Deci, 1992).
Ryan and Deci (2000, p. 56) argue that "[f]rom birth onward, humans, in their healthiest states, are active, inquisitive, curious, and playful creatures, displaying a ubiquitous readiness to learn and explore, and they do not require extraneous incentives to do so". Consequently, "[t]o be motivated means *to be moved* to do something" (ibid., p. 54). Interest, in turn, is considered an important facet of human motivation and development. According to Deci (1992, p. 45), a "state in which a person is completely immersed in an activity and experiences a flow of awareness" – he refers here to Csikszentmihalyi's (1975) concept of flow – has to be considered as "a prototype of being interested".
Cognitive psychology distinguishes between intrinsic and extrinsic motivation, a distinction for which Ryan and Deci present an elaborate construct in the articles mentioned above. While intrinsic motivation makes a person act for the fun or challenge involved in an activity, and not because of external pressure or rewards, extrinsic motivation is more complex (Ryan & Deci, 2000, pp. 55f.) Their "taxonomy of extrinsic motivation" distinguishes between various degrees of internalization of external regulation – from a complete absence of self-determination to the introjection of externally set goals as a next step towards the identification and ultimate integration of external regulations into one's own values and needs (ibid., pp. 61f.). However, even if integrated forms of external regulation share a number of attributes with intrinsic motivation, they still have to be regarded as extrinsic "because behavior motivated by integrated regulation is done for its presumed instrumental value with respect to some outcome that is separate from the behavior, even though it is volitional and valued by the self" (ibid., p. 62). Intrinsic motivation, in turn, has to be seen as a "prototype of self-determined activity" (ibid.). Ryan and Deci then go on to name three factors that a number of studies have shown prove to foster internalization and, consequently, an increase in self-determination: (1) relatedness, (2) the support of competence, and (3) autonomy support.
Relatedness refers to the fact that people will be more willing to follow external motivation in their behaviour if this behaviour is valued by significant others "to whom they feel (or would like to feel) connected, whether that be a family, a peer group, or a society" (ibid., p. 64). As far as competence is concerned, Ryan and Deci (ibid.) found out that students will be more prepared to take on an externally set goal if they feel they have the skill to succeed at it. It must therefore be assumed that supporting competence by "offering optimal challenges and effectance-relevant feedback" facilitates internalization and, consequently, self-determination (ibid.). With regard to the third factor, autonomy support, they argue that "it is the critical element for a regulation

being integrated rather than just introjected" (ibid.), accounting for this claim as follows: "Controlling contexts may yield introjected regulation if they support competence and relatedness, but only autonomy supportive contexts will yield integrated self-regulation." (p. 64)
In an earlier publication, Deci also addresses the question of how interest – as a major facet of motivation – is created. Research has shown, he maintains, that there are two primary factors that would seem to make an activity interesting, namely "optimal challenge and novelty" (Deci 1992, p. 50). Even if some of the studies mentioned in this article are rooted in a different tradition, they share the common notion that "people tend to freely seek and be interested in those activities or inputs that are optimally challenging, in other words, that are not fully mastered but are not so discrepant as to be frustrating" (ibid., p. 51). Moreover, there is a difference between the "importance" of an activity and its "interestingness": importance is more instrumental and therefore belongs to extrinsic motivation, while interestingness is closely linked to intrinsic motivation (ibid., pp. 55f.). Deci then goes on to refer to the facets of relatedness, support of competence and autonomy support that he and Ryan would later (see above) define as the central aspects for the development of self-determination, itself in turn the main driving force – in cognitive psychology terms – behind intrinsic motivation.
Deci maintains that relatedness is always embedded in a specific social context, which has a tremendous effect on motivation: "When the context is experienced as being controlling – as pressuring people to think, feel, or behave in some specific way – their interest will tend to be undermined and they will be motivated to maximize their extrinsic outcomes." (1992, p. 59) If, on the other hand, people experience the context as autonomy supportive they will maintain their interest (ibid.).
In a study assessing the perceptions that third-through-sixth-grade students had of their parents' autonomy support regarding school-related activities, Grolnick and Ryan (1987; see also Grolnick, Ryan & Deci, 1997) determined that the way parents acted (e.g. whether they were more controlling or more open) highly influenced the students' "inner resources for learning" (Deci 1992, p. 60). Fairly similar results were also found for the way teachers acted in the classroom and their tendency to either give pupils room or exert control (ibid.).
Along with the question of motivation, memory performance as a main asset for learners plays a central role in cognitive psychology. Since some of the research on human cognition which was directed against behaviourist concepts had been inspired by ideas from artificial intelligence and the computer sciences, most of the memory concepts in cognitive psychology adopted the computer metaphor for the working of the human brain. Consequently, memory and the act of learning are understood as types of intricate information acquisition and storage. In the introduction to an elaborate account of his theory of multicomponent working memory, Alan Baddeley describes working memory as "a temporary storage system under attentional control that underpins our capacity for complex thought." (Baddeley, 2007, p. 1). It is to be seen as a complex system that "effectively forms the crucial interface between perception and memory, and between attention and action." (ibid.) Working memory is supposed to have a limited capacity – it is said to be able to hold only 5 to 9 items at a time (cf. Miller, 1956). Information is lost if the transfer to the so-called long-term memory, whose capacity appears almost unlimited, is not secured within a short time span (see also Schneider & Stern, 2010, pp. 80f.) Working memory load, it is suggested, can be reduced by "chunking" information, i.e. structuring it according to its semantic relatedness to other information. Moreover, a considerable number of studies point out that retention and transfer from working to long-term memory depends on the depth of semantic involvement, which means that the respective information has to be associated with other information or has to gain some deeper meaning for the learner (Craik & Lockhart, 1972, Craik & Tulving, 1975).
In summary, numerous studies have been undertaken by psychologists and cognitive scientists to find out about how people are *moved to learn* and how what is learned can be best retained.

Curiosity and interest are considered to be the main driving forces, while memory is seen as the storage place in which information is retained for re-use. However, cognitive psychology does not explore where the driving forces to learn come from – aside from making the succinct assumption that they seem to be attributes which humans display from birth (see above). From an educational perspective, we also have to question whether the storage model of memory has enough reach to capture the actual complexity of learning processes. Baddeley himself critically identifies this desideratum, accepting that while we might know a lot about why we do one thing rather than another, the basic question of why we do *anything at all* remains unanswered by cognitive psychology (2007, p. 344).
Concepts like intrinsic and extrinsic motivation point to curiosity and interest as driving forces for learning and try to explain what happens when we are moved to learn; memory concepts explain the subsequent process of the acquisition of new information; the idea of relatedness hints at the interrelated nature of human activity and social context. However, there is no explanation of why and how human agency actually exists. Yet, it is precisely the *relatedness* and the *interactive* nature of learning as *sources* for curiosity, interest and memory performance that we regard to be most crucial for education. We will come back to this idea later on, after we have taken a look at learning-related findings in the neurosciences.

In recent years, the neurosciences have had an enormous impact on educational research. Indeed, it has frequently been claimed that their findings have significantly transformed the field. Their suggestions on how learning must be understood and can be facilitated have generated great excitement (predominantly among practitioners, but also among educational scientists) – as a result both of their positive and their critical reception. Since the neurosciences are a fairly young branch of science, studies in this field are sometimes rather inconsistent in their approach, and their results and do not give the impression of coherency. Nonetheless, there are still quite a number of educationists or researchers in neighbouring areas who expect the neurosciences to have a deep and fertilising effect on our knowledge of learning. The insights they have produced about learning are derived mostly from neuroimaging and related experimental studies. These emphasise the plasticity of the brain, which is seen as one of the most interesting findings of neuroscientific research into learning and thinking. Hüther (2004, p. 489) in particular, but also a number of others (e.g. Singer, 2006, Braun & Meier, 2004), emphasise the influence of the environment on the structural architecture of the brain – which is said to be shaped according to the physical and social environment it interacts with. Like the cognitive sciences, the neurosciences also assume that humans are driven to learn by an innate curiosity. This is why games are often identified as the prototypes of informal as well as fun-based learning.
One influential group of neuroscientists claims that there are developmental windows for certain learning areas. “Once the respective windows close, neurons stop to form [sic!] new connections and existing connections can no longer be removed” (Singer, 2006, p. 14). Were it based on sufficient evidence (which others maintain it is not), Pauen’s (2004, p. 14) suggestion that the idea of such critical developmental windows is an oversimplification could be an important claim for educationists. Indeed, this whole field is clearly both promising and controversial at the same time.
According to neuroscientists like Jacobs, Hutzler and Engl (2006), psychology can only provide information on the behavioural product of mental processes, whereas imaging methods enable the neurosciences to measure and map the material substratum of mental functions. By doing so, they can provide material correlates of mental processes, i.e. of their “when” in terms of the observed sequences and their “where” with regard to the observed activity in specific regions of the brain.
However, there are a number of critical voices, who view such claims as overrated promises. One major criticism of neuroscientific research is that its findings are often based on empirical

studies using animals instead of human beings, with the results then transferred to the latter (e.g. Pflüger, 2006, Sachser, 2004). Findings from individual animal experiments (e.g. with mice, rats or birds) cannot easily be generalized and transferred to the nature of human learning (e.g. Becker, 2006).

As already mentioned, many of the results produced in the neurosciences – as interesting as they might be – reflect a lack of agreement across the studies with regard both to the data and its interpretation. Baddeley, who has made a name for himself in cognitive science with his concept of the working memory (see above), reminds us to bear in mind that the data produced by the neurosciences might well become ground-breaking in the near future, but at present "simply concerns anatomical localization." (2010, p. 234). Accordingly, others claim that the ability to watch "the brain at work" (cf. Hagner, 2006) does not necessarily explain causal relationships or offer concrete insights into the nature of learning and, accordingly, into the consequences for teaching – a central concern in educational research (cf. Borck, 2006). While the neurosciences seem to be quite enthusiastic about what their findings can offer to education, a significant number of educationists maintain that the results obtained so far only reinforce existing theory, but do not provide any strikingly new information, particularly with regard to the educational perspective on learning (Zirfas & Liebau, 2006). According to the critics, the overall problem lies in the as yet unanswered question of *how to interpret* the mental images produced by neuroimaging. The cognitive or emotional processes that can be derived from the visualised physical and chemical reactions identified in certain brain areas remain a desideratum. In other words, the status quo in educational research is that neuroscientific findings are definitely promising, but that a fruitful interdisciplinary discourse remains to be found.

In this regard, a budding development has to be seen in the emergence of the so-called learning sciences, a fairly new field that is trying to bring together research on learning in such partly disparate areas as constructivism, cognitive science, educational technology, sociocultural and educational studies. Sawyer (2006, p. 10) describes the focus of these learning sciences as follows: "The learning sciences are centrally concerned with exactly what is going on in a learning environment, and exactly how it is contributing to improve student performance. The learning environment includes the people in the environment (teachers, learners, and others); the computers in the environment and the roles they play; the physical objects in it; and the social and cultural environment."

According to Sawyer, the learning sciences are a response to the demands of the 21st century knowledge society. While instructionism prepared students for the industrialised economy of the early 20th century, the modern world is far more technologically complex, and instructionism is "increasingly failing to educate our students to participate in this new kind of society". He also emphasises that "instructionism is an anachronism in the modern innovation economy" (ibid., pp. 1f.) and goes on to explain that this is why a new interdisciplinary science of learning was born in the 1970s. After about 20 years of intense collaboration in learning research, the new learning sciences have reached a consensus on some basic facts on learning, which Sawyer (ibid., pp. 2f.)summarises as follows:

1. "The importance of deeper conceptual understanding"

The acquisition of mere factual and procedural knowledge as a main result of instructionism does not suffice for 21st century knowledge societies. Experts and knowledge workers need to have a deep understanding of the acquired knowledge in order to be able to adequately apply it in given situations.

2. "Focusing on learning in addition to teaching"

Students do not learn better simply through better teaching. Deeper conceptual understanding is only reached if students actively participate in their own learning [which seems self-evident, or

even tautological, when learning is conceived as an activity on the part of the learner, IS]. This is why the new learning sciences focus on student learning along with instructional techniques.

3. "Creating learning environments"

The task of schools is to help students "to learn the full range of knowledge required for expert adult performance" (p. 2). Facts and procedures are important, but must be taught in the context of deeper conceptual understanding 'that will allow them to reason about real-world problems'.

4. "The importance of building on a learner's prior knowledge"

Learners come to the classroom with preconceptions about how the world works, some of them basically correct, some of them misconceptions. Children learn best if these conceptions – and misconceptions – are taken into account by teaching.

5. "The importance of reflection"

Learning is more effective when learners "express their developing knowledge – either through conversation or by creating papers, reports or other artefacts – and then are provided with opportunities to reflectively analyse their state of knowledge."

At one point, Sawyer states that "[l]earning science research has identified the key features of those learning environments that help students learn deeper conceptual understanding." (ibid.) This is quite an ambitious statement, and we are not quite sure if it actually fully applies to the potential of the learning sciences. Furthermore, all these aspects are also considered important from an educational standpoint and, incidentally, are not new when it comes to educational research. The notion that understanding is essential to make learning work is an argument that has been put forward time and time again by educationists – often contrary to behaviourist methods (e.g. most recently by Gruschka, 2011).

Nonetheless, the fact that learning as an activity has to be taken into account if we want to know more about successful teaching has only recently become a topic in educational research in German-speaking countries, where it has since rapidly gained momentum (cf. Göhlich & Zirfas, 2007, Meyer-Drawe, 2008, Mitgutsch et al., 2008).

As far as the design of learning environments is concerned, pedagogues and educationists make more modest promises than the learning sciences. We can learn a lot from research for the way we conceive teaching. However, we still have a long way to go to gain robust knowledge on the fine mechanics of learning in real-life settings (such as schools) and how to truly foster such learning. Educational research concurs with the learning sciences in its aim to find out as much as possible about this issue.

As far as its findings are concerned, neither the learning sciences' proclaimed importance of building on a learner's prior knowledge nor its recognition of significance of reflection for successful learning processes are new. Both ideas have long been part of educational basics and were also proclaimed essential by cognitive science many decades ago.

In other words, what the learning sciences state as their consensual findings on how learning can be facilitated concurs with most of the findings in traditional educational research and is not totally novel. Still, with its focus on the situated nature of learning and on how learning situations can be successfully arranged by teachers, the learning sciences perspective comes fairly close to educational areas of interest – with one key difference: in the learning sciences approach, it is the environment as a whole that technically seems to navigate the learning of the learners. If we look at learning from the teaching perspective, however, it is the *learners* and the *teachers* with their specific *interactions* who are the central figures in the learning situation, with the teachers being primarily responsible for what is going on and how learning is facilitated. The reasons why the interactions between learners and teachers are to be seen more important for the learning process than other facets of the learning environment (such as facilities or technologies) will be explained in the following section.

On human agency and learning

By taking into account the different approaches to learning and their respective benefits and shortcomings described above, we seek to present a learning concept that is inspired by educational philosophy and focuses on aspects of learning that are important to teaching. To facilitate an understanding of learning that is based on human agency, we will first endeavour to embed our concept in a general human agency concept [1].We will then draw some conclusions for our concept of learning and present some of the consequences it has on the teaching process. As is also the case for the learning sciences, John Dewey serves as a central figure of reference in our own conception of human agency. According to Dewey, humans constantly make hypotheses about the conditions of their surroundings. These hypotheses are provisional. Every human activity can thus be seen as an improvisational response to a situation that a human agent has to deal with. Hans Joas (1996) develops this idea further and offers an activity theory, which we in turn use as the basis for our attempts to conceptualize our own theoretical framework of the learning process. Joas contends that a continuum has to be assumed in our quasi-dialogical relationship with the world. At one end of this continuum is a vast repertoire of routine responses to familiar situations, while at the other are instances of creativity stimulated by crises which confront actors with completely new givens for which no routines are yet available. Creative activity is therefore to be perceived as a ubiquitous trait of human agency that is used to cope with situations of crisis. We get into such situations, they happen to us, we find ourselves confronted with them, and they provoke action from us because they affect, interest or concern us (Joas, 1996, p. 160).

Against this background, it can be said that learning takes place when we respond to situations by restructuring our knowledge, our experiences and our beliefs. Stimulated or driven by a problematic situation, we engage in learning when we are prepared not only to find new ways of dealing with it, but also to unlearn what had previously seemed safe and true. Or as Mead (2002/1932, p. 43) puts it: when this happens, the present begins to re-write the past. According to Joas (1996), the character of every activity, and consequently of every learning activity, must therefore be described as situated, corporeal (as it concerns our whole being) and social. From this perspective, humans are understood as embodied beings with a "primary sociality which has not been generated by conscious intentionality but has preceded such" (ibid., p. 184). Learning, by these guidelines, is understood as a prototype of situated activity – an activity that most of all secures human survival through its creative dimension.

In 1993, prior to the publication of Joas' analysis, the critical psychologist Klaus Holzkamp published an elaborate study on learning, which he based on similar assumptions. He examines the learning process from the standpoint of the subject and conceptualises learning as a major human capacity to cope with life. Learning, according to Holzkamp (and in line with Dewey and Joas), is initiated through a crisis situation which makes the learner aware of the fact that he/she has to extend his/her competencies in order to come to terms with this crisis (*Lernkrise*, *Lernproblematik*).

In contrast to coincidental, informal learning processes, Holzkamp's primary interest lies in intentional forms of learning. At the core of his theory is the claim that learners always have *good reasons* for learning, and that it is these reasons which shed light both on how learning should be contextualised – particularly in school practice – and on how it can be fostered (or hampered). When trying to master the crisis situation, such reasons might aim either at expanding one's opportunities and improving one's quality of life or defending one's status quo (Holzkamp refers to these as expansive or defensive learning reasons). Similar to Joas' theory on human agency, Holzkamp conceives learning from the perspective of the subject as a contextualised ("situated") activity, which has to be understood as a bodily and socially

embedded process. This conception has consequences for learning research and for teaching methods.

Capturing the fruitful moments of learning

Our elaborations on various conceptualisations of learning in sections 1 and 2 show that cognitivism, the neurosciences and, more recently, the learning sciences all share a deep interest in how learning happens – although they each have different ways of investigating this. Most representatives of cognitive psychology focus their research on solitary brain activity and concepts of motivation and memory (e.g. Deci's and Ryan's taxonomy or Baddeley's theory of working memory). More recent approaches in cognitive science have taken a somewhat broader stand that includes social contexts and their influence on learning (cf. Anderson et al., 2000). The neurosciences, in turn, try to derive knowledge on learning from neuroimaging. The learning sciences, for their part, build on the findings of cognitive science, but also draw on educational technology and sociocultural studies to build their methodological foundations.
In recent publications, educational theory examines anthropological preconditions and the nature of human agency in its attempts to solve the learning enigma. Here, learning is seen as an experience that happens to humans and represents a turning point in a person's understanding of something (Göhlich & Zirfas, 2007, Meyer-Drawe, 2008, Mitgutsch, 2008, Schrittesser, 2011b). The disturbances caused by this experience and the facets of delay and crisis are considered the *fruitful moments of learning* (see also Copei, 1930). Without these turning points, which always demand that the learner dispense with familiar ideas and routines, genuine learning will not take place.
Holzkamp's activity-oriented, subject-scientific learning theory takes a similar stance, with the difference that the emphasis lies more on intentional learning processes and less on the implicit aspects of a learning experience (which are emphasised more by other theorists like Meyer-Drawe).
We argue that the central question from the educational perspective is how learning can become a transformative experience in the sense that it becomes an enterprise which focuses on the reasons learners have for learning. Such an experience helps to bring forth as many expansive reasons (according to Holzkamp, see above) as possible and, at the same time, does not ignore the defensive aspects of learning as often experienced in the school scenario – such as to achieve certain learning outcomes, to get good grades, to obtain an acceptable school leaving certificate, etc. The teacher's role in this concept cannot be reduced to being part of a learning environment as the learning sciences suggest. Instead, the teacher has to actively offer learning opportunities by having students participate in his/her own way of dealing with a theme, subject or problem and use this to show them how to go about such challenges. According to Holzkamp's theory, it is this participative dimension that can turn learning in school into a more expansive enterprise than is the case in a traditional classroom (1993, pp. 501ff.) . Both teacher and students together cope with a task – each of them with different levels of competence, but working together on the same exercise of coming to terms with a problem. The fruitful moment of learning itself is not primarily found in successfully achieving a learning outcome, but in providing enough room for a genuine learning opportunity – with its dimensions of crisis and the challenge of having to un-learn what has so far been considered true and helpful. Learning in this sense – if made possible by the teacher – is not simply something that needs to get done (in a 'job done!' sense), it is a lived experience (cf. Rumpf, 2008), which in turn fosters other good reasons for learning.
For teachers to be successful in helping to turn learning into a lived experience for their students, they will need to acquire a set of completely different educational and professional competences. Profound knowledge of their subject is vital – otherwise they cannot focus on the essential ideas of a theme, a problem or whatever they need or want to show their students. In addition, they

will have to have profound knowledge of their students and their relationships. It is this double orientation (where one cannot do without the other) that makes teaching such a complex and sophisticated undertaking and teacher education such a vast and demanding domain. "Teaching," says Van Manen "as a pedagogical interaction with children, requires not only a complex knowledge base but also an improvisational immediacy, a virtuelike normativity, and a pedagogical thoughtfulness that differs from the reflective wisdom of other practitioners." (1994, p. 139) Teacher education will therefore have to be re-oriented. First of all, to secure the above, profound subject knowledge must play a central part in teacher education. Teacher education students must not be second rate in their subjects compared to the other students. Teacher education has to attract high potentials – top mathematicians, linguists, social and natural scientists, etc. These high potentials in turn need to be challenged by ambitious courses to make sure that they gain the deep understanding of their subject and discipline that is crucial when it comes to initiating conceptual understanding in their students. They also have to acquire relational knowledge based on receptive and interpretive competences, which are vital for the pedagogical sensitivity described above.

Moreover, if genuine learning – as opposed to the mere reproduction of knowledge – always goes hand in hand with some crisis or irritation (positive or negative), then the mainstream idea that good teachers make learning effortless, quick and easy proves to be an attractive, but false, myth. Meaningful learning always involves the whole person, is linked to effort and demands commitment. It is the task of teachers to ensure this is the case.

In many aspects, the findings of the learning sciences do not contradict our argumentation in this paper. Yet in our perspective, education has a less instrumental, less technical and more interaction- and relationship-oriented interest in learning, especially as far as the interaction between learner and teacher is concerned. The associated consequences for teacher education are outlined briefly above. As far as learning research is concerned, educationists – with their double interest in learning and teaching – will still have to develop and share more elaborate research methods than presently available in order to capture the fruitful moments of learning and filter out those aspects that put successful learning processes at risk. An intensified inter- and transdisciplinary discourse, also among the English- and German -speaking scientific communities with their different approaches and standpoints would definitely enhance the chances of gaining more robust knowledge on how learning can be fostered in and by educational settings.

References

Anderson, J.R., Greeno, J.G., Reder, L.M. & Simon, H. (2000) Perspectives on Learning, Thinking, and Activity. Paper posted at Research Showcase, Carnegie Mellon University http://repository.cmu.edu/psychology/3

Baddeley, A. (2007) *Working Memory, Thought and Action*. Oxford: Oxford University Press.

Becker, N. (2006) Von der Hirnforschung lernen? Ansichten über die pädagogische Relevanz neurowissenschaftlicher Erkenntnisse [Learning from Brain Research? Views on the Pedagogical Relevance of Neuroscientific Findings], *Zeitschrift für Erziehungswissenschaft*, 9 (5), 177-200.

Borck, C. (2006) Lässt sich vom Gehirn das Lernen lernen? Wissenschaftshistorische Anmerkungen zur Anziehungskraft der modernen Hirnforschung [Can we Learn how to Learn from the Brain? Notes on the Attractiveness of Modern Brain Research from the Standpoint of the History of Science],in *Zeitschrift für Erziehungswissenschaft*, 9 (5), 87-100.

Böhler, D. (1985) *Rekonstruktive Pragmatik* Reconstructive Pragmatics. Frankfurt/Main: Suhrkamp.

Braun, A.K. & Meier, M. (2004) Wie Gehirne laufen lernen oder: „Früh übt sich, wer ein Meister werden will!“ [How Brains Learn to Walk or: ‘Practice Makes Perfect‘]*, Zeitschrift für Pädagogik*, 50 (4), 507-520.

Copei, F. (1966/1930). Der fruchtbare Moment im Bildungsprozess [The fruitful moment in the educational process], 8th edition. Heidelberg: Quelle & Meyer.

Craik, F.I.M., & Lockhart, R.S. Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior,* 1972, 11, 671-684.

Craik, F.I.M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology: General, 104,* 268-294.

Csikszentmihalyi, M. (1975) *Beyond boredom and anxiety*. San Francisco: Jossey-Bass

Deci, E. L. (1992) The Relation of Interest to the Motivation of Behavior. A Self-Determination Perspective, in K.A. Renninger, S. Hidi. & E. Krapp (Eds), *The Role of Interest in Learning and Development*, Hillsdale, NJ: Erlbaum.

Dewey, J. (1916) *Democracy and Education*, N.Y.: Macmillan 1969.

Dewey, J. (1934) *Art as Experience*, N.Y.: Putnam’s 1980.

Geertz, C. (1973) *The Interpretation of Cultures*. *Selected Essays*. New York: Basic Books.

Glaser, B. (1978) *Theoretical Sensitivity*. San Francisco: University of California Sociology Press.

Göhlich, M. & Zirfas, J. (2007) *Lernen. Ein pädagogischer Grundbegriff* [Learning. A Basic Concept in Education]. Stuttgart: Kohlhammer.

Grolnick, W.S. & Ryan, R. M. (1987) Autonomy in children’s learning: an experimental and individual difference investigation, *Journal of Personality and Social Psychology.* 52, 890 – 898.

Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The selfdetermination perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children’s internalization of values: A handbook of contemporary theory,* 135–161. New York: Wiley.

Gruschka, A. (2011) *Verstehen lehren. Ein Plädoyer für guten Unterricht* [Teaching for Understanding. The Case for Good Teaching]. Stuttgart: Reclam.

Hagner, M. (2006) *Der Geist bei der Arbeit. Historische Untersuchungen zur Hirnforschung* [The Brain at Work. Historical Research into Brain Research]. Göttingen: Wallstein Verlag.

Hüther, G. (2004) Die Bedeutung sozialer Erfahrungen für die Strukturierung des menschlichen Gehirns [The Significance of Social Experience for the Structuring of the Human Brain], *Zeitschrift für Pädagogik*. 50(4), 487-495

Jacobs, A. M., Hutzler, F. & Engl, V. (2006) Dem Geist auf der Spur: Neurokognitive Methoden zur Messung von Lern- und Gedächtnisprozessen [Tracking the Spirit: Neurocognitive Methods for Measuring Processes of Learning and Memory]*,* in *Zeitschrift für Erziehungswissenschaft*, 9 (5), 71-86.

Joas, H. (1992) *The Creativity of Action*. Cambridge, UK and Malden, USA: Polity Press 2005.

Mead, G.H. (2002/1932) *The Philosophy of the Present*. Amherst, NY: Prometheus Books.

Meyer-Drawe, K. (2008) *Diskurse des Lernens* [Discourses on Learning]. München: Wilhelm Fink Verlag.

Miller, G.A. (1956) The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological Review*, 63, 81 – 97.

Mitgutsch, K., Sattler, E., Westphal, K. & Breinbauer, I.M. (Eds) (2008) *Dem Lernen auf der Spur. Die pädagogische Perspektive* [Tracking Learning. The Pedagogical Perspective]. Stuttgart: Klett-Cotta.

Oevermann, U. (2000) Die Methode der Fallrekonstruktion in der Grundlagenforschung sowie der klinischen und pädagogischen Praxis [The Method of Case-Reconstruction in Fundamental Research as well as in Clinical and Pedagogical Practice], in K. Kraimer, (Ed): *Die Fallrekonstruktion. Sinnverstehen in der sozialwissenschaftlichen Forschung* [Case-Reconstruction. Understanding in Socio-Scientific Research]. Frankfurt/Main: Suhrkamp.

Pauen, S. (2004) Zeitfenster der Gehirn- und Verhaltensentwicklung: Modethema oder Klassiker? [Critical windows of brain- and behaviour development: fashion or classic?], *Zeitschrift für Pädagogik*. 50. Jg. 2004, Heft 4, 521-530

Pflüger, H.-J. (2006) Von den Neurowissenschaften erziehen lernen? [Learning How to Educate from the Neurosciences?]*, Zeitschrift für Erziehungswissenschaft*, 9 (5),43-49.

Rumpf, H. (2008) Lernen als Erledigung und als Vollzug. Sich einlassen auf Befremdliches oder : Über Lernvollzüge ohne Erledigungsdruck. [Learning as a job to be done and as a transformative experience. Getting involved with the strange and disoncerting or: about learning without having to rush through], in K: Mitgutsch et al. (2008) *Dem Lernen auf der Spur. Die pädagogische Perspektive* [Tracking Learning. The Pedagogical Perspective]. Stuttgart: Klett-Cotta, 21 – 32.

Ryan, R. M. & Deci, E.L. (2000) Intrinsic and Extrinsic Motivation. Classic Definitions and New Directions, in *Contemporary Educational Psychology* 25, 54- 67.

Silvia, P.J. (2008) *Interest: The Curious Emotion. Current Directions in Psychological Science*, 17, 56-60.

Sachser, N. (2004) Neugier, Spiel und Lernen: Verhaltensbiologische Anmerkungen zur Kindheit [Curiosity, Game and Learning: Notes on Childhood from the Perspective of Behavioural Biology], *Zeitschrift für Pädagogik*, 50(4), 475-486

Sawyer, K. (2006) (Ed) *The Cambridge Handbook of the Learning Sciences*. New York: Cambridge University Press.

Schrittesser, I. (2007) *Bildung: Organisierter Widerspruch?* [„Bildung“: Organized Antagonism?]. Frankfurt am Main/New York/Wien: Peter Lang.

Schrittesser, I. (2011a) Lernen pädagogisch gewendet. Eine Annäherung und ihre Folgen für Methodologie und Methode [Looking at Learning from a Pedagogical Perspective. An Approach and its Consequences for Methodology and Method], in I. Schrittesser et al. (Ed): *Innovative Learning Environments - Fallstudien zu pädagogischen Innovationsprozessen* [Innovative Learning Environments – Case Studies on Pedagogical Processes of Innovation]. Facultas/WUV: Wien.

Schrittesser, I. (2011b) Professionelle Kompetenzen: Systematische und empirische Annäherungen [Professional Competences: Systematical and Empirical Approaches], in M. Schratz et al. (Ed) (2011): *Pädagogische Professionalität quer denken – umdenken – neu denken* [Re-Thinking Teacher Professionalism]. Facultas/WUV: Wien.

Singer, W. (2006) Brain Development and Education, *Zeitschrift für Erziehungswissenschaft*, 9 (5), 11-20.

Winch, Ch. (1998) *The Philosophy of Human Learning*. New York: Routledge.

Zirfas, J. & Liebau, E. (2006) Erklären und Verstehen: Zum methodologischen Streit zwischen Bio- und Kulturwissenschaft [Explaining and Understanding: On the Methodological Argument of Biological and Cultural Sciences],, in *Zeitschrift für Erziehungswissenschaft*, 9 (5), 231-244.

Notes

[1] For more on this see Schrittesser, 2007, 2011a and 2011b (in German).