Closing the Circle: From Dewey to Web 2.0.

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ABSTRACT

Taking into account the complexity and multiplicity of constructivist theories, the first part of this chapter focuses on the relationship between epistemology and pedagogy in constructivism, in particular in the radical constructivist position of von Glasersfeld, which is considered a significant referent in constructivism. To overcome some of the shortcomings of radical constructivism, I have then explored the origins of constructivist theory and practice in the work of John Dewey, whose ideas could be still a source of inspiration for constructivist educational practice. The second part of this chapter analyses the social constructivist development in different internet-based learning platforms and social software and considers at the end some practical difficulties and benefits of online learning for the implementation of constructivist learning theories for learners as teachers.

The definition of constructivist theory or constructivism is an issue in itself. Constructivism has become such a complex topic that just the effort to clarify the different positions and trends is enough to serve as the main subject of some papers where the authors have tried to put some structure into the enormous range of definitions, sections and positions regarding constructivism (Phillips, 2005; Riegler, 2005; Steffe &Gale,1995). It is not the purpose of this paper to do so, I will however give a brief overview of the complexity and multidimensionality of this field.

The difficulty of defining "constructivism" starts with the question whether constructivism is a theory, an approach, or a perspective. For von Glasersfeld constructivism is a way of thinking (von Glasersfeld (1985, 1992), for Siebert it is a metatheory (Siebert, 2004), Huitt considers the constructivist approach to teaching and learning as based on a combination of cognitive psychology and social psychology (Huitt, 2003), Dougiamas talks about the faces of constructivism (Dougiamas, 1998) as does Philips, considering constructivism as a secular religion within educational theory (Phillips, 1995) or even a magic word (Phillips, 2000) and Duit (1993) regards it as a fashionable and fruitful paradigm. What seems clear from all these studies is that, as Horst Siebert (2005) puts it, constructivism is not a scientific discipline in itself but an interdisciplinary and transdisciplinary "Paradigma," it is a perspective in which reality depends on the observer.

Common to all the approaches and different definitions is the source of the term "constructivism," which is a metaphor of architecture, and is about the building up of structures from pre-existing pieces, possibly specially shaped for the task. This metaphor, as Ernest (1995) points out, describes understanding as the building of mental structures, and it is also contained in the term "restructuring," often used as synonym for accommodation or conceptual change. Ernest also notes a relevant feature of this metaphor: the building blocks are not merely received, they are products of previous acts of construction.

A fundamental component of constructivism is action: knowing is an active process, learners are not passive receivers of learning contents. As Glasersfeld (1989) formulates the first principle of constructivism: "Knowledge is not passively received but actively built up by the cognizing subject" (p.182).

Although constructivism has received significant inputs from specific sciences such as neurobiology with the authors Humberto Maturana and Francisco Varela, and from brain research, two main fields remain the most relevant within the constructivist discussion: epistemology and pedagogy. Epistemology, or theory of knowledge, which considers the genesis and the nature of knowledge, is the main philosophical discipline associated with the term constructivism. The particular vision of theory of knowledge which considers that our knowledge is constructed has been labelled as constructivist epistemology or epistemological constructivism (Heylighen, 1995). In pedagogy the term constructivism applies to different aspects of this discipline such as learning theory, teaching techniques or the general pedagogical approach (Phillips, 2000). Although the theoretical frame of this paper as well as that of this volume is clearly within the educational aspects of constructivism, the first sections of this chapter will look in some detail the most relevant position in constructivist epistemologies to provide an insight into the origins and spirit of constructivism. After this I will look into new developments of online learning tools and to what extent they are within the spirit of constructivism.

Constructivism as Epistemology

A first look into the studies on "constructivism" show clearly the two parallel trends within this paradigm: the epistemological and the pedagogical. It is worth researching the extent to which these two positions are parallel – i.e., that they expand and develop in different realms never touching each other, or whether they are intrinsically interrelated.

It seems to make sense that learning theories come after philosophical ones, that is, the first fundamental question is: "what is knowledge?" and then the question arises "how to acquire knowledge?"

Constructivist theory has been associated with epistemology, which is the discipline within philosophy which deals with the question of what we can know, and with the possibility of truth and objectivity. Epistemology addresses the fundamental question in theory of knowledge of the relation between "reality" – the outside world – and our ideas about it. One main epistemological tradition, realism, states the possibility of true knowledge, of objectivity. Realism maintains the existence of a world – independent from the knowing subject - and the correspondence between this world and our ideas about it. Opposed to this

tradition, constructivism argues that our beliefs and perceptions of the world are purely human constructs and it denies the possibility of discovering and knowing the world as it is.

It is not clear where the origins of constructivist epistemology can be found, whether its origins can be dated to the 17th or 18th centuries, or even to Socrates. Although the term "constructivist epistemology" seems to have appeared recently (Piaget, 1967), the ideas of constructivist epistemology can be clearly found in the Enlightenment in the 18th Century in Kant's philosophy, even if he does not use this term. This philosopher declared that it is we who construct - and not discover – the known world. In his *Critic of Pure Reason* Kant demonstrated the framework-dependent character of perception and argued that the epistemological claim of knowing an object in "itself", independently of the subject that knows, has to be abandoned. It is impossible – argued Kant – to know the things in themselves, the noumena. This pure knowledge is possible for religion and ethics, but not for science. Science has to do with phenomena, and these are always determined by the categories of our way of knowing objects. Hence even if Kant did not use the word "constructivism," the essence of his epistemology is clearly constructivist as the human cognitive system is responsible for shaping our experience in the categories he described.

Later in the 20th century the rise and development of philosophy of science took as its starting point this critical position in relation to knowledge, and all the different positions that emerged at this time can be considered "nonfoundationalist epistemologies" (Phillips, 2003). Traditional epistemologies on the contrary were foundationalist in the sense that they regarded knowledge as being built upon some solid foundation. In the 20th century the major epistemological trend was to recognize that there is no absolutely secure starting point for knowledge: all knowledge is tentative, as Karl Popper (1968) states. Also the work of Thomas S. Kuhn on scientific revolutions and paradigms has been considered an important influence for constructivist authors, as Kuhn (1962) stressed the active role of scientific communities in science construction and he popularized the notion that inquirers always work within the context of a paradigm.

Radical Constructivism as a Referent

One of the most influential authors within the constructivist context is Ernst von Glasersfeld, whose work is an obligatory reference for every constructivist approach. According to Siegler (2005) Glasersfeld pioneered the philosophical-epistemological approach. The Austrian author explicitly takes Kuhn as a precursor of his position, which he has called "radical constructivism". Glasersfeld, who was also significantly influenced by Piaget's work, based his position on two principles:
Knowledge is not passively received but actively built up by the cognizing subject and the function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality, Glasersfeld (1989).
He names his position "radical" because he claims that constructivism has to be applied to all levels of description:

> The revolutionary aspect of Constructivism lies in the assertion that knowledge cannot and need not be 'true' in the sense that it matches ontological reality, it only has to be 'viable' in the sense that it fits within the experiential constraints that limit

the cognizing organism's possibilities of acting and thinking. (Glasersfeld, 1989, p.162)

These two principles of Glasersfeld quoted above have become a reference with respect to other constructivist positions and have, so to speak, a definition building character, that have played a significant role in distinguishing several types of constructivism, depending on the acceptance of the first principle only or of both of them (Ernest, 1995)

According to Glasersfeld (1983) the constructivist approach has had a significant impact on different disciplines, such as psychotherapy, but the main influence has been in educational practice and research. In following the consequences for education that Glasersfeld enumerate will be summarized:
- educational procedures aim at generating understanding (teaching) and not merely repetition of behaviour (training),
- the interest of the educator will be focused on what can be inferred to be going on inside the student head, rather than on overt responses
- teachers will realize that knowledge cannot be transferred to the student by language, but language can be a tool to guide the student's construction
- teachers will be aware that students are attempting to make sense in their experiential world, therefore they will be interested in student's deviation form the expected path.

These features of what Glasersfeld considers to be a constructivist pedagogy seem to be in agreement with the constructivist epistemology: the consequence of the enormous limitations of human knowledge would be to transfer the focus of education in learning how to learn rather than on learning contents. As Zarnik (2001) observes, the educational philosophy of constructivism is usually understood as being motivated by these metatheoretical insights.

The question is whether a constructivist epistemology is the condition for developing a constructivist pedagogy. And there are some reasons to think that it is not a necessary condition. On the one hand – as Rubin (1995) points out – nowadays constructivist epistemology is the only paradigm that survives, and that would mean everyone would belong to the constructivist school, and would turn "constructivism" into a more or less empty concept.   On the other hand there are other relevant authors in progressive education – e.g. John Dewey - whose starting point was not radical constructivist epistemology. The shortcomings of Glasersfeld's constructivism have been exposed in respect to his theory of knowledge, as well as to his pedagogical ideas. Vanderstraeten and Biesta (1994) state how radical constructivist theories of knowledge fail to explain the existence of plural worlds: it is not enough to reiterate that the correspondence between reality and knowledge cannot be proved and to acknowledge in general terms the existence of an external world. What is needed is to explain how we know that there is no correspondence, and how we know that there are no external objects out there. Also Howe and Berv (2000) point to the weak, actually shaky bridge between the subjective and intersubjective, when the private worlds of the teacher and her students are merely "taken-as-shared" in radical constructivist theory.

Although Glasersfeld's epistemological position is without doubt a necessary reference within constructivist theory, it is too embedded in epistemological questions to be a reference for a constructivist pedagogy in particular in relation to the more and more significant field of education within CMC (Computer Mediated Communication). Maybe an insight into the work one of the first precursors of constructivist learning theories, John Dewey, could

provide a fruitful link of the origins of constructivism and new developments in online learning.

John Dewey: Back to the Beginnings

There is no doubt that Dewey can be considered one of the developers of educational theories that lead to the evolution of constructivism. As a matter of fact he anticipated most of the relevant issues in constructivist pedagogy. Dewey has been considered a pragmatic social constructivist (Garrison, 1998). His starting point is clearly the primacy of action. In his work *The Quest for Certainty* (1929/1979) he regrets "the depreciation of action, of doing and making" that has been cultivated by philosophers. According to Dewey the reason for this elevation of knowledge above practice is fundamentally connected with the quest for certainty "which shall be absolute and unshakable." (Dewey, 1929/1979, p.6) and the search for certainty is based on the human need for safety, "to escape from peril." Dewey's proposal is, however, not to abandon the idea of certainty but only the one based on pure ideas. He states that many of the long-standing problems of philosophy in general and of theory of knowledge in particular could be addressed by "substituting search for security by practical means for quest of absolute certainty by cognitive means" (Dewey, 1929/ 1979, p.26)

One of the fundamental topics Dewey developed through his works is the intrinsic relation between action and knowledge: "our conceptions and ideas, are designations of operations to be performed or already performed. Consequently their value is determined by the outcome of these operations. They are sound if the operations they direct give us the results which are required." (Dewey, 1929/1979, p.137) For Dewey "knowing is not the act of an outside spectator but of a participator inside the natural and social scene, then the true object of knowledge resides in the consequences of directed action." (Dewey, 1979, p.196)

This last quote also shows Dewey's integration of individual and social dimensions in the construction of knowledge, which is actually a leitmotiv throughout Dewey's work, to reconsider the relationship of organism and environment (Vanderstreten & Biesta, 1998). Dewey's concept of transaction stresses the continuous, intrinsic connection of organism and world on the level of action (Dewey, 1896).

This practical approach to philosophy has been called "pragmatic social constructivism" (Garrison, 1998) and has significant consequences for his educational vision.
It is clear that with his work Dewey built the foundations of constructivist pedagogy which, according to Howe and Berv (2000), has two basic premises: instruction must take as its starting point the knowledge, attitudes and interests students bring to the learning situation, and instruction must be designed so as to provide experiences that effectively interact with these characteristics of students so that they may construct their own understanding. These both premises are extensively developed in the Deweyan educational theory.

In his book *How we think* (1910/1991) Dewey states the need to train the natural capacity of thinking into habits of critical examination and inquiry but also stresses the active role of learners:

> In the educational transaction, the initiative lies with the learner (…) If an individual can learn to think only in the sense of learning to employ more economically and effectively powers he already possesses, even more truly one can teach others to think only in the sense of appealing to and fostering powers already active in them.

Effective appeal of this kind is impossible unless the teacher has an insight into existing habits and tendencies, the natural resources with which he has to ally himself." (Dewey, 1991, p.29-30)

Dewey stresses the necessity of an active role for learners. When this active principle is neglected and the child "is thrown into a passive, receptive, or absorbing attitude (…) the result is friction and waste." The energy in schools should be "spent in training the child's power of imagery and in seeing to it that he was continual forming definite, vivid, and growing images of the various subjects with he comes in contact with his experience." Dewey (1897), p.5

From Constructivism to Constructionism: More than a Word Game

A significant emphasis on the social dimension of constructivism is the main characteristic of constructionism.
This term has been used in many contexts and for different purposes since Peter L. Berger and Thomas Luckmann published their book *The Social Construction of Reality* in 1966. As a learning theory the term has been associated with Seymour Papert. According to Papert (1987), the word constructionism is a mnemonic for two aspects of the theory of science education: From constructivist theories of psychology it takes a view of learning as a reconstruction rather than as a transmission of knowledge; the other aspect is that learning is most effective when part of an activity the learner experiences as constructing a meaningful product.

The simple catchy version of this idea is "learning-by-making", but as Papert (1991) asserts, constructionism is a multifaceted idea: with the play on the words from constructivism to constructionism (the *n* word opposed to the *v* word) constructivism shares with constructionism the connotation of learning as "building knowledge structures," irrespective of the circumstances of the learning. Constructionism then adds that learning occurs especially well when the learner is engaged in constructing something for others. Ackermann (1990) also notes that while most constructivist models of human intelligence remain essentially science-centred and logic-oriented (e.g. Piaget and Vygotsky) for constructionism (e.g. Papert and Turkle) offers a far less canonical view on formal knowledge and revaluates the concrete, more personal knowledge, as well as the art of learning and the importance of tools, media and context.
Gergen (1995) puts more emphasis on the affinities and differences between the two terms. From an epistemological point of view both are sceptical of foundational epistemologies and both challenge the traditional view of the individual mind as a device for reflecting the character and conditions of an independent world; the main difference -, however is that radical constructivism still maintains dualistic formulations traditional to Western epistemologies, while constructionism tries to break with this tradition, as also does Dewey in his practical and social approach to knowledge.
As educational theory constructionism is according to Gergen (1995) "a process in motion" which can be best described with the metaphor of the social dialog. Not only knowledge is considered in constructionism as being in continuous production of dialogues. The idea of the authority of the teacher is also challenged. The constructivist approach in pedagogy since Dewey has questioned in depth the "frontal style" of teaching.

Construcionism goes one step further questioning the myth of the superiority of teachers, regarding them more as a facilitators and as a learners themselves, as they try to know their students and their background.

In spite of these different connotations, the term constructionism does not seem to have been adopted generally by constructivist authors, not even in the context of social constructivism or CMC. For that reason to avoid confusion, I will use the general term "constructivism" or "social constructivism" instead of constructionism.

Constructivism in Practice: An epic journey?

The development of all these constructivist approaches to learning theories involves the rise of new attitudes, practices and techniques within education. It is, however, not a smooth development. The clash between theory and practice in education is impossible to overlook. On the one hand constructivist approaches are currently broadly accepted within the academic community. Today at educational research conferences, the idea that learners actively construct new knowledge is taken almost as a gospel (Kafai and Resnik, 1996), but in the concrete educational settings and institutions it is very difficult to put into effect. As Dewey (1938) noted long time ago, the road of new education is not an easier one to follow than the old road but a more strenuous and difficult one.

First, the roles of teachers and students have to be redefined and new roles learned, and this causes a significant amount of insecurity, anxiety and resistance. For students it is much easier to continue with the traditional passive role and acquire what the teacher or the book says, than to take an active role in the process by constructing, reflecting on their own experience, collaborating with other students and taking responsibility for their own learning. It is not easy to help students "break away" from their initial "regions of comfort" (Resnick and Ocko, 1991).

Second it is also enormously challenging for teachers to renounce their comfortable, secure and efficient authority position and to develop a very different – much more egalitarian - relationship to the students, more as a facilitator than a teacher. The change is not only difficult from a psychological point of view, as a possible crisis of identity, but is also related to specific didactic complexities within the new learning model. Examples are the necessity of finding out in which types of environments students are most likely to make personal connections with their projects, or exploring how learning activities can be organized to insure that students care about their projects in an deep and personal way (Resnick, 1991). Drawing on my own experience, a constructivist approach implies a bigger workload and time consuming preparation, and sometimes also lack of understanding by colleagues who ask: "Do you really want to do so much work?".

Trying to use a constructivist approach in teaching practice can be like an epic journey where many obstacles have to be overcome: after passing the land of the unwilling students and the land of the identity crisis and hostile colleagues – to use a metaphor from the Lord of the Rings – the last and most difficult obstacle has to be overcome: the land of the rigid institutions.

It is very difficult to introduce changes in the structure of schools, colleges, universities, even if they are small, and it always involves a great deal of effort, energy and time. Educational institutions are very reluctant to challenge their view of learning and to question, for example,

ways of assessment or to change the curriculum to allow more flexibility in academic tasks or to facilitate collaborative learning.

Despite all these difficulties it is not only possible to develop constructivist approaches and attitudes in teaching and learning, but it is, I would say, an unstoppable process that has been accelerated through the use of CMC (Computer Mediated Communication) and elearning.

Learning Management Systems (LMS), e-tivities and Web 2.0:
 A path without return

Constructivist ideas have been further developed and implemented in particular within the field of new technologies and design of learning software.
One of the most relevant authors in this context is Martin Dougiamas with his work on a well known open source virtual learning environment, Moodle.
Other successful Learning Management Systems - for example: Blackboard, eCollege, WebCT, Angel, Desire2learn - have very similar features. They all offer an online environment where students have access to personal functions such as email, calendars, file sharing and basic discussions, and some will offer as well new features encompassed in the realm of Web 2.0.
 I will however concentrate on Moodle because its author has explicitly referred to constructivist theories and authors in developing his VLE. The characteristics of LMS described in following can thus be considered general for virtual learning platforms.
According to Dougiamas (1998) the learning process is, as he states about his own developing of ideas, especially fostered when creating texts, web sites or computer software for and with others. This type of social constructivism focuses on the individual development of meaning through construction and sharing of texts and other social artefacts. (Dougiamas, 2003) The pilosophy of Moodle extends the ideas of constructivism into a social group constructing things for its members, collaboratively creating a small culture of shared artefacts with shared meanings.
Dougiamas drew on the work of S. Papert, K.J. Gergen and F. Steier to develop a pedagogy for internet-based tools to support learning. He states as the core of social constructivism five principles (Dougiamas 2008, p.2)

1. All of us are potential teachers as well as learners.
2. We learn particularly well from the act of creating or expressing something for others to see.
3. We learn a lot by just observing the activity of our peers.
4. By understanding the context of others, we can teach in a more transformational way (understanding the background of the students).
5. A learning environment needs to be flexible and adaptable, so that it can quickly respond to the needs of the participants within it.

These five principles focus on the idea of redefining the role of teacher and learner, where the limits become fuzzy or even interchangeable and also stress learning by doing something with and for others. Drawing on these principles, Moodle, the software designed by Dougiamas, aims to be a true collaborative environment to develop the idea that all are potential teachers as well as learners. Many of the activities in Moodle allow students to control common content such as forums, wikis, glossaries, databases, messaging and so on. It

also tries to break down further the distinction between teachers and students allowing system administrators and teachers to create new roles with any mix of capabilities they like.
All VLEs also facilitate construction and sharing of learning through all types of collaborative tools and tries also to make possible the understanding of the contexts of others, for example through the use of profiles, individual blogs, discussion starters, etc.

The question is whether the mere use of a LMS would per se imply a constructivist and more interactive way of learning. Tolmie and Boyle (2000) investigate the idea that technologies create environments which shape interpersonal exchange. They look into the notion of *affordances*: "properties of objects or systems which allow certain actions to be readily performed with them and which therefore push behaviour in certain directions" (p.120) According to their study, high-quality interaction, full participation and reflection do not happen simply by providing the technology. A "little human time and energy to get them to work" in words of Gilly Salmon (2002, p.4) is necessary. This is the starting point for this author in developing the concept of e-tivities and a five-stage framework for e-learning. Computer-mediated technologies offer an enormous potential for active and reflective learning; the key point, however, is activity design. The five steps in Salmon's model of teaching and learning online are: 1. Access and motivation, 2. Online socialization, 3. Information exchange, 4. Knowledge construction and 5. Development. The last two ones are clearly based on the "spirit of constructivism." At stage four, *Knowledge Construction,* participants start interacting with each other in more exposed and participative way, and as conferences unfold many participants engage in some very active learning (Salmon, 2000). The role of e-moderators at this stage is crucial to pull together participants and to enable development of ideas through discussion and collaboration. E-moderating is, however, according to Salmon, not the same as facilitating a face-to-face group. In CMC at stage four there is much less of a hierarchy, because participants start to become online authors rather than transmitters of information. At stage five, development, e-moderators and participants are essentially using a constructivist approach to learning: they explore their own thinking and knowledge building process.

According to Salmon the role of the e-moderator and activity planning would be essential for these learning platforms to support a constructivist learning approach.
Stephen Dowes goes one step further with his concept of "E-learning 2.0" (Dowes, 2006)
Dowes considers that the learning technology employed in LMSs in almost any higher education institution as a way to deliver online courses and organize learning content is not very different from traditional ways of delivering distance learning, even if the learning platform is supported by quizzes, tests and discussions.
He refers to other technologies that are introducing other ways of more active, learner-centered learning: Web 2.0
This term was coined to describe new developments and collective trends in the use of internet and to distinguish them from the original uses of the Web (1.0). Franklin & Harmelen (2007) explained that while Web 1.0 provided content for an audience of passive readers, in Web 2.0 many more users generate, consume and transform material posted on the web, an innovation referred to as "shared content" or "read/write." The most important feature of Web 2.0 is that the web becomes a platform and enables users to collaborate, work and play together.
The most important applications of Web 2.0 are blogs, wikis, podcasts, social tagging services (del.icio.us, Flicker), social networks and tagging. All these applications have many

educational uses (Franklin & Harmelen, 2007) in particular in higher education, because Web 2.0 is a natural platform for open learning materials.

In relation to constructivism Web 2.0 is highly relevant because it represents the web shifting from being a medium in which information was transmitted and consumed, into being a platform, where content is created, shared, repurposed and passed along as (Dowes 2006, p.4) formulates it:

> What happens when online learning ceases to be like a medium, and becomes more like a platform? What happens when online learning software ceases to be a type of content-consumption tool, where learning is "delivered," and becomes more like a content-authoring tool, where learning is created? The model of e-learning as being a type of content, produced by publishers, organized and structured into courses, and consumed by students, is turned on its head. Insofar as there is content, it is used rather than read— and is, in any case, more likely to be produced by students than courseware authors. And insofar as there is structure, it is more likely to resemble a language or a conversation rather than a book or a manual.

Although the use of Web 2.0 in higher education is too recent to have relevant and conclusive data about its pedagogical benefits it seems clear that the tools associated with Web 2.0 support social constructivist approaches to teaching and learning. Some studies carried out recently in UK and European universities suggest that students and staff recognized the advantages of Web 2.0 compared to traditional VLEs (Franklin & Harmelen, 2007). Dowes also emphasizes that the use of Web 2.0 taking as a starting point the student's own range of interest and experiences rather than the course topic: Further,

> This approach to learning means that learning content is created and distributed in a very different manner. Rather than being composed, organized and packaged, e-learning content is syndicated, much like a blog post or podcast. It is aggregated by students, using their own personal RSS reader or some similar application. From there, it is remixed and repurposed with the student's own individual application in mind, the finished product being fed forward to become fodder for some other student's reading and use. (Dowes, 2006, p.5)

This development in teaching and learning involves significant challenges not only in terms of intellectual property, control and accessibility. From a pedagogical point of view assessment is one of the main issues. The nature of assessment will need to be revised and new forms and new methods will have to be developed, where group work is going to replace individual work.

But the changes introduced by web 2.0 are going to challenge other concepts within the academic community such who is to decide the learning content of a course, or even whether there are objective criteria to compare different learning products? These questions bring us to back to the field of philosophy, specifically to epistemology. Web 2.0 confronts us with a reality that seems to be very near von Glasersfeld's radical constructivism and also in keeping with Dewey's ideal of learning.

Challenges for the future

Taking into account the issues that I have briefly considered in the previous sections: the difficulties of putting constructivist learning theories into practice and the affordances of new technologies, in particular of Web 2.0, there seems to be a clear shift in direction. New generations of students and course participants are so embedded in new technologies and new social uses of the web that they are using and developing constructivist ideas anyway. The problem of the unwilling students seems to be fading away while the hostile colleagues, and the land of the rigid institutions are likely to become the most important obstacles to deal with. As a recent research report by Becta (2008), on new technologies states, the most basic tension to be experienced in adopting Web 2.0 practices in educational settings concerns a shift in control or management of the educational experience: teachers and institutions may be actively resistant to changes that imply a greater learner autonomy, and a change of the teacher role from 'sage on the stage' to 'guide on the side'. But the change from individual learning to collaborative learning is also going to be a major issue in terms of assessment within the context of academic degrees. It is possible that new approaches to collaborative work within social constructivist approach could also change the traditional idea of assessment.

Conclusion

Familiarity with the knowledge about epistemological constructivism in general and radical constructivism in particular, as well as the work of Dewey is important not only to understand the origins and development of constructivist theory and practice, but also as a wider theoretical frame to see and analyze current debates and developments in teaching and learning with new technologies. Kuhn was one important theoretical referent for radical constructivism and now we can observe in the development of uses of new technologies, in particular in Web 2.0, a Kuhnian shift of education paradigms, where the direction is bottom up, where students are being the motor of changes in direction to more constructivist approaches. This trend is also very much in the spirit of John Dewey's practical approach to learning.
In constructivism we are confronted with the old philosophical problem of the relation between theory and practice. This is a tension that can be transformed into a fruitful dialogue between philosophical theories and technical developments, where both can learn and benefit from each other.

References

Ackermann, E. (1990). Piaget's constructivism, Papert's Constructionism: What's the difference? Retrieved April 15, 2008, from: http://learning.media.mit.edu/

Boudourides, M.A. (1998, July). *Constructivism and Education: A Shopper's guide.* Paper presented at the International Conference on the Teaching on Mathematics, Samos, Greece. Retrieved May 2, 2008, from: http://math.upatras.gr/~mboudour/articles/constr.html

Becta (2008) Web 2.0 technologies for learning at Key Stages 3 and 4. Retrieved August 13, 2008 from: http://becta.org.uk

Dewey, J. (1910/1991). *How we think.* Amherst/ New York: Prometheus.

Dewey,J. (1929/1979). *The Quest for Certainty.* New York: Paragon.

Dewey,J. (1897) My Pedagogic Creed. *The School Journal,* LIV (3), 77-80. Retrieved April 23, 2008 from http://www.infed.org/archives/e-texts/e-dew-pc.htm

Dougiamas, M. (1998). A Journey into Constructivism. Retrieved May 1, 2008, from http://dougiamas.com/writing/constructivim.html

Dougiamas, M. (2008). Pedagogy. From MoodleDocs. Retrieved May 1,2008, from http://docs.moodel.org/en/Pedagogy

Dougiamas, M. (2003). Moodle> Using Learning Communities to Create an Open Source Course Management System. Refereed paper, presented at EDMEDIA 2003. Retrieved May 2, 2008, from http://dougiamas.com/writing/edmedia2003/

Downes,S.(2006)'E-learning 2.0', *ELearn Magazine* http://elearnmag.org/subpage.cfm?section=articles&article=29-1

Duit, R. (1993). The Constructivist View: A Fashionable and Fruitful Paradigm for Science Education and Practice. In L.Steffe (Ed.), *Epistemological Foundations of Mathematical Experience.* New York, Springer-Verlag.

Eisner, E. (2003). Objectivity in Educational Research. In: M.Hammersley (Ed) *Educational Research. Current issues* (pp.57-72) London : Paul Chapman Publishing

Ernest, P. (1995) The One and the Many. In: P.Steffe & J.Gale (Eds). *Constructivism in Education* (pp.355-366). Hillsdale/New Jersey: Lawrence Erlbaum Associates.

Franklin,T., & van Harmelen, M. (2007). *Web 2.0 for Learning and Teaching in Higher Education*, London/ UK: The Observatory on borderless Higher Education.

Gergen, K.J. (1995). Social Construction and the Educational Process. In: P.Steffe & J.Gale (Eds). *Constructivism in Education* (pp.355-366). Hillsdale/New Jersey: Lawrence Erlbaum Associates.

Glasersfeld, E. von (1989). Constructivism in Education. In: Husen, T.,& Postlethwaite, T.N. (Eds.), *The International Encyclopedia of Education,* Supplement Vol.1. Oxford/New York: Pergamon Press, 162-163.

Heylighen, F. (1997). Epistemological Constructivism. *Principia Cybernetica Web.* Retrieved May 5, 2008 from http://pespmcl.vub.ac.be/CONSTRUC.hyml

Hildebrand, D.L. (2008). *John Dewey: A Beginner's Guide.* Oxford, UK: Oneworld Press.

Holec, H. (1981). Autonomy and Foreign Language Learning. Oxford: Pergamon

Howe,K.R.,& Berv,J. (2000).Constructing Constructivism, Epistemological and Pedagogical. In: Phillips, D.C.(Ed).(2000). *Constructivism in Education: Opinions and Second Opinions on Controversial Issues.* Ninety-ninth Yearbook of the National Society for the Study of Education. Part I. Chicago, Illinois, The University of Chicago Press.

Kant, I. (1784), *An Answer to the Question: "What is Enlightenment?"* . Konigsberg in Prussia, 30th September, 1784. Retrieved May 27, 2008, from http://philosophy.eserver.org/kant/what-is-enlightenment.txt

Kuhn, T.S. (1962). *The Structure of Scientific Revolutions.* Chicago and London: The University of Chicago Press.

Papert, S. (1987). Constructionism: A New Opportunity for Elementary Science Education. Retrieved May 12, 2008 from http://nsf.gov/awardsearch/showAward.do?AwardNumber=8751190

Papert, S. (1991). Situating Constructionism. In: I.Harel & S.Papert (Ed) *Constructionism* (pp.1-12). In:. Norwood/New Jersey: Ablex Publisheng Corporation

Phillips, D.C.(1995). The Good, the Bad and the Ugly: The Many Faces of Constructivism. *Educational Researcher,* 24(7), October, 5-12.

Phillips, D.C.(Ed).(2000). *Constructivism in Education: Opinions and Second Opinions on Controversial Issues.* Ninety-ninth Yearbook of the National Society for the Study of Education. Part I. Chicago, Illinois, The University of Chicago Press.

Phillips, D.C. (2003). Subjectivity and Objectivity: An objective Inquiry. In M.Hammersley (Ed) *Educational Research. Current issues* (pp.57-72) London : Paul Chapman Publishing

Popper, K. (1968). *Conjectures and refutations.* New York: Harper

Resnick, M. (1991). Xylophones, Hamsters, and Fireworks: The Role of Diversity in Constructionist Activities. In: I.Harel & S.Papert (Ed) *Constructionism* (pp.1-12). In:. Norwood/New Jersey: Ablex Publisheng Corporation

Resnick, M. & Ocko, S. (1991). LEGO/Logo: Learning Through and About Design. In: I.Harel & S.Papert (Ed) *Constructionism* (pp.1-12). In:. Norwood/New Jersey: Ablex Publisheng Corporation.

 Riegler, A. (2005). Editorial. The Constructivist Challenge. *Constructivist Foundations.*1(1), 1-8.

Rubin, D. (1995). Constructivism, Sexual Harassment, and Presupposition: A (Very) Loose Response to Duit, Saxe and Spivey. In: P.Steffe & J.Gale (Eds). *Constructivism in Education* (pp.355-366). Hillsdale/New Jersey: Lawrence Erlbaum Associates.

Salmon, G. (2000). *E-Moderating. The Key to Teaching and Learning Online.* London and Sternling (USA): Kogan

Salmon, G. (2002). *E-tivities. The Key to Active Online Learning.* London and Sternling (USA): Kogan

Siebert, H. (2004). Sozialkonstruktivismus: Gesellschaft als Konstruktion. *Sowi-online.e.v., 2. R*etrieved May 5, 2008, from http://www.sowi-online.de/journal/2004-2/sozialkonstruktivismus_siebert.htm

Siebert, H. (2005). *Pädagogischer Konstruktivismus. Lernzentrierte Pädagogik in Schule und Erwachsenenbildung.* Weinheim und Basel: Beltz Verlag

Vanderstraeten,R. & Biesta, G. (1998). Constructivism, Educational Research and John Dewey. In: Paideia Project on-line, 20th World Congress of Philosophy. Retrieved May 5, 2008, from http://www.bu.edu/wcp/Papers/Amer/AmerVand.htm

Zarnic, B. (2001). Learning to learn: An Epistemological Paradox in Education. *Synthesis Philosophica, 32,* 355-362.