Constructivism as an `energiser for thinking'!

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Abstract

This paper aims to re-examine recent criticism on radical constructivism as an inadequate research framework for discussing learning and teaching. A number of questions are raised in an attempt to focus attention not on the theory itself but on what the theory may imply for the learner's rights. Finally it is suggested that even though the theory cannot provide clear cut answers to issues related to learning as a contextualised practice in a social and political setting, it still challenges research theorising and contributes to an educational discourse.

A few words about the scene...

Although constructivism has been severely criticised during the last two decades either in the name of Piaget or in the name of its `radical' successor von Glasersfeld, this theory of knowledge or alternatively of `knowing' is still a matter of discussion. In particular, the criticism of Piagetian theory and methodology has been widely accepted via the seminal work of Donaldson (1978) and Walkerdine (1984), who have put forward convincing arguments about the stages of understanding being an unhelpful way of conceptualising the process of learning.

We have witnessed the rise and fall of the radical perspective of constructivism advocated strongly by von Glasersfeld. Radical constructivism has enjoyed a rapid rise of followers within the maths education community in which many researchers have found hope and inspiration. It was seen as an alternative to the Piagetian approach of understanding the process of learning by appreciating its complexity and not conforming to the discreteness implied by the Piagetian stages. At the same time fierce debates were initiated, due to its harsh principles, which brought constructivism to the forefront of maths education (Davis *et. al.* 1990, Malone and Taylor 1993). Its strong position regarding the status of knowledge concerns the denial of objective truth and emphasis on subjective constructions of reality. This has resulted in the argument of language being considered as an efficient means for communicating and that perfect communication is an illusion (see von Glasersfeld 1989, 1995 for a detailed outline of the above).

Negative interpretations of the above claims accuse radical constructivism as leading to a view of learning as a process of isolation (Davis *et. al.* 1990, Lerman 1989). Positive interpretations of radical constructivist positions have

directed our attention at the potentially useful implications for approaching the learning of mathematics. For example, the issue of denying the existence of any absolute truth, can be interpreted as a challenge to the traditional attitudes and viewpoints about the epistemology of mathematics as both a body of knowledge and a process of practice. The following quotations are representative of this line of thinking. Narode argues:

But not all constructivism is nihilism. The aim of this epistemology is not to destroy for the sake of destruction, but to expose the myth of reality so that attention may be focused on the social and psychological processes of individuals together defining not one world, but many worlds . . . the worlds individually constructed

(Narode 1987, p 3)

In this sense, one's attention can be focused on subtle issues and interactions that affect the process of communication, which a transmissional perspective may hide. Lerman in a similar way had also argued for exploring learning through a radical constructivist viewpoint:

Far from making one powerless, I suggest that research from a radical constructivist position is empowering. If there are no grounds for the claim that a particular theory is ultimately the right and true one, then one is constantly engaged in comparing criteria of progress, truth, refutability etc., whilst comparing theories and evidence. This enriches the process of research.

(Lerman 1989, p 216)

In other words, the learner needs to change his/her attitude towards what constitutes knowledge and learning and by being critical and in charge of his/her development as a learner.

Narode and Lerman were not alone in this interpretation of constructivism. Many other researchers have also argued that this perspective has challenged the transmissional type of teaching, (i.e. the form of 'lecturing' and 'telling') and has encouraged a new view concerning the process of learning (Confrey 1990, Kilpatrick 1987, Wheeler 1987, Goldin 1990, Ernest 1991). As a result, the transmissional model of learning has been rejected since there was no hope of matching knowledge of the one individual to the other. And at the same time, the role of both the teacher and the learner has changed into one of being more

active participants in the process of communication, where they aim along with the teachers to understand each other. Knowledge is not regarded anymore as 'transferable' and although 'perfect' communication among people is an illusion, it is believed that this perspective implies that successful communication can be pursued. There is a persuasive power in these arguments that can easily lead us to believe that the way to promote autonomous and critical learners needs to come through the adoption of a radical constructivist perspective. This, of course, raises a serious political question: to what extent does the society, through the microcosms of university, school or community, need critical and autonomous learners? In other words, can the system in its present state afford them?

Recently we have observed the rapid advancement of the socio-cultural perspective of constructivism influenced by a re-discovery of Soviet psychology based mainly on the work of Vygotsky. Projects inspired by radical constructivism, and having an explicit relatedness and resonance to its principles, now have their findings being re-examined and re-constructed through a socio-cultural perspective (e.g. Cobb and Yackel 1996, Jaworski 1994). Researchers who had been influenced by radical constructivism have now shifted their attention towards a socio-cultural perspective. For example, Lerman (1992, 1994, 1996) objects to the neglect of language and citing Vygotskian theory suggests that the construction of mathematics knowledge needs to be approached as a "social construction through language" and not as merely subjective interpretations "whose communication are ultimately incommensurable with others" (Lerman 1992, p 8). And Jaworski (1994) asserts that radical constructivism cannot provide answers to the question of how pupils come to know/learn what the teachers or the curriculum intends to teach. Some researchers attempt to explore the complementary between the radical and the socio-cultural, whilst others remain sceptical about an unquestioned or uncritical adoption of constructivism in maths education (Confrey 1995).

A few `naive' questions...

Reflecting on the above, I would like to raise the following questions:

Radical constructivism has challenged the conservative viewpoint of teaching as `telling' or as `transferring' information. *Why then is it regarded nowadays as a conservative and restrictive perspective for looking at the process of teaching and learning?* In particular the denial of an objective reality can be interpreted as the denial of authority which to many does not signify a capitalistic or conservative viewpoint. *Why then is the focus on subjective meanings of reality interpreted as denial of social awareness?*

Moreover, learning within this paradigm has been viewed as a highly subjective process in which the learner creates `powerful mathematical constructions', to use Confrey's words. Critical awareness, reflection and autonomy are encouraged in this complex learning process. Consequently, it has been claimed that radical constructivism promotes a model of the learner that can be met only in elitist circles of our society (Woodrow 1996). Does it mean then that the above attributes need to be regarded as `luxuries' for the few? And that people from lower socio-cultural backgrounds must be deprived of being/becoming critical, autonomous and aware learners. Could one not see the above as the right we all deserve to being empowered learners, to being able to govern our own knowledge and its process, and to being able to enjoy related types of teaching?

Learning from a radical constructivist perspective has been described as a lonely process. Is it really lonely, or does it only become lonely when the `critical', `reflective' learner cannot easily find teachers or co-learners who will be willing to `negotiate' and `communicate' his/her mental constructions of a particular problem or task? Instead of looking for ways of supporting the `subjectivity', `loneliness' or `struggle' of the individual (learning is after all an emotional process with ups and downs),why do we turn our backs on the `big problem' and get busy ourselves with defining the problem in different words, or posing the same question only in a different way? Is it perhaps because it provides a difficult perspective for learning to be pursued within classrooms and within the programmes of initial teacher education and teachers' in-service training? Or is it because it does not fit with the social system in schools and institutions? Or is it perhaps because we do not simply know yet what it means to support a reflective and critical learner?

The socio-cultural perspective promises to provide tools for exploring the process of learning as it takes place within the social and political conditions of the varied institutional systems in which it is contextualised. In this way one can understand the nature of pupils' tensions and teachers' constraints in being able to carry out their work and duties in the complex system of a classroom. However, would this be with a view of explaining the complicated reality and the restrictions it poses on pupils empowerment? Or would it be with an eye of finding ways that would promote easier conformity with the established norms of the individuals, classrooms, institutions and communities?

Back to the reality of research practice...

In the meanwhile, projects are in progress, research findings need to be disseminated and researchers must produce reports that successfully inform practice and policy. Moreover, we are still driven by a moral duty or responsibility as workers in the field of maths education to contribute collectively in order to articulate and raise the status of maths education as a

scientific field (see Sierpinska *et. al.* 1993).

To this end, researchers are seeking channels and means for communicating the products of their research and also their ideas which are in progress of development. Pimm (1987) has used the linguistic term `register' (Register is a technical linguistic term which Halliday (1975) describes as `*a set of meanings that is appropriate to a particular function of language, together with the words and structures which express these meanings*", p 65, quoted in Pimm 1987). He used this to describe not only the words and symbolisms used in maths but also the broader aims and behaviour of people who work in this practice, including their attitudes and ways of expressing and communicating ideas and knowledge. Pimm preferred the term `register' as being more appropriate to describe mathematics, not as a dialect, but as a system of meanings which accommodates the co-existence of variations in actual meanings rather than surface variations due to the choice of different words.

Along similar lines, I would like to suggest that constructivism can be viewed as the contributor of a `register' for maths education research, not in the sense that it covers the needs of all researchers but of a significant community within the broader area. It provides not only a theoretical framework about `subjective construction of knowledge' or `knowing' or `social construction of knowledge', but also `semiotic tools' that can be used as means for communication and development of new knowledge within the field. These semiotic tools include language and terminology, theoretical constructs and specific research methods for carrying out research. As examples, one can refer to the Piagetian clinical interview, or the teaching experiment first devised by the Soviets and used extensively by radical constructivist researchers. Of course these are broader research methods which have been modified for the purposes of the research questions posed within this frame. Moreover, a well established bank of published work exists which contains a public history of its background and evolution through books, journals and project reports. This makes the theory of constructivism open to public debate, discussion, argument and also further development.

The above all help people to know what they are talking about, to take meanings as shared and to feel they belong in a domain of `consensus' or `intersubjectivity'. Even though there are disagreements, different viewpoints and approaches to the same questions, researchers still use terms, language and meanings that assist them to engage in an educational discourse where arguments are put forward and opinions are disseminated and hopefully communicated. For some, it is a territory within which researchers themselves construct their own knowledge about the practices they explore. The constructivist `register' forms a community of users with positive outcomes but

also with the associated danger of being trapped into a particular line of thought be it radical or socio-cultural.

In conclusion, I feel that the question "How does this theory inform our conceptualisation of learning and teaching mathematics?" needs to remain open, thus safeguarding creativity and open-mindedness in researching and theorising. In fact, it is probably very difficult. Indeed, it may well be impossible to articulate precisely the dialogical, cyclical or palindromic relation between the theory and the practice of teaching and learning. Perhaps seeking one single answer is admitting uniformity across different research settings, a viewpoint that resulted in the application of relevant curricula in developing countries with having very negative feelings (see research in `ethnomathematics'). The existence of a constructivist `register' is primarily an energiser for thinking, in the sense that it can assist to raising questions and articulating interpretations about a specific research problem and for communicating within the wider maths education community.

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