

# CAN WE TALK ABOUT CONSTRUCTIVISM?

Steve Lerman

Centre for Mathematics Education South

Bank University, London

Constructivism is the dominant view of learning, at least within the mathematics education community. It is not difficult to understand why: it offers a theoretical rationale for the desire of most teachers to shift the locus of authority and control from the teacher to the pupils; it offers a justification for mixed-ability classes and individualised learning; the powerful metaphor of children constructing their own knowledge seems to describe the processes which are currently emphasised as thinking mathematically, particularly in problem-solving. I would argue that constructivism has been widely adopted because it appears to suit existing approaches to teaching, not the reverse, that it offers a particular view of the role of the teacher and the nature of the classroom. On the contrary one of the major weaknesses of constructivism is that it offers no connection between its theoretical foundations, that children construct their own knowledge, and what the teacher should do. Even in a banked lecture hall of 300 students and one lecturer 'transmitting' material for hours students are still constructing their own knowledge. All that is argued by constructivists is that some situations will encourage better or richer constructions than others. In order to make claims about the structure of the classroom, role of the teacher, appropriateness of materials, that encourage 'rich' constructions, constructivists need to draw on other values and beliefs, such as the 'good' ways to teach I mention above. In this report of the presentation given at the meeting I will focus both on the ideas presented and on those I did not quite complete, as well as attempting to incorporate at least some of the comments made by the other participants.

Constructivism's problem with 'social'

The limitations that I will argue are inherent in the radical constructivist position stem from the fact of other people, culture, and the social. The central principle of constructivism is that the individual is the source of meaning; indeed, constructivists will claim, how can meanings inhere in anything outside the cognizing human agent, and if they did how could they be absorbed by that individual?

„ ... we come to see knowledge and competence as products of the individual's conceptual organization of the individual's experience ... „ (E. von G. 1983 p. 66)

This principle was formed by Piaget, although carried many steps further by von Glasersfeld and others, in order to challenge both naive empiricism and platonism as theories of knowledge. We are neither born with the inherent notion of 'table' nor does unsullied observation provide us with the essence of 'table'. There is another view, which constructivists do not consider except when mistakenly conflated with these two absolutist theories, namely that 'table' is what cultures say a

table is, that is all, and individuals are enculturated into those meanings through human consciousness being actually about communication. I return to this below.

Constructivist researchers have recognised, in recent years, that social aspects of the classroom have been underplayed:

"Constructivism, at least as it has been applied to mathematics education, has focused almost exclusively on the processes by which individual students actively construct their own mathematical realities ... However, far less attention has been given to the interpersonal or social aspects of mathematics learning and teaching ... how ... does mathematics as cultural knowledge become "interwoven" with individual children's cognitive achievements? In other words, how is it that the teacher and the children manage to achieve at least temporary states of intersubjectivity when they talk about mathematics?" (Cobb, Wood & Yackel 1991 p. 162)

The answer that is offered is that one must take account of 'social interaction' and this answer is offered in various forms. I will describe the two main ones.

How do the radical constructivists (a la Piaget) deal with social Interaction?

The first of these forms of response is to re-examine what Piaget has to say about the function of social interaction.

(i) elaborating and justifying Piaget's position (Steffe, von Glasersfeld, Jaworski etc.)

Constructivism draws on biological metaphors to talk of equilibration of the individual's mental structures and the viability of the individual's theories or knowledge. By this argument, interactions with the world are necessary to the individual to test out her or his ideas and beliefs. This testing is driven both by the active and inquiring nature of all humans and by the very conceptualising itself. All interactions, though, are on the same level. There is no privileging of language and human communication:

"Sensory-motor material, graphic representations, and talk can provide occasions for the abstraction of mathematical operations, but they cannot convey them ready-made to the student." (von Glasersfeld 1992)

Thus I will challenge *my* belief that I can walk through walls by a sensori-motor experience and *my* belief in *my* own views about learning by testing them in argument with a constructivist. Perturbations will be set up by those interactions which will challenge the viability of those theories and the cognitive conflict will be resolved by me through striving to return to an equilibrium in *my* personal knowledge. I would argue that the wall will set up a much stronger perturbation; *my* reaction to someone disagreeing with *my* ideas is to think them stubborn, unreasonable and wrong. Of course they will think the same of me. The argument I am making here is that the reaction an individual makes to these perturbations is just as likely to be a splitting or 'monster-barring' as an accommodation. However, many constructivists will maintain that Piaget's formulation of the effect of social interaction is quite adequate:

"In this sense it is legitimate to interpret Piaget's work as a social-cultural approach in which he explained the mathematical development of children as self-regulating, autonomous organisms interacting in their environments. He seemed to take the social-

cultural milieu of the children as a given without attempting to alter their most general experiences. "

"Making sense", then can mean to construct ways and means of operating in a medium to neutralise perturbations induced through social interaction." (Steffe 1993)

I want to argue that whilst this position is coherent and consistent it is also very limited. It ignores so many aspects of social life and all of the power of communication, language and enculturation, and cannot accommodate any of the socio-cultural research of recent years. But I will briefly return to these below.

(ii) deveiooino a 'social constructivism' which incorporates both (Ernest, Cobb, Wood, Yackel, Voigt, Bauersfeld etc.)

The other move that is made by many of the constructivists is to try and incorporate an emphasis on communication into their constructivism in a complementary fashion. Below are three such arguments:

" ... we can observe that when we talk of students' constructive activities we are emphasising the cognitive aspect of mathematical learning. It then becomes apparent that we need to complement the discussion by noting that learning is also a process of acculturation. "(Cobb, Yackel and Wood 1992 p. 28)

" ... although the primacy of focus of each of conventionalism (*Ernest's term for inter subjectivity*) and radical constructivism is sacrificed in social constructivism, their conjunction in it serves to compensate for their individual weaknesses ... " (Ernest 1991 p. 86, italics my addition)

"The fundamental orientation of the work in our own classroom springs from the radical constructivist principle and an integrated and compatible elaboration of the role of the social dimension in these individual processes of constructing as well as the processes of social interaction in the classroom." (Bauersfeld 1992 p. 2)

I want to argue that social constructivism, sometimes taking one view of learning as observably occurring and sometimes the other, is incoherent and inconsistent. For one thing knowledge, concepts and even the filter for perceptions are individual and not shared, in the constructivist view. This filter is the conceptual state of the individual which makes her or him interpret or indeed ignore any interaction. But how is it that what constitute cognitive conflicts, disagreements and social interactions that are supposed to lead to dis-equilibrium and consequently adaptation do impinge on the individual and are shared, arising out of the 'social dimension of individual processes'? (Actually this is a criticism of radical constructivism as well as of social constructivism.) The strongest incoherence, however, is in taking communication and language as having no power to enculturate or to position individuals or to carry and regulate subjectivities at one time, but to accept those characteristics of discursive practices at another time.

#### **ANOTHER ALTERNATIVE: REJECTING CONSTRUCTIVISM**

There is another view of knowledge and of people that is not considered, one that transcends the separation of subject from everything else and without recourse to denying any validity to knowledge except that in individual minds. I would argue that it is offered by Lev Vygotsky's

cultural psychology; by the research on situated cognition of Jean Lave; by the studies of context and of affect and cognition of Jeff Evans; by the studies of classroom discourse of David Pimm and pupils' writing of Candia Morgan and Andrew Waywood; and the work influenced by poststructuralist discourse of Valerie Walkerdine and others. In my own recent and current writing (1992, 1993 and forthcoming) I have attempted to elaborate some aspects of this view. Here, I would summarise the view as follows:

Knowledge Isn't In the Individual's mind, nor 'out there' In objects or symbols.  
Knowledge Is as people use It, In Its context, as It carries Individuals along In It  
and as It constructs those Individuals. Knowledge Is fully cultural and social.  
and so too Is what constitutes human consciousness. Communication drives  
conceptualisation.

As I argued at the start. constructivist principles and especially the metaphor of construction are powerful and dominant. However, radical constructivism is a severely limited view of learning, denying so much of life, and social constructivism is incoherent, an attempt to have one's cake and eat it. Starting from a fully socio-cultural view of the mind, the individual, learning and knowledge is a different position, one which seems to me to offer a much richer view of teaching and learning.

## References

- Cobb, P., Wood, T. & Yackel, E. 1991 "A Constructivist Approach to Second Grade Mathematics" in von Glaserfeld (Ed) *Radical Constructivism in Mathematics Education*, Dordrecht/Kluwer.
- Cobb, P., Yackel, E. & Wood, T. 1992 "A Constructivist Alternative to the Representational View of Mind in Mathematics Education" *Journal for Research in Mathematics Education* Vol. 23, No.1, p. 2-33.
- Ernest, P. 1991 *The Philosophy of Mathematics Education* Brighton UK: Falmer.
- von Glaserfeld E. 1983 "Learning as a Constructive Activity" *Proceedings of the Fifth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, Montreal, Vol. 1, p. 41-69.
- von Glaserfeld E. 1992 "A Radical Constructivist View of Basic Mathematical Concepts" paper presented at Topic Group 16, Seventh International Congress on Mathematical Education, Quebec
- Lerman S. 1992 "The Function Of Language In Radical Constructivism: A Vygotskian Perspective" *Proceedings of Sixteenth Meeting of the International Group for the Psychology of Mathematics Education*, New Hampshire, Vol. 1
- Lerman 1993 "The Position of the Individual in Radical Constructivism: In Search of the Subject" *Constructivist Interpretations of Teaching and Learning Mathematics* J. Malone & P. Taylor (Eds), Curtin University of Technology, Perth
- Lerman S. (forthcoming) "Changing Focus in the Mathematics Classroom" in *The Culture of the Mathematics Classroom* S. Lerman (Ed)
- Steffe, L. 1993 "Interaction and Children's Mathematics" Paper presented at American Educational Research Association, Atlanta, Georgia