TWO MARKS OUT OF TEN FOR CONSTRUCTIVISM

Stuart Rowlands

Centre for Teaching Mathematics, University of Plymouth, Drake Circus, Plymouth, PL4 8AA (srowlands@plymouth. ac. uk).

> I have a candidate for *the* most dangerous contemporary intellectual tendency, it is .... constructivism. Constructivism is a combination of two Kantian ideas with twentieth-century relativism. The two Kantian ideas are, first, that we make the known world by imposing concepts, and, second, that the independent world is (at most) a mere'thing-in-itself forever beyond our ken .... [considering] its role in France, in the social sciences, in literature departments, and in some largely well-meaning but confused, political movements [it] has led to a veritable epidemic of 'worldmaking'. Constructivism attacks the immune system that saves us from silliness (Devitt, taken from Matthews 1997).

In 1993 Duit had estimated that 2,500 constructivist research articles were published in education journals (Matthews 1997). Many of these articles are inspired by constructivism but with little reference to the controversial philosophical issues. What we have instead are erroneous philosophical assumptions from which pedagogical issues are elaborated. This is true of both mathematics and science education and the latter has led Matthews (1997), the editor of *Science & Education*, to complain that:

> Unfortunately matters of deep philosophical importance over which there have been centuries of debate, too frequently appear almost as throw-away lines in science education writing. When they are elaborated, the elaboration is often slight, being little more than the citing of names, or claims that 'since Kuhn such and such', or 'following Kant so and so', or 'Latour has shown that something or other'. There have of course been deeper analysis .... But overall the theoretical, pedagogical and curriculum proposals of educational constructivism are like an inverted pyramid: they rest on a tiny base. It is in everyone's interest that this base be made more substantial, and be well scrutinised (p. 8).

'The history of philosophy is a footnote to Plato' (A. N. Whitehead) and the issues that surround relativism, that central ingredient of constructivism, have been debated since Plato and Protagoras.

The irony is that if reference is made to the issues raised by constructivism back in, say, 1994, then you are in danger of being dismissed on the technical point that 'the debate has moved on since then'. But has it? Consider a recent contribution: Staver's (1998) *Constructivism: Sound Theory for Explicating the Practice of Science and Science Education.* The following is Staver's four principles of von Glasersfeld; the first three, Staver states, are non-controversial:

> Knowledge is actively built up from within by a thinking person: knowledge is not passively received through the senses or by any form of communication. Second, von Glasersfeld described the importance of social interaction in the construction of knowledge. Social interactions between and among learners are central to the building of knowledge by individuals. Third, the character of cognition is functional and adaptive. Cognition and the knowledge it produces are a higher form of adaptation in the biological context, in which the functional concepts of fit and viability - two concepts which we know well and embrace in evolutionary theory - also characterise knowledge. Fourth, von Glasersfeld described what the purpose of cognition is, and what it is not. Cognition's purpose is to serve the individual's organisation of his or her experiential world; cognition's purpose is not the discovery of an objective ontological reality (p.503).

If knowledge is not received by any form of communication (first principle) then how is social interaction central to the building of knowledge (second principle)? That the first three principles can be considered to be 'non-controversial' is an outrage, given that this contradiction between the first and second principle is what radical constructivists, social constructivists and socioculturists have been debating (eg. Lerman 1994; Steffe & Tzur 1994) and will continue to debate for evermore (eg. Lerman 1998 V's Steffe 1998 in *Chreods* 13). If knowledge is a product of cognition (third principle) then how can mathematics simply be a product of the student's cognition if it has taken centuries to develop? Staver states that the fourth principle is controversial. The irony is that the fourth principle is stated in such a way that it becomes non-controversial: in what possible sense can we say that cognition's purpose *is* the discovery of an objective ontological reality? What does 'discovering' an ontological reality mean, and would we recognise an ontological reality once we have discovered it? What *is* controversial is whether or not one considers the proposition 'There is an external world that exists prior to consciousness' as a *truth* that cannot be proved. This proposition separates the realist from the idealist and has been the subject of much heated debate in the history of philosophy (see Suchting 1986). This is also the central issue in constructivism and one that is central to Staver's article:

> The continuing debate about constructivism as an epistemology and, more fundamentally, about truth as correspondence versus coherence provides an opportunity to examine the relative importance of the two issues that Osborne mentioned. Scientists value parsimony and building on prior work. Which do scientists value more? As an epistemology, constructivism should be preferred on grounds of parsimony because it contains one less assumption - the realist presupposition; it does not assume a priori the existence of an external world which is separate from human perception (p.514).

Do scientists value parsimony? The Copernican system is often cited by many as an exemplar of 'simplicity' because it contains fewer assumptions than the Ptolemaic one (the latter contains assumptions such as epicycles in order to sustain it). Actually this is not the case! There were more difficulties besetting the Copernican system then there ever were besetting the Ptolemaic one (initially the former still had to employ epicycles in order to give correct predictions) and these troubles were persevered with for over two centuries until the system was perfected (Chalmers 1982). So should we accept constructivism on the grounds of 'parsimony' - that it does not contain the assumption of an external world prior to consciousness? Despite any love of parsimony that the scientist might have, the *practice* of science presupposes the existence of the external world that is prior to consciousness *simply because science is an attempt to say something about the world and is not an attempt to give coherence to our experiences.* In fact, the concepts and *theoretical objects* (see Suchting 1986) of science are contrary to making sense of experience. For example, a thrown ball 'going up' is contrary to it being in 'free-fall' and student 'preconceptions', 'misconceptions', 'alternative frameworks' or 'intuitive ideas' of force and motion (making sense of experience) as reported in hundreds of research papers (see Rowlands et al. 1999) are contrary to the well-defined meaning offorce in Newtonian mechanics (which models the physical world).

The removal of the assumption that the external world exists does not make constructivism simpler, in fact it does quite the reverse: while constructivists continue to exist then constructivism will continue to be debated with more outrageous statements being added to the claptrap. Unfortunately, to give 'justice' to Staver's article requires a critique with as twice as many words as Staver's article (Suchting 1992 does a good 'deconstruction' job on one of von Glasersfeld's articles, and yet the only reference to this deconstruction I have seen is Lerman's 1994 exhortation that it is 'maddening'.

Why, I wonder?). I will therefore focus on the central issue of constructivism - the existence of the external world.

Yon Glasersfeld's (1995), and Staver's (1998), attack on realism is an attack on the correspondence theory of truth. The correspondence theory of truth asserts that knowledge of the world is structured according to the state of affairs that it depicts. For example, if I were to say that 'the cat is on the mat' then I am not just expressing a thought but I am saying that things are as I say they are (that there is a cat on the mat). The correspondence theory is untenable when it comes to the way science explains the physical world (see Chalmers 1982). For example, what state of affairs does the proposition 'an object in the absence of force moves in uniform motion' depict? Implicit in Yon Glasersfeld's main argument is that it is *because* the correspondence theory is untenable then the external world ('ontological reality') is unknowable (and so knowledge is of experience and not of the world). The correspondence theory is untenable when it comes to science, so what do the theoretical objects of science refer to? For von Glasersfeld (1995) they don't refer to anything but are merely 'fictions' that can 'explain anything you want to explain'. However, it must seem strange to von G that such 'fictions' can be seen colliding with smoke particles in the phenomenon of Brownian motion, or that Kekule's molecular rings can be seen almost directly under an electron microscope or that Hertz was able to express Maxwell's equations 'in a visible and tangible form' (Chalmers 1982). As Chalmers explains, *acceleration* is on the one hand an abstract mathematical concept and yet *it is what objects do!* If! were to drop a pen what would it do? For one thing it will not go up, for another it will accelerate downwards. *The pen obeys the laws of nature and cannot be explained in terms of making sense of experience* (unless perhaps you are Aristotle, but then Armstrong walking on the moon was calculated using Newtonian physics, not Aristotle's). What laws of nature? The laws of nature as expoused in many physics textbooks. *If the physical world was other than it is, then the concepts of science would be different to what they are.* If there is no correspondence between scientific theory and the state of affairs its meant to depict, then what does scientific theory refer to? It refers to the state of affairs as artificially created in experimentation. This is not to say that the laws of nature are only obeyed under experimental conditions; rather, experimentation creates the conditions to show that certain laws are obeyed - laws do not depict empirical generalities or localised states of affairs but *transfactual tendencies* that can only be revealed under artificial conditions (Chalmers 1982) - in other words, 'Nature is tortured in order to reveal its secrets' Matthews (1980).

Constructivism attacks the immune system that saves us from silliness, but worst, it downplays the very subject matter (science and mathematics) that educationalists are meant to have a keen interest in (a critique of the relativism that exists in mathematics education can be found in Rowlands et al. 1998). There is a political point to be made from all this: if the present standard of debate continues then educationalists are liable to come under attack from the right-wing. As the international recession worsens (and contrary to the economists, who do not even understand the workings of the economy that supports them, the crisis of capitalism has developed over two decades) further cutbacks in education, including educational research, will be made. *Constructivism and the nonsense that is written on its behalf will provide the ready made excuse that cutbacks ought to be made* (e.g. 2500 papers inspired by constructivism is a waste of taxpayers money) and the difficulty posed for educationalists is that a criticism *raised by the right* does not necessarily mean that the criticism is *ergo* invalid. For all our sakes, the standard of debate has to be raised!

Why the two marks out of ten? Two marks were awarded because of the eloquent and proper use of English by many constructivists (which I have to admit is far superior to mine). However, many marks were lost because of the use of rhetoric and sophistry.

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