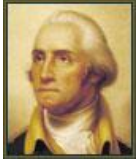


## Could it be More Different? Radical Constructivism Applied to Physics Teaching

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"When students can repeat something verbatim, it is obvious that they have learned it.—Whether they have understood it, is a question these tests avoid." --Ernst von Glasersfeld in "Radical Constructivism and Teaching," to be published in French in Archives Jean Piaget, Geneva

"...a physics major has to be trained to use today's physics whereas a physics teacher has to be trained to see a development of physical theories in ... students' minds." -- Hans Niedderer in "International Conference on Physics Teachers' Education Proceedings" Dortmund: University of Dortmund, p. 151, 1992.

The program of physics teaching at any level is best described as: the presentation of the established canon by approved methods for the benefit of the deserving. This practice is rooted in a 'normal science' of teaching physics, to use T. S. Kuhn's expression. This 'normal science' manifests a view of the essential nature and meaning of human knowing: The true nature of reality, what causes our experiences when we interact with it, can ultimately be known by our mental effort. We can compare two statements and ascertain which is closer to the true description of this reality. We can present such statements to others and they can know what we know.

This 'normal science' entails a view of the nature and value of people. We know the deserving because they 'get' what has been presented. The deserving, by definition, have the requisite mental capacity and have worked hard enough to 'get' what is presented. Many do not to 'get' what is presented, but we cannot all be physicists! With this program we troll through society finding the deserving and initiating professional training and indoctrination. The undeserving are helped to adjust to their status and to accept the authority of the deserving on issues of physics.

Could a pedagogy were based on an entirely different view of the nature and significance of human knowing such as radical constructivism? Given the hegemony of the 'normal science,' this new 'science' of physics teaching is a 'revolutionary science.' The program of this new physics teaching is to engage students in examining their conceptions of physical phenomena by comparing their predictions with actual experiences with the phenomena. When students decide their predictions are inadequate, they are engaged in constructing and testing new explanations for the phenomena. It is not about presenting the established canon. Student understanding and the effort to formulate explanation that enables assimilation of experience drive the process. All students are capable of noticing when an explanation does not work for them and of collaboratively formulating explanation that better fits their experience. The intended and actual outcomes are also decidedly different.

We cannot decide what is a true description of objective, external reality, but we can ascertain the degree of fit and usefulness of an alternative 'science.' Evidence of change in student understanding will be shared for comparison of these two programs of physics teaching.

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