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11-15-2010

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What Can We Learn from the Misunderstandings of Radical Constructivism?

Commentary on Slezak's "Radical Constructivism: Epistemology, Education and Dynamite"

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> Problem • What alternative strategies from our experiences using a Piaget-based radical constructivist pedagogy might have more and better results than the current practice of responding in debate form, each side trying to prove the other wrong? **> Method** • Use of Slezak's paper to illuminate the point that the central problem with the interpretation of RC generally used in such writing is that the authors seem not to be able to operate from the central tenet of RC, which is the opposite of that used in realism. Description of how this failure to use the central tenet of RC results in claims that RC is irrelevant to education and to definitions of good teaching. **> Results** • A specific approach shown to be useful in facilitating the construction of new understanding in science is adapted in order to guide interaction between an RC and a realist, which can result in the realist understanding the RC point of view. **> Implications** • Instead of debating with critics of RC, where each side is trying to prove the other side wrong, we need to change the interaction to one in which members of opposing sides attempt to understand the other's position. In this situation we are in a position to use a pedagogical strategy in which the realist examines her own fundamental assumption that we can know a mind-independent world, and considers the implications of a starting assumption that is exactly the opposite.
> Key words • **Realism, good teaching, solipsism, disequilibration, folk theory teaching.**

Introduction

We have seen many criticisms of radical constructivism (RC) in many venues from those representing realism, objectivism, and materialism. The paper by Peter Slezak in this issue is a good example (Slezak 2010). In this commentary I attempt to supplement the excellent commentary on Slezak's paper by Leslie Steffe (2010). Needless to say, I wholeheartedly agree with Steffe's lines of reasoning. He has identified some of the fundamental issues in these "constructivism debates" and has cogently responded to them.

Between us, I believe Steffe and I touch on the fundamental issues in the debate, but not the many other finer points that might be raised about this particular paper. Clearing the fundamental issues can tend to render some of the finer points moot. As Steffe points out in his first paragraph, others will have different interpretations. We offer our comments to illuminate the reasoning presented from a RC point of view.

In the first section, I offer some additional insight to what Steffe calls "an unjustified criticism" and offer an explanation of why this unjustified criticism might be so often voiced. In the second section, I address claims typically made about RC with respect to education based on misunderstandings of RC. In the third section, the question, "What is good teaching?" is addressed in terms of a distinction between a realist view and an RC view.

Origins of the unjustified criticism

In the Fall of 1989, I spent the semester at Carnegie Mellon University working with a colleague on the first stage of a project to construct an artificially intelligent conceptual physics tutor. My relatives live near Washington, DC, so I took the opportunity early in the semester to drive down to visit them and our program officer, Ray Hannapel, at NSF in DC. Ray and I talked about various things including the project. At one point Ray said: "You sound like Ernst von Glasersfeld. Do you know his work?" When I replied that I was unfamiliar with von Glasersfeld's work, Ray provided me with Ernst's well-known chapter, "An Introduction to Radical Constructivism," (Glasersfeld 1984) in a book named *The Invented Reality*.

I had seen the term "constructivism" in the publications of Rosalind Driver's group at Leeds. For about 10 years, I had been using Jean Piaget's theory of cognitive equilibration in my thinking about learning and teaching physics. There was something different between how I was thinking at the time and the details of the Leeds group dis-

cussion of constructivism, but I could not clearly describe it.

I was interested to see if this "radical constructivism" of von Glasersfeld was closer or not to how I was thinking. I read the piece once during the weekend. Something bothered me. I agreed with everything I was seeing in von Glasersfeld's chapter but one thing: it seemed he was talking about solipsism. I could not see how I could agree with the rest so much, yet have it end up in solipsism. As a person who is in physics, solipsism just does not fit my experience. I spent several days mulling this over, rereading the chapter several times daily. Finally on a warm afternoon later that week, walking back from the office on campus to my apartment several blocks away, I realized that von Glasersfeld was *not* talking about solipsism. Instead he was talking about not being able to compare directly our explanatory stories concerning our world of experience with some independently existing world; that is, we cannot determine the truth of such explanation or even their relative proximity to truth, but merely determine how well they fit the evidence of our experience.

The contradiction that I first thought was there did not exist. Indeed, von Glasersfeld was rendering on paper what I had begun to think about the origins and nature of students' conceptions of phenomena and he was helping me fill in gaps. There was no contradiction between my understanding of Piaget's ideas, of von Glasersfeld's ideas, and my own experience.

This little story about my first reading of the piece on RC by von Glasersfeld and at first thinking RC is solipsism – a denial of the existence of an objective reality independent of our own thinking – is something I have seen repeated many times. One can see countless examples of this in the "constructivism debates" in all forms of media. The first response of a materialist, realist, objectivist to a statement such as "our knowledge can never be interpreted as a picture or representation of that real world" (Glasersfeld 1984: 18) is to jump to the conclusion: if we cannot know a mind-independent reality, then there must not be any mind-independent reality, i.e. solipsism. One can argue from the evidence that for most such people there seem to be only two options: either this mind-independent, objective reality exists and we can know it, or it does not exist and we cannot know it.[1] What such a conclusion derives from is the unquestioned notion that the result of our mental efforts approaches a true description of a mind-independent reality. Two physicists described this idea in the following way:

"…we postulate the objective existence of physical reality that can be known to our minds…with an ever growing precision by the subtle play of theory and experiment." (de la Torre & Zamorano 2001: 103)

If it is possible to know this mind-independent reality then if one claims we cannot know it, there must not be a mind-independent reality. Logically, if the first premise is not taken, then the rest of the reasoning does not follow, which is the position in RC. The adherence to this first premise can be seen to be the origin of the criticism that RC is solipsism. Those who have not let go of this fundamental tenet of realism are not in a position to understand RC.

That RC has dropped this tenet, as pointed out by von Glasersfeld in several of the quotations from him in Slezak's paper, constitutes a fundamental distinction with major implications for the nature and status of knowledge. It is clear that those who do not understand the implications of dropping this one assumption, that we can know a mind-independent world, tend to gloss over this point, as we see in the paper. One of the many results is failure to realize what the adjective "radical" is intended to signify:

"von Glasersfeld (1995a) explains that radical constructivism is 'an unconventional approach to the problem of knowledge and knowing' that 'starts from the assumption that knowledge, no matter how it is defined, is in the heads of persons, and that the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience … It is unclear why such truisms might warrant extravagant claims for being radical and revolutionary." (Slezak 2010: 107)

Assuming that when a person reads von Glasersfeld where he writes that the adjective "radical" refers to "going to the root of" a distinction between realism and RC as to whether one makes the same assumption as de la Torre and Zamorano, then this is evidence that the detractors of RC may not be doing their homework when studying RC. Alternatively, if they have done their homework, it is also distinctly possible that, not realizing this distinction, the detractors make a different meaning of von Glasersfeld's words than he intends. In short, the adjective "radical" in RC is not intended to refer to the ideas of "far out," "not mainstream," "beyond fringe" that were introduced to the meaning of radical by the surfer culture in the U.S. back in the 1960s. The radical in RC refers to the fact that RC goes to its roots in the nature of knowledge.

While the physicists de la Torre and Zamorano appear to be in the realist camp, others are clearly not. For example, Max Planck wrote:

"Now there are two theorems that form together the cardinal hinge on which the whole structure of physical science turns. These theorems are: (1) *there is a real outer world that exists independently of our act of knowing* and (2) *the real outer world is not directly knowable*." (Planck 1932: 82, emphasis in the original)

In this passage we see one of the fathers of quantum theory seem to take the same position on our ability to know the real outer world as do von Glasersfeld and Piaget.

1| We should note that this "either-or" is a conflation of two propositions: *either* 1) a mind-independent reality exists and 2) we can know that mind-independent reality *or* the negatives of these two propositions. Where RC differs from realism is that RC does not consider these conflations. It deals with the second proposition, that we can know a mind-independent reality, and all that this entails. Specifically, RC holds that we should not claim we can know a mind-independent reality, because all we have is whether or not our constructed explanations fit our experiential world. Since we hold that we cannot know a mind-independent world, we can take no definitive position on such a world and taking no definitive position does not in any way hinder our efforts to construct explanations to enable us to be successful and survive.

Because I have developed and use a RC/Piaget-based pedagogy and have been doing so for nearly 30 years, I spend a fair amount of time helping my students come to grips with the nature of knowledge in such a pedagogy. Along with the numerous "constructivism debates," presentations at conferences, journal articles and books written attempting to "prove" RC is wrong and bad for people, I have watched literally several thousand people have this same initial reaction to RC's view of the nature of knowledge: that RC is solipsism.

We are all so immersed in a realist, objectivist, materialist culture that, without our being aware of it, realism has become part of the "air we breathe." Most in society take this realism as given, just the way things are. For the realist, no other options than that either the mind-independent world exists or it does not are available. A second taken-as-given notion in this realism is that the explanation we develop is true or a nearly true "picture" of a mind-independent world, with its corollary being that we can determine which of two explanations is closer to the truth of a mind-independent world. These two ideas taken together make it no surprise at all that the first reaction to a description of RC is that RC is just solipsism. We should be surprised if this was *not* the initial reaction.

Clearly, this little drama repeats itself in RC-critical papers, as we see here in several passages from Slezak's paper:

"[Von Glasersfeld] recommends: 'Give up the requirement that knowledge represents an independent world' (1995b: 6–7) … On a different construal, the idea that there is no mind-independent world is undoubtedly a radical proposal." (Slezak 2010: 103)

"It is in keeping with his insistence on rejecting an unknowable ontological reality to read von Glasersfeld's remarks as Quine's holism." (ibid: 106)

"*They reject the external world when they evidently wish to reject absolute, infallible truth claims.* Of course, the fallibility of our scientific knowledge is undoubtedly an important insight but is hardly new with radical constructivism and it is unclear who the target may be for von Glasersfeld's critique on this score." (ibid: 106–107, emphasis added)

The resistance to letting go of the premise that we can know the mind-independent world apparently leads critics of RC to miss the fact that Quine, whom Slezak quotes below, is saying essentially the same as von Glasersfeld on the issue.

"Hence it is meaningless, I suggest, to inquire into the absolute correctness of a conceptual scheme as a mirror of reality. Our standard for appraising basic changes of conceptual scheme must be, not a realistic standard of correspondence to reality, but a pragmatic standard." (Quine 1961: 79, quoted in Slezak 2010: 106)

"Von Glasersfeld's notion of 'viability' seems best understood as a 'coherentist' position concerned with what he calls 'the goal of a coherent conceptual organization of the world as we experience it' (Steffe & Gale 1995: 7), and with 'the goal of constructing as coherent a model as possible of the experiential world' (ibid: 8)." (Slezak 2010: 106)

It is no surprise at all that the first reaction to a description of RC is that RC is just solipsism

There is other evidence that being able to know a mind-independent world is still very fundamental to the thinking of those against RC. Coherence and viability are not interchangeable notions. The desire for coherence is not an idea that is claimed to be unique to RC. The desire for coherence is common to descriptions of the development of rational explanation from all points of view. Realists, objectivists and materialists strive for the same thing, coherence, in their practice of understanding and developing science. What distinguishes RC from other views is its position that the role of knowledge rests on its viability, its fit to experience, not its correspondence to a mind-independent world. This substitution of coherence for viability is another manifestation of the notion that one can know a mind-independent world being still central to the thinking of those who oppose RC.

"Following Quine, our ontological commitments are *ipso facto* the posits of our best theories and have nothing to do with an inaccessible, unknowable reality lying beyond our experience, our theories or the 'veil of ideas.' It is this repeated emphasis on an inaccessible or unknowable reality by von Glasersfeld that warrants the repeated charge of idealism." (Slezak 2010: 106)

The "veil of ideas" notion is an attribution by Slezak, not one that is present in von Glasersfeld's work. It is interesting to notice here that Slezak adds this notion of "veil of ideas," not von Glasersfeld, and then uses this notion to brand RC as idealism.

The realist will claim, as do de la Torre and Zamorano (2001), that by dint of our mental effort we can know the nature of a mind-independent world with ever increasing accuracy. Setting aside this one premise, at least temporarily in order to understand RC, would enable the realist not to have to struggle to give RC labels that do not fit as exemplified in the previous two quotations. I am not suggesting that the realist must accept abandoning the premise that we can know the mind-independent world, merely that the realist suspend the premise for the purpose of understanding RC. Having set aside the premise temporarily, the realist will see that statements, claims, and descriptions made in RC truly do fit the tenets of RC and its description of human knowing. Such statements, claims, and descriptions were formulated to be consistent with RC. They were not formulated to be consistent with realism, so it is no surprise when a realist points this out. Dykstra (2007) has expanded on this point in the pages of *Constructivist Foundations*.

How might we help the realist to see RC as it is? The following strategy is adapted from one shown to be highly effective at inducing conceptual change (Dykstra 2005). If we in RC wish to deal with this issue of this normative first response to RC, first we must accept that it happens and must expect it to happen. If it were the case that insisting that critics are misconstruing RC would result in them realizing what RC is, we would see different responses to our efforts than we see. Insisting and telling them that it is so, is as ineffective in this case as it is in science teaching.

Because understanding RC requires the individual to become aware of a fundamental premise of realism, that we can know a mind-independent world through our thinking, then a first step would be to engage the realist in discussion examining the fundamental features of their beliefs. When one is unaware of the foundations of one's views, then one is doomed to be a victim of these foundations, RC or not. Once their position on the possibility of knowing a mind-independent world by mental effort is explicit to them, then the interaction can move to exploring the possibility of setting this position aside temporarily, which can be the object of the discussion. This discussion will inevitably lead to considering the consequences of setting the position aside. At this point, if the previous steps have been carried out, the RC and the realist are in a position to discuss the nature of knowledge from the RC point of view as one possible consequence of these steps.

Type of instruction	N	Pre-diagnostic score	Post-diagnostic score	Majors
Folk theory-realist[1]	596	1.8	3.8	Science & Engineering
RC-Piagetian	365	1.1	9.8	Non-science Non-engineering

Table 1: Average scores on a diagnostic of student beliefs about the relationship between motion and force. A computed summary of data presented in Dykstra (2005). The diagnostic was developed by Thornton & Sokoloff (1998). All scores included are matched pairs, pre and post instruction. The diagnostic is scored on a 15-point scale. The data from folk theory instruction was collected in multiple institutions across the U.S. over a period of a dozen years. The data from the RC-Piagetian instruction was collected at the same institutions over 6 years.
(1) In folk theory pedagogy, teaching is the presentation of established canon by approved methods for the benefit of the deserving (Dykstra 2005).

On education

That RC is of no value to education and the preparation of teachers is often repeated, as we see in Slezak's paper and in Nola's writing as we see it quoted in the paper. The paper opens with:

"Despite its overwhelming influence among educationalists, I suggest that the 'radical constructivism' of von Glasersfeld is an example of fashionable but thoroughly obscure and problematic doctrines that can have no benefit for practical pedagogy or teacher education." (Slezak 2010, abstract)

Later we find:

"Such insights are surely familiar to teachers innocent of constructivism or any other philosophy, for that matter. We will see that this stark discrepancy between philosophical pretensions and practical pedagogy is the consistent pattern in constructivist writings. For example, as Nola (1998: 33) has noted, effective teaching methods that may be an alternative to didactivism cannot be inferred from a non-realist philosophy of science." (Slezak 2010: 103)

"Fully acknowledging the distinction between denying a mind-independent world and the claim that we cannot know it, it remains that the relevance and bearing of these matters on education must remain zero." (Slezak 2010: 104)

In order to convince us of the verity of this claim that RC can have no benefit for practical pedagogy or teacher education, the RC critic must logically prove the claim or demonstrate that actual evidence collected in classrooms that applying a pedagogy developed from RC results in either poorer, or at least no better, learning results from the students when compared to the majority pedagogy based in realism. But neither is present in the paper – no data on learning results from the classroom is cited and the same claim is repeated several times with no proof. As such, we have no reason to accept the claim introduced in the abstract.

We can easily determine that the RC critic is on thin ice with respect to such claims about RC and education. In the first issue of *Constructivist Foundations*, evidence is presented that reveals an RC, Piaget-based pedagogy results in change in student understanding that is far superior to that achieved in traditional pedagogy. In fact the difference is so great that one does not need statistics to see it in the data.

Table 1 shows that good folk theory teaching (at good universities by Ph.D. physicists assisted by graduate students in physics using the best texts and well equipped instructional laboratories) leaves the science and engineering majors still with the everyday, *common sense* conception that as the force changes, so changes the velocity. This would be perfectly fine if indeed that was the intent of the professor and textbook author, but it is not. Yet the very students most physics professors believe really are not capable of understanding physics demonstrate a class average shift indicative a significant percentage being able to demonstrate in their responses that as the net force changes, so changes the acceleration. The difference here is the RC-Piaget based pedagogy in contrast to the realism-based, folk theory instruction.

With this it seems that we have no reason to accept this claim that the relevance of RC to education is zero. We have in front of us data collected in a careful way from real classrooms that contradicts the claim. The evidence also renders *non sequitur* any logical argument in support of the notion that RC can have no relevance to education. This evidence is a direct challenge to the claim that anti-realist RC can have no relevance or bearing on pedagogy, that it can have no benefit for practical pedagogy, and that effective teaching methods cannot be derived from anti-realist RC.

Lest one leap to a conclusion not intended, the claim is *not* being made here that teaching with good results is possible *only* through RC. What the learning evidence cited represents is an example repeated over many semesters at university level that the claim that RC cannot or does not have any value to education is false.

What is good teaching?

This question arises in assessing the claims often made in reference to the usefulness of RC to education. Slezak writes as if good teaching is prevalent without RC and that much good teaching has been going on for a long time:

"Somehow good teaching has managed to flourish despite the persistent obduracy of these [philosophical] problems." (Slezak 2010: 103)

"Some of my best friends are dualists and great teachers." (ibid: 103)

"In the light of an undeniable history of centuries of successful teaching, it seems clear that teachers and learners may manage effectively, even superlatively, without knowing or caring about psychology, much less epistemology or metaphysics." (ibid: 109)

If good teaching results in change in *understanding* of the phenomena being taught about, then the evidence is overwhelming that such is not the case with realism-driven teaching. Evidence that such pedagogy in science education is a spectacular failure is massive.

The tip of this iceberg of the failure of folk theory instruction is revealed in Dykstra (2005). In that paper a bibliography is referenced that contains thousands of pieces of research on students' conceptions in refereed publications. All of the ones that examine the effect on students' conceptions in normal (folk theory) instruction reveal the same results: essentially *no change* in student understanding. Since RC critics clearly reject the notion that a RC-driven pedagogy can have any real relevance to education, then one can only imagine that "good teaching" is folk theory teaching. Hence, we must question these claims about good teaching and great teachers.

How might the realist, objectivist, materialist honestly be able to make such claims? It is fairly clear that the RC critic must have a different measure of the results of teaching. In folk theory teaching, a portion of the established canon is presented (transmitted) to the students by approved methods. To measure the effect of this teaching one naturally asks the students to show what they have "gotten" from the presentation by reporting it back in various ways called for by the instructor. From the evidence of research in student conceptions in science referred to above, it is clear that students can give back on exams what they have gotten from the presentations in ways that satisfy the folk theory instructor. Furthermore, they can do this without any real effect on the conceptions of the phenomena they had when they came to the course. We see from Table 1 that there is at least one pedagogy, based in RC, that has a far more substantial effect on the understandings of students who participate with it.

In the discussion of constructivism and education, we find:

"As the banality of the foregoing translations suggests, teaching and learning are among the natural, intuitive mental skills that humans display through a tacit knowledge rather than explicit theory or doctrine. In the light of an undeniable history of centuries of successful teaching, it seems clear that teachers and learners may manage effectively, even superlatively, without knowing or caring about psychology, much less epistemology or metaphysics. I have argued that teacher and learner are perhaps best conceived on the analogy of speaker and hearer in a conversation." (Slezak 2010: 109)

We have no reason to accept this claim that the relevance of RC to education is zero

In particular, the passage "an undeniable history of centuries of successful teaching" is explicit evidence that the view of good teaching is apparently what was described above as folk theory (realism)-driven teaching, which is demonstrably a spectacular failure at inducing change in understanding, at least as described in physics and mathematics education research and other educational settings.

For example Howard Gardner, not a science educator, points out the problem:

"If you answer questions on a multiple-choice test in a certain way, or carry out a problem set in a specified manner, you will be credited with understanding. No one ever asks the further question 'But do you *really* understand?' because that would violate an unwritten agreement: a certain kind of performance shall be accepted as adequate for this particular instructional context. The gap between what passes for understanding and genuine understanding remains great; it is noticed only sometimes […] and even then, what to do about it remains far from clear.

"In speaking of 'genuine understanding' here, I intend no metaphysical point …[W]hat an extensive research literature now documents, is that even an ordinary degree of understanding is routinely missing in many, perhaps most students. (Gardner 1991: 6, *emphasis* in the original)

Conclusion

I came to RC and initially made a logical assumption that it was about solipsism, which I reject. This assumption is very natural and logical, given that we grow up and are immersed in a realist culture. Instead of rejecting RC, I struggled with a description of it until I was able to see how it made sense. That sense was not that RC is solipsism. At that point, I was in a position to make a proper decision about how it works and whether I thought it was useful. I did not have to decide to accept it at that point, just see how it works. I could not really make such a decision to accept or not accept RC until I could understand how it works otherwise such a decision would be premature and ill informed. It appears that many authors of RC-critical papers have stopped at the first sentence of this paragraph in their own understanding of RC, as seems to be the case as evidenced in the present example.

Once I saw how RC works, I realized I could use RC because it fits my understanding of how physics (science) is done. Just as important to me as an instructor, RC puts the construction of understanding as central to making sense of phenomena, and places this construction process in the "hands" of the students. Whether RC or not, I think that most thoughtful instructors would agree that only the students can change their own understanding.

This rush to judgment without actually understanding RC has been evidenced

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is Professor of Physics and Coordinator of Physics Teacher Education in the Physics Department at Boise State University in Boise, ID. His first disequilibration on the path to RC happened shortly after he started teaching in 1969. This initial disequilibration was resolved 8 years later when he read an article on Piaget (Fuller, Karplus & Lawson 1977). Understanding Piaget's theory of cognitive equilibration opened the door to radical constructivism. His work as a physicist has engaged him in studies of how, why and under what circumstances student change their conceptions of physical phenomena. He has applied conclusions from these studies, testing his understanding of RC, to the development of an RC-consistent pedagogy and instructional materials.

many times in many venues. It enables raising a collection of arguments against RC that are only valid if one applies to what an RC writes and says the notion that one can indeed know a mind-independent world. Since this notion is the opposite of the central distinction RC makes between itself and realism, none of the arguments presented can be valid for RC.

Steffe and I are two of the researchers in mathematics and science learning who operate from a theory base for how we understand learning that we have derived from Piaget and RC. We have seen evidence of substantial conceptual change made by students many times and we can interpret it very well from an RC- and Piaget-based perspective.

According to Piaget, based on observations collected by the Center for Genetic Epistemology in Geneva, what we have come to call "conceptual change" begins when a person becomes aware of a new experience that does not fit their existing mental structures, that is their understanding of their world of experience. Piaget calls this mismatch a "disequilibration." It is most distinct when the person has elicited from herself a clear explanation justifying the expectation not met by the experience. If allowed and encouraged, the person will begin to modify and test alternative explanations to find one that fits the "offending" experience. People move to restore equilibration between their mental structures and their experiential world when they realize a disequilibration.

We have used this explanation for change in understanding to devise instructional activities in science and mathematics that appear to induce this chain of events. The results are strong evidence that many students do construct an alternative explanation, which they can use successfully and which constitute for them a re-equilibration with their expanded experiential world. Evidence of this has been presented in this commentary.

This same strategy applied to working with realists is described near the end of the first section of this commentary. If we apply this strategy, born out of RC and Piaget's idea of cognitive equilibration, to the challenge of helping realists, objectivists, and materialists understand RC, there is some promise that more will understand RC. In this effort we are not trying to prove RC is true and we are not trying to proselytize to swell our rank. Instead we are trying to help others understand RC so they can make honest judgments about it for their own use.

We in RC are not claiming realism applied to education is incorrect and RC contributions to education are true

Because our RC perspective in learning is on understanding, i.e., how, why and under what circumstances it appears to change, we have little interest in whether or not a person can repeat back something they have been drilled and practiced at. Drill and practice has an appropriate place in certain settings, but not when one is focused on changes in understanding.

Passages from Slezak's paper suggest a meaning for the phrase "good teaching" that is very consistent with what is called folk theory teaching. Evaluation of student performance is mostly, if not completely, checking to see if the students can give back in some appropriate way what was presented. With this notion of evidence of learning, there is no doubt that good teaching in this sense exists.

Research in physics and mathematics education reveals that responses worthy of credit in such courses can be generated with very little change in the understanding required. By the measure of change in understanding, the conclusion is that very little good teaching exists. Hence, again, using a realist perspective yields supportable claims, yet these claims are not applicable to what we find of value in learning.

The argument that good teaching exists without RC is based on the initial assumption that we can know a mind-independent world through our mental efforts. Unfortunately, the initial assumption in RC is that we cannot know a mind-independent world; hence the realist claims about good teaching and that it is not necessary to go beyond common sense in teaching do not really carry water from the RC perspective. We in RC are not claiming realism applied to education is incorrect and RC contributions to education are true. We merely point out how RC applied to education works and what results it gets in education as compared to realist forms of pedagogy. The evidence is on the table. It is up to the readers to consider it and act upon their conclusions.

In RC we acknowledge that our starting assumptions cannot be proven true. Hence,

we cannot claim that our assumption that a mind-independent world absolutely cannot be known (as opposed to such a world not existing) is true, but we have not yet found convincing evidence to the contrary. The realist assumption that we can know by dint of our mental effort a mind-independent world is their fundamental assumption held as dear as the contrary is in RC. We see no convincing evidence in support of the realist's initial assumption.

It is amply demonstrated in the many papers and book chapters written against RC that when one does not use the RC initial assumption, that we cannot know a mind-independent world through any mental efforts, then all the rest of RC is based logically on quicksand. Indeed, one should not expect otherwise. Just as amply demonstrated by these publications is that many of the authors apparently do not understand RC because they show no evidence of being able to use the initial assumption in RC in their thinking. If we, as practitioners of RC, wish to change the situation, change has to start by helping others to see how using the RC initial assumption works in interpreting our experiential worlds.

The process outlined at the end of the first section of this commentary does not involve two people debating to win. It is obvious that such a strategy does not make any significant difference. Instead, the process outlined is more of an interaction where two or more people are really striving to understand each other's ideas instead of proving each other wrong. In such a context the process described will result in mutual understanding, which in this case means those who do not already think in terms of the RC initial assumption come to be able to try this initial assumption on for size to see how it works; in other words come to understand the RC position on the nature of knowledge and how it plays out. Again, this is not about accepting the RC position, but merely understanding it. Once RC is understood, there is no reason to write yet another article proving RC wrong. The effort devoted to the writing such pieces can be expended in more useful efforts. To reach this goal, folks who agree with the RC view have to practice what they preach, instead of practicing what realism preaches.

References

de la Torre A. C. & Zamorano R. (2001) Answer to question #31. Does any piece of mathematics exist for which there is no application whatsoever in physics? American Journal of Physics 69(2): 103.

Dykstra D. I. Jr. (2005) Against realist instruction: Superficial success masking catastrophic failure and an alternative. Constructivist Foundations 1(1): 49–60. Available at http://www.univie.ac.at/constructivism/journal/1/1/049.dykstra

Dykstra D. I. Jr. (2007) The challenge of understanding radical constructivism. Constructivist Foundations 2(2–3): 50–57. Available at http://www.univie.ac.at/constructivism/journal/2/2-3/050.dykstra

Gardner H. (1991) The unschooled mind. Basic Books, New York.

Glasersfeld E. von (1995a) Radical constructivism: A way of knowing and learning. Falmer Press, London.

Glasersfeld E. von (1995b) A constructivist approach to teaching. In: Steffe L. P. & Gale J. (eds.) Constructivism in education. Lawrence Erlbaum, Hillsdale NJ: 3–15.

Glasersfeld E. von (1984) Introduction to radical constructivism. In: Watzlawick P. (ed.) The invented reality. Norton, New York: 17–40. Available at http://www.vonglasersfeld.com/070.1

Nola R. (1998) Constructivism in science and science education: A philosophical critique. In: Matthews M. R. (ed.) Constructivism in science education. Kluwer, Dordrecht: 31–59.

Planck M. (1932) Where is science going? W. W. Norton & Co, New York. Reprinted in 1981 by Ox Bow Press, Woodbridge CT.

Quine W. V. (1961) Identity, ostension, and hypostasis. In: Quine W. V., From a logical point of view. Harper, New York: 65–79.

Slezak P. (2010) Radical constructivism: Epistemology, education and dynamite. Constructivist Foundations 6(1): 102–111. Available at http://www.univie.ac.at/constructivism/journal/6/1/102.slezak

Steffe L. (2010) Consequences of rejecting constructivism: "Hold tight and pedal fast". Constructivist Foundations 6(1): 112–119. Available at http://www.univie.ac.at/constructivism/journal/6/1/112.steffe

Steffe L. P. & Gale J. (eds.) (1995) Constructivism in education. Lawrence Erlbaum: Hillsdale NJ.

Thornton R. K. & Sokoloff D. R. (1998) Assessing student learning of Newton's laws: The force and motion conceptual evaluation and the evaluation of active learning laboratory and lecture curricula. American Journal of Physics 66: 338–352.

Received: 12 October 2010
Accepted: 30 October 2010