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## Conceptual Change by Fiat?

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**> Abstract** • What Murphy and Gash are attempting to do is to solve a significant problem some students have being successful in school, one that is not often addressed in any significant way. The language used to describe the lessons has some significant departures from radical constructivism. It is, no doubt, beneficial that the students in the study may have developed improvements in self-image, but, as seen in other work, the application of radical constructivism to develop and extend the work started in the study could result in more and more lasting improvements.

Handling Editor • Alexander Riegler

« 1 » In the target article, Fiona Murphy and Hugh Gash are working with stu-

dents who think they cannot be successful at school tasks. Murphy and Gash are trying to change the students' conceptions of themselves.

### The need to cultivate a growth mindset in students

« 2 » One of the chief problems in schools is that children learn damaging views of themselves and their relationship to knowledge. We know that, early on, young girls "learn" that they are not good at math and science in school. While this may have begun to change, it has not stopped. Students who show some potential at something in school are easily "forgiven" for not doing well at something else. A prevailing notion is that some people are "just good" at some things, while others are not. This is soaked up as much by boys as girls and continues as they grow up to be young women and young men. It is as if we must be thankful for what small successes we see. However, that the result is substantial damage to our culture seems to go unseen. Of course, the damage is in the eye of the beholder. There are those who generally have sway over the schools, who benefit by having the "I can't" self-image be the result of schooling for many students (Bowles & Gintis 1976).

« 3 » I agree strongly with Murphy and Gash in the sense that our students are not served well by what they learn in school about their own abilities in school, their relationship to knowledge and the nature of knowledge. Students probably learn these things in more lasting ways than anything "taught" to them as content in school. Every year in school from K-16 (kindergarten through the 4th year in college), at least, instructors wonder: what were these students doing last year, why can't they do what they are supposed to have learned last year? This seems to have been going on for decades, as can be attested by teachers of long standing. And, these teachers will recall, when they were just beginning, teachers of long standing back then saying the same things.

« 4 » In my own field, physics education research, since about 1980, we have been documenting that students come to us already having constructed understandings of the physical phenomena we deal with in our introductory courses (Dykstra 2005). They have constructed a kind of toolbox

of conceptions, which they extend to new phenomena they encounter without close examination because they have never been engaged in close comparison between their conceptions and their experiential worlds. We also find that standard teaching results in very little change in these initial conceptions through three or four repeats of this type of conventional instruction on the same topics at different introductory levels. So, while they form lasting impressions of themselves as to what kind of learners they are, they leave 12 or more years of schooling having hardly changed their understanding of the issues in the content of their classes at all. Having taught students from 11th and 12th grade in American high schools, to majors across the full range of majors at two different universities, to teachers in graduate courses preparing to teach the physical sciences in American secondary schools, in my experience I know this situation is not unique to physics courses.

« 5 » One way to understand how this state of affairs is continued is to consider what the conventional view of teaching is. The conventional view can be put something like this (Dykstra 2005: 54):

*Conventional view: Teaching is the presentation of the established canon of knowledge by appropriate means for the benefit of the deserving.*

This is a folk theory, meaning that for a very long time it has been generally accepted without question, as “just the way things are.” Since this is the “way to teach,” students who do not seem to get what has been presented probably are not among the “deserving.” Such students apparently lack the requisite mental ability and/or did not work sufficiently diligently at acquiring what was presented. Out of this view of teaching, the evils of schooling come, in particular, blaming the students, which is a source of the “I can’t” we see the students have learned by the beginning of the study. This folk theory is also based on the notion that what is to be learned is a commodity that exists outside the mind and can be transmitted by presentation, a realist notion of the nature of knowledge.

« 6 » That folk theory is generally accepted can be seen in a number of impor-

tant places that reinforce adherence to the folk theory. In the US, teacher preparation specifications, generally determined at the state level, all have these important features for issuance of the state license to teach: Subject-matter teachers are required to earn acceptable grade-point averages in courses they are being licensed to teach, and in many states an additional privately developed exam in the subject that is selected by the state must be passed with a state-specified minimum score (to make sure the college professors who issued the grades were not being too easy on the teacher candidates). Do they know the established canon? Teacher candidates are coached at and evaluated for how well they can use approved methods of presentation. Can they present the canon in an approved way? When teachers at both levels are evaluated on their teaching, the evaluator is asked whether the instructor knows the subject, and whether the instructor answers every question in a timely manner, usually taken as within minutes. At both levels the instructor is expected to have a detailed listing of topics to be presented. At the secondary level, states specify this listing and local school systems require every teacher of a certain subject to treat the same subset of topics on the same day, sometimes down to the minute. In recent decades, at the higher education level, the “evaluators of teaching effectiveness” have become the students. These students just earning their bachelor’s degrees are asked whether PhDs in the subject they are teaching know the subject. These evaluation-tool results are used to determine income and advancement decisions at the higher education levels, but not always in unbiased ways. Using these methods, the folk theory is very firmly enforced.

« 7 » From the list of references provided by Murphy and Gash, there is something that comes to mind, which might be of value in thinking about the problem they are attempting to address. In 1970, William Perry published a book about his studies with Harvard students during their time at that institution (Perry 1970, 1981). He saw a pattern repeated by the students as they grew cognitively and ethically in college.

« 8 » Perry and his colleagues identified a series of nine intellectual positions,

which Perry divided into four stages, with respect to knowledge, as the students moved through college. The stages Perry and colleagues describe are descriptions of the *students’* apparent thinking based on what they observed students saying and writing in the interviews Perry conducted. When entering college the majority of students do not know about RC, so it should not be a surprise that they appear to hold a view of the “enterprise” of college as about being given “Truth,” as in absolute truth, for them to know. To get to college, students have to be very good at remembering Truth as it has been revealed to them. With relatively infrequent exceptions, students in schools in the US come to this intellectual position by graduation from high school or before.

« 9 » These stages in Perry’s scheme can be described in the following way:

- Dualism refers to the belief that Truth is known to Authorities and it is the students’ role to accept the Truth as given by these Authorities;
- Multiplicity describes the stage in which students become aware of conflicting Truths, motivating a decision to trust their own “gut feeling” and not external Authorities;
- Relativism relates to the students’ insight that “gut feelings” are not reliable, but they notice that faculty have methods or approaches that work, at least under certain conditions. So, they must work out methods to develop and evaluate solutions to problems and proposed conclusions;
- Commitment refers to each individual student’s decision that each one of them is responsible to themselves and others around them to make the best decisions they can, using methods they have developed or learned in their experience with others.

At this end of the sequence, students recognize that since each of them has this task, they may find others have come to different conclusions, but they can interact with others to find out what led them to those different conclusions.

« 10 » Perry had noticed that beginning Harvard students seemed to be there for different reasons from those of the faculty. Now, we would say that the students came in the Dualism stage, but the faculty were

at the Commitment stage. The students had come to get Knowledge from Authorities, but the Professors were operating at higher stages. Students were frustrated by the faculty, because they are seen by the students as Authorities who are supposed to give them Truth – but were not doing so. This Truth seems to be a kind of privileged knowledge not available to the students except from Authority. Instead, the faculty are inviting students to move from the position of absolute realism toward being able to analyze new situations and being able to come to decisions they can justify by various means about these new situations; i.e., the Commitment stage. With persistence from the Professors, the students were seen to advance through the nine positions in the four stages Perry observed. Perry and some colleagues developed interview protocols and interviewed a large number of students through their whole careers at Harvard to collect a large data set from which Perry's group was able to make their description of the intellectual development of the students.

« 11 » My point in bringing this up is that Perry's work shows the evidence of growth in the power of the mind. The students in Murphy and Gash's study are most likely in the earliest stage of Perry's positions, Dualism. How early might young students be able to move from Dualism? Q1 The answer to this question might be very useful in advancing the project that starts with their study.

« 12 » Also, others have found Perry's Scheme very informative. Mary Belenky and colleagues, using his Scheme as a starting point, studied a different population, women, since at the time of Perry's initial study, Harvard was an all-male institution (Belenky et al. 1997). They looked at women college students, but because they were professors in Psychology, they also worked in other settings, prisons and settings where women suffering challenges were being helped. Their work with a larger population than just male college students at an elite university revealed additional positions for Perry's Scheme, such as a stage that might be called "Knowledge as Weapon." This is seen with battered women where knowledge is used by the abusers to control and psychologically batter the women they are abusing.

### Compatibility issues

« 13 » As a radical constructivist, there are aspects I have difficulties agreeing with in the Murphy and Gash article.

« 14 » In §12, they write: "The lessons had a clearly stated learning intention both for the teacher and for the teacher to share with the children." What is bothersome here is that, in most settings in education, such objectives are statements of what the students are to know or be able to do as a result of instruction. This is all very well and good for folk theory approaches to teaching, but it is profoundly inappropriate for instruction based in radical constructivism (RC).

« 15 » In the same paragraph, the third sentence ends with: "[...] and could be applied to other lessons taught during the experimental period in whatever way the teacher found appropriate." We are told that the teacher had two years' teaching experience. We are not told the nature of the teacher's training to teach. So, we have no idea as to what extent the teacher's training included radical constructivism, if any. The teacher might have heard or seen the word, constructivism, but we know that, if so, it was more likely a form of constructivism Ernst von Glasersfeld labeled trivial, not differing in any substantial way from realism. It is unlikely that the teacher knew anything about the form of constructivism von Glasersfeld labeled radical, and its implications for teaching. As such, how could the instruction in this study be consistent with RC?

« 16 » The problem here is that constructivism became a buzzword or fad in education, and other fields such as nursing, several decades ago. As with many fads, people never learn why the word was originally coined and what the original meaning was intended to be. As a buzzword, it has become fashionable to use the word, but those who use it can be seen not to understand the original meaning in how they use the word and their actions in the name of the word. Any developments based on the trivial meanings of constructivism are seen not to work better than conventional folk teaching, motivating the drop of constructivism into the oblivion of no new results.

« 17 » The last sentence in §12 reads: "What makes the lessons constructivist are the opportunities provided to challenge the children's ideas when they found a lesson

difficult by introducing ideas about how to approach whatever it was that was difficult." And in §17, we find: "In this way, the teacher could challenge the children's perceptions of their abilities so they had opportunities to reflect on and reconfigure their self-concepts." This might apply in trivial constructivism, but in RC the children should be the ones to challenge their own ideas when they become aware of a disequilibrium. If the teacher does the challenging, then the process becomes one of following the teacher's lead, entirely consistent with the folk theory of teaching. Even less like RC is the teacher introducing ideas about how to approach what is difficult. Such a strategy sounds very Vygotskian, with scaffolding and zone of proximal development, and so on, but not RC.

« 18 » In §17, the third sentence ends with: "[...] and introduce the idea of growth mindset as a way of thinking about learning." If the teacher is introducing the idea, then it is not RC instruction, but folk theory teaching. In order not to wreck the RC instruction, the closest we come is concept first, name second. By this is meant, when students have constructed the concept for themselves, *only then* can we introduce a name for it.

### Evaluation

« 19 » The study included in the target article appears to have had a positive effect. We do not know how long-lasting it will be or how transferable it is. The next step would be to begin the empirical research. This would include: How do the students explain their trouble dealing with these difficulties? Q2 We want to understand the students' understandings of these difficulties they have. From these, can we construct an understanding of what the students believe such that we can predict how they might respond to new situations we have not seen them in before? Q3

« 20 » I agree with Murphy and Gash that all students are different, but the students have come out of very similar experiences to those of others in their culture. In other situations, on other topics, people who are from very different cultures, with very different languages, build remarkably similar predictions about novel (to them) situations about their experiential worlds.

For example, English-only speaking students from the US, Spanish-only speaking instructors from Mexico, and Tibetan-only speaking (with maybe a little Sanskrit and a bit of some local language in India) Tibetan Buddhist monks all seem to have very similar conceptions to explain their physical experiences from their everyday lives.

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**Dewey I. Dykstra, Jr.** started his career teaching high school. He has focused his work on the question: how, why, and under what circumstances do people change their understanding of physical phenomena? In his quest he was aided by the work of Jean Piaget and Ernst von Glasersfeld and the link between their work, radical constructivism.

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## Mind in Flux

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**> Abstract** • The optimism of radical constructivism is contrasted with the relative pessimism of biological determinism in the context of educating young children. The plasticity of the learning brain is contrasted with the relatively fixed intelligence view linked to IQ testing.

Handling Editor • Alexander Riegler

« 1 » In my commentary on Fiona Murphy and Hugh Gash's target article, I deliberately paint with a big brush to situate their article in a wider context and to assess its pragmatic value. I do this also because my main experience is that of a clinician working with adults with psychological and psychiatric "disorders" where pragmatic results are often demanded. I have a background in genetics as well as in psychology, education and constructivist psychotherapy, but I have not been directly involved in school education for several decades.

« 2 » This very erudite and well-written target article by Murphy and Gash is a challenge in that it raises many issues within the "subjective mind versus the objective brain" debate. It does so by the application of constructivist theory and praxis to an educational setting. The article addresses a pre-post research paradigm from the perspectives of social learning theory and radical constructivism, looking at seven- to eight-year-old pupils and their teacher in an Irish primary school (§10). This was primarily an exploratory piece of qualitative research using Gregory Bateson's (1972) learning-to-learn frame. Unfortunately, there was no comparison or control group. Hence its interesting but limited findings (research-wise) would require more rigorous replication and, as the authors themselves stated, by a follow-up study with greater constructivist content, perhaps also including the checking out of the participants' expectations prior to any intervention. However, having made these observations with respect to their research paradigm, my interest is more in some of the constructivist theoretical and philosophical assumptions inherent in the target article.

« 3 » The radical constructivist underpinnings to this qualitative study render their approach to education rather idealistic – in both connotations of the word "idealistic," i.e., suggestive of an optimistic approach, as well as literally meaning an idea or mind-based approach. Pupils' potential is emphasised in the sense that "all children can learn without limits" (§66). No biological determinants are seen to pose unsurpassable obstacles to learning. A "growth mindset" is fostered by the teacher so that pupils "learn to learn." It is contended that this "meta-learning" approach should help pupils with limited resources, be they intellectual or socio-economic, because their brains are seen to be so malleable (§47). Thus, radical constructivism here implies significant neural plasticity which is the sine qua non of education. Neural plasticity has been shown to occur ontogenetically, for example in the repair of acquired brain damage and during reparative re-education (Moucha & Kilgard 2006; DelMonte & Halpin 2019).

« 4 » For which purpose has the human cortex developed a great amount of neural plasticity? To answer this question, we need to look in the epistemological underpinnings of constructivism, starting with George Berkeley's position of "immaterialism" (Berkeley 1710). It was also referred to as "subjective idealism" by several philosophers in the monistic metaphysical tradition (Downing 2011). With Berkeley's arguably solipsistic perspective there is no mind-independent reality and no objective essence – only subjective existence. Opposite to Berkeley's subjective idealism we have constructivist-inspired theories such as George Kelly's personal construct psychology. Kelly with his "fundamental postulate" (Kelly 1955: 46ff) and its various corollaries did assume the existence of a "primary reality" (Kenny 1984: 26; Kenny & DelMonte 1986: 6), which is in constant flux, to which our minds, also in flux, are trying to adapt by developing personal construct systems (seen to be secondary realities) – but only with varying degrees of success. Kelly stated that

“whatever nature may be, or howsoever the quest for truth will turn out in the end, the events that we face today are subject to as great a variety of constructions as our wits will enable us to contrive.” (Kelly 1955: 1f)