

Critical Constructivism for Teaching and Learning in a Democratic Society

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Practice is never a simple application of general rules to concrete situations... (Bettancourt, 1993)

We begin with a caveat: We do not believe it is possible to derive any straightforward recipe for teaching practice from constructivism, or any other general theory. Attempts to make recipes out of educational theories tend to make them rigid, languid, and unable to motivate teachers or students. Such has been the fate of constructivism. As an educational reform, constructivism has become inert, merely another detachable means to whatever curriculum ends politicians or educational authorities prescribe. Since our first introduction to it over twenty years ago, we have been generally enthusiastic about the constructivist view of meaning and knowledge creation. Understanding both that knowledge *is* constructed and “how” it is constructed serves to reveal the contingency and contextuality as well as theory- and value-ladenness inherent in knowledge. Theory-ladenness of observation, for example, is a phenomenon that one’s observations are influenced in various ways by one’s background. In other words, observations and experiences have to be *interpreted* to be meaningful and it is this unavoidable association of a theoretical dimension that represents theory-ladenness. Awareness of these characteristics more readily renders all knowledge claims subject

to deconstruction and reconstruction, an important basis for a more critical, creative, and mindful approaches to teaching and learning.

Excited by the pedagogical possibilities of a constructivist perspective, a group of us worked together to develop what we call “critical constructivism.”¹ This expanded idea of constructivism emphasizes understanding the contingent nature of knowledge to induce a more critical reflection about various educational institutions and practices. Thus, despite the nearly wholesale acceptance of a trivialized version of constructivism by mainstream educators, we believe that the ideas of constructivism remain a viable and vibrant tool of responsible critique for teaching and learning in a democratic society. In what follows we take a look at school-based education, and particularly curriculum and instruction in the sciences and social studies, through a critical constructivist lens.

Sadly, the school curriculum often unwittingly presents content in the humanities, social sciences, and sciences as objective and beyond question. The decontextualization of this content conceals any of the contingent circumstances of its construction or curricular representation, as well as the larger sociopolitical and economic conditions upon which it depends. In the process, school knowledge loses contact with the context of the student’s everyday life; its reification leads the learner to think that knowledge is simply the property of the sages, rather than a revisable social product of humankind. Thus *reification* and *decontextualization* are two undesirable outcomes of education addressed by critical constructivism, a third being *technocratization*, a process we see in the high-stakes testing movement, by which knowledge is used to serve bureaucratization and results in the deskilling of teachers.

Looking at schooling through critical constructivism we seek to deflate the pretensions of content in the curriculum by exposing it as *contingently constructed*, *contextualized*, and *value-oriented*. This exposure occurs by involving students in examining the processes that originally led to its production as well as to the processes by which it is reproduced via curriculum. We are particularly interested in what we have referred to as the students’ *rapport au savoir* (Désautels, Garrison, & Fleury, 1998), that is best understood as “a relation of meaning, and thus of value, between an individual (or a group) and the processes and products of knowledge production” (Charlot, Bautier, and Rochex, 1992, p. 29). Most importantly, we think that attending to these critical aspects of constructivism serves as a constitutive means to the democratic ends of teaching and learning.

We fondly recall the moment in the Wizard of Oz when Toto pulls back the curtain revealing the great and wonderful wizard as merely an ordinary person pulling hidden levers. We would like to teach our own

preservice teachers, experienced teachers, and administrators to pull back the curtains and expose the workings of power over their lives. In turn, they may do the same with their students. In what follows, we share ways we attempt to draw back the veil and why we think the robust form of constructivism we call critical constructivism is helpful to those with similar pedagogical purposes. Towards this end, critical constructivism involves both a more critical understanding of the ideas of constructivism, and takes into account—upfront and explicitly—the social, cultural and political nature of knowledge in the teaching and learning process.

Pedagogy Informed by Critical Constructivism

We try to be careful in our own courses about using the phrase “constructivist teaching” so that our students will not regard constructivism as merely an alternative teaching technique. For example, Windschitl (1999) notes “constructivist teaching is less about the sequencing of events and more about responding to the needs of a situation.” (p. 753). This is true, and the reference to “constructivist teaching” reminds us that reifying constructivism as a teaching method is dangerously seductive, and may ultimately hinder a full consideration of the insights and implications critical constructivism might afford. Instead, we point out that the ideas, attitudes, and practices referred to as constructivism are about how humans learn by building knowledge cooperatively through social interaction and the application of prior knowledge (as tools) in a continual interpretation of ongoing experiences. Understanding the import of this theory enables teachers to better choose and direct methods and strategies (Bentley, Ebert, & Ebert, 2007).

Ernst von Glasersfeld reminds us that merely noting that humans construct knowledge does little to transform our ideas or orientation. Constructivism challenges some deep-seated cultural assumptions about the creation and ownership of knowledge, which is why, even while claiming to hold to its precepts, many resist coming to terms with its deeper implications (e.g., the contingency of all knowledge and personal identity construction).

Take the case of the conceptual change model, one of the most popular and widespread applications of constructivism in science education (Osborne & Freyberg, 1985; Posner, Strike, & Gertzog, 1982). In that model, learning is seen as a process of merely deconstructing (or simply destroying) the student’s misconceptions and facilitating the reconstruction of the unquestionably correct scientific ones in their place. This is a truncated and incomplete understanding of constructivism that fails to challenge

the nature and assumptions of traditional science education, which disempowers all but a few students (Fleury & Swift, 1989, 1990).

Academic knowledge—the content of the curriculum—is important, but it is just one instrument for helping students emancipate themselves from their own biographies (Désautels, Fleury, & Garrison, 2002). Taking account of students' initial knowledge needs to go beyond the narrowly instrumentalist goals of the conceptual change model (Garrison & Bentley, 1989, 1990). Fourez (1997) notes, “No particular knowledge is absolutely necessary, in itself, to enable one to live in our society.” (p. 920) Cobern and Loving (1998) recognize this *principle of epistemological pluralism* in acknowledging that, “truth is never the sole proprietorship of any single domain of knowledge—not even science” (p. 14).

In schools today violent behavior has emerged as a widely reported problem, but *conceptual violence* has long contaminated the school environment. Our colleagues Marie Larochelle and Jacques Désautels (1996, personal communication) remind us that the conceptual change model puts teachers in the position of colonizing children's minds with scientists' concepts, thus violating the philosophical principle of *epistemological symmetry*. Conceptual violence occurs, for instance, by failing to consider the knowledge developed by students in the context of their local culture as viable and genuine (Désautels, Fleury, & Garrison, 2001). Understanding what, how, and even where a student knows is important, and in a very practical way relates to student ownership of the content and motivation to learn: “The most effective strategies have to do with treating students as capable persons, capitalizing on their knowledge and interests and involving them in determining goals and methods of learning” (Levin, 1994, p.760).

Our opening caveat disavowing recipes for constructivist education does not mean we don't recognize curricular and pedagogical practices that are compatible with constructivism. A variety of strategies can be employed to assist students in their knowledge-building, testing, and understanding. Scaffolding, modeling, coaching, questioning, guiding and advising are but a few strategies. Inquiry teaching (National Research Council, 1996) and problem-based learning (PBL) have been widely promoted in science, social studies and mathematics education. These inductive and cooperative group practices tend to be student-centered and to foster meaning-making. PBL emphasizes using authentic problems across the curriculum at all levels (Bridges & Hallinger, 1995).

There is also an approach to curriculum that is compatible with critical constructivism. In science and sometimes in social studies a Science-Technology-Society (STS) approach typically focuses on issues and addresses the development of students' social consciousness

(Thirunarayanan, 1992). The National Science Teachers Association (1990-1991) identifies features of an STS approach. Further, inquiry and problem-based learning are often ingredients of STS-oriented curricula. Lederman (2004) argues that, "The subject matter of a reformed science education would include the interaction of science and the society in which it is practiced...", and also that, "We should break the cycle of teaching just the facts by including science-and-technology studies in teacher education" (p. B-16).

However, the use of STS curricula and PBL and inquiry methodologies, per se, provide no assurance that one's teaching has a socially critical edge. Carter (1991) has urged a closer attention to Paulo Freire's (1989) *problem posing* methodology. Carter's hope is that students might come to see the world less as a given and more as "reality in the process of transformation" (Freire, 1989, p. 71, cited from Carter, p. 278). Carter's appeal resonates with critical constructivists who want to work with students to mutually attain "emergence of consciousness and critical intervention in reality" (Takacs, 2003, p.3).

Many years after Carter's (1991) admonition, educators wishing to use PBL within an integrated curriculum face even more structural barriers. In describing the results of a National Institute of Environmental Health Sciences (NIEHS) curriculum development project, Martina, Hursh, Markowitz, Hart, and Debes (2003) found that the pressure on teachers to adhere to state curriculum standards and for their students to attain high standardized test scores nearly eliminated opportunities for them to incorporate problem-based learning in their classroom curricula. Yet, Martina, et al. (2003) found that teachers who were successful at incorporating environmental health activities involved their students in ethical discussions and incorporated their indigenous knowledges. As an example, one teacher reported:

The assignments required that students connect what they were learning with their own and others' lives, and consider the consequences of different actions and what might be done to solve problems. Students were pushed to think about questions not normally considered in the standardized curriculum. One teacher offered that "When the students are involved in this type of project they can go further and they can talk about.... how does this affect my life and my family or my friends, or society as a whole? I think it is getting into ethical decision-making, that's very high level. I think it's important that student get to do that." (Martina, et al., p. 25)

Martina et al. (2003) conclude by condemning the oppressive nature of the testing and standards movement and its obstruction of problem-based teaching and learning. The quandary in which Martina and colleagues

find themselves raises important questions and calls for a more critical understanding of constructivism. Nor are theirs the only researcher voices raising such concerns about the unintended consequences of high-stakes tests. Linda Darling-Hammond (2004) cites a number of studies that “have found that high-stakes tests can narrow the curriculum, pushing instruction toward lower order cognitive skills” (p. 1048).

Critical Constructivism: Starting with Teacher Education

We believe that the most important work of teacher education is examining and attempting to transform teachers’ *rapport au savoir*. Typically, teachers themselves have undergone an education that has involved repeated instances of reification and normalization of the contingent categories making up knowledge. Immersed in the technocratic rationality of schooling with its reified constructs about organization, learning and curriculum content most teachers have internalized an inert, non-problematic image of formal knowledge through taxonomies, discrete codifications, and implicit and explicit hierarchical organizational forms. However, it does not have to be this way and teacher educators are afforded a unique opportunity to influence the *rapport au savoir* of teachers and, consequently, students.

Recognizing the inseparability of considerations of curriculum content and teaching methods, it is clear to us that the way to change the status quo is not by convincing preservice teachers to adopt *different* organizational forms of knowledge, but rather by ensuring that they *experience something different* in their use of these forms. Here we turn to further develop the idea of *rapport au savoir*. Following are some examples of methods and strategies selected from our own various courses that represent practical means for producing changes in how teachers understand and relate to knowledge and meaning-making.

One of the most subtle but influential changes in pre-service teachers’ understanding of knowledge has to do with how they come to view the development of ideas about teaching, learning, curriculum and education. In teacher education programs, educational psychology has often shouldered most of this responsibility, typically providing a survey of learning theorists. All too often, however, preservice teachers view the series of theories being considered as equal competing models from which they can choose (or justify) their own classroom behaviors. Rarely does this survey approach help students understand learning theories as *artifacts* in our evolving conceptualizations about teaching and learning. Rarely does this approach help students understand how to use such theories as referents to their own theorizing about practice.

We recommend placing psychological theories into their cultural context. Recognizing psychological theories as themselves historical artifacts introduces students to the contingent and falsifiable nature of psychological knowledge. For that matter, explicating how any educational theory relates to other contemporary and historical, cultural, economic and political influences reveals the value-ladenness of knowledge itself. For instance, Frank Smith (1998) argues at length that modern learning theory originates in Prussian militarism. Examining the various sociocultural influences on learning theories over time provides the scaffolding to recognize that how people in a society “know,” i.e., the kind of knowledge they construct (its nature, evidence, etc.), relates to how they live. For example, teaching and learning that presumes knowledge is indubitable and absolute, even when contradicted, is not amenable to the formation of democratic processes as part of schooling. This is one of the dangers of the structural emphasis on imposed tests and standards. Another danger is that this emphasis suppresses the role of student-generated questions, including reflective and imaginative questions.

In our own courses, we attempt to habituate the formation of questions among preservice teachers in responding to their assigned readings using a technique called Questioning the Author (QtA) (Beck, McKeown, Hamilton, & Kucan, 1997), an “approach that emphasizes the students’ construction of meaning from text by encouraging students to collaboratively grapple with and reflect on what an author is trying to say” (McKeown & Beck, 2004, p. 392). Preservice teachers are asked to identify several ideas they have found important in the text. They are asked to state each idea in a sentence or two and to respond to the author with two questions related to each idea. To varying degrees, an activity such as this enables students to interact with an author’s ideas before class discussions. Students may share their questions in small groups during class to clarify meaning, generate issues, or evaluate the substantiality of the questions. We have found that students initially resist writing questions and insist on providing short summaries and reactions. However, learning is promoted by the demands of the small group discourse and by other students’ modeling of questions. Subsequent activities involve students in critiquing the different levels of questions they compose, making them even more aware of the potential functions of different types of questions. As a teaching strategy, QtA engages students in dialog about text, challenges the notion of author as authoritative voice, moves from teacher-dominated talk toward shared learning, and moves the focus of thinking to the students.

To those teachers who already use the strategies discussed above (and below) with little or no explicit theory, we say three things. First,

bravo, good practice does not require an explicit theory. But we believe that every practitioner has a subjectively reasonable theory working to guide his or her practice, whether recognized or not. Secondly, making one's tacit theory explicit makes it possible to reflect on it. Anyone who already employs these kinds of strategies should be able to further refine his or her practice through reflecting on our suggestions (critically of course).

“Selective Neglect” and Teacher as Curriculum Maker

One effective way for preservice teachers to learn about the value-ladenness of knowledge involves the teacher as curriculum maker and what we call “selective neglect.” This exercise requires students to choose what other students in the class will come to know about a given topic, for example, theories in educational psychology. Given a one-week notice, students are asked to research and prepare a no more than five-minute class presentation on a selected theorist. They are limited to identifying and explaining just a few ideas for which the theorist is associated. Although held to a time limit, the students have unlimited time to respond to class questions and debrief with the class afterwards. They can be persuaded of the possibility that what they decide to present about their assigned theorist may be the only information their peers may ever learn about this person. This recognition emphasizes the ethical aspect of the assignment while subtly reminding the students of the power of a teacher's representations to distort student understanding.

Academic and social discussions become dilapidated whenever agents find themselves in a simple either/or, pro/con debate. In part, this is because many do not perceive issue analysis as a part of the “normal” construction of thought. But because of the pluralistic nature of knowledge, rarely are issues ever accurately portrayed in neat categories of right and wrong. Teachers may provide their students a format for analyzing “issues” that goes beyond the traditional pro-con debate. An issue may be defined as a problem whose definition or solution involves multiple and competing perspectives either over ends (values, ideals, etc.), means (methods, techniques, tools, etc.) or both. One assignment we recommend requires students to provide at least three perspectives about an issue, a technique that promotes understanding the complexity often involved in issues. Students should come to understand that social issues often arise from differences over ends, means or both, and that how a problem is defined often constricts the possible solutions, which sometimes is indicative of a power move.

Issue analysis is one strategy that addresses the fact that truth

can be elusive in a world full of social claims purportedly supported by various kinds of often-contradictory evidence. Seldom will we have the time or perseverance to examine the basis for every claim we hear in our daily lives, yet in the professional field of education, developing a process of teaching with a more critical understanding of constructivism requires preservice teachers to understand and evaluate the philosophical nature of subject matter claims and the professional claims of other educators. Distinguishing between claims based on empirical studies vs. those based primarily on someone's ideological point of view may involve a change in one's consideration of what "truth" is. As students become more aware of the limitations of particular studies, design flaws, and other research "problems," they develop both a more critical attitude and a more positive attitude about their ability to fairly and successfully challenge other people's knowledge claims.

Another teaching activity that we have found effective is something we call "research thinking." As one of the first classes, graduate education students immediately begin collecting qualitative and quantitative data at locations ranging from shopping malls to their own practicum school sites. The first week begins with a general observation assignment with no guidelines based on the variety of data provided, and each subsequent week the assignment becomes more focused. In this strategy students experience situations first, process various ideas, and then later, as a topic comes up in class conversations, the instructor is able to identify the conventional research label. Concurrently, students are asked to bring in newspaper articles that purport to be based upon some scientific finding. Spending the first half-hour of class discussing the claims in these articles promotes a more sophisticated understanding of research.

Here is an activity one of us uses that is easily transferred to other curricular domains. In the Cube Investigation (Working Group on Teaching Evolution, 1998), students are invited to consider how investigating a cardboard cube is analogous to the process of science. Each student is presented with a cardboard cube containing markings in the middle of each face and on two corners. The rule is that students may not look at the facedown side. Markings on the five visible faces provide clues as to what might be on the hidden face. After some thought, the students predict what is on the bottom face. They are then told they may slightly lift only one corner of the cube and use a mirror to view one of the hidden corners. The cube is then removed and put away, leaving them wondering about what is on the rest of the hidden surface. The debriefing features a discussion of how the cube investigation represents or does not represent the nature of science.

It is possible to extend the foregoing activity in ways that profoundly

obviate the contingent, contextualized, and constructed nature of knowledge. During the subsequent class the students take a “pre-test” designed to disclose some of their assumptions about science. Students also view a series of optical illusions illustrating that our brains are organs that interpret sense impressions, as opposed to representing external reality. The objective is to make explicit one of the central tenets of constructivism, that “meaning is assigned” instead of being inherent in external phenomena. From there the class reads selections in a course text on the philosophy of science. In this text Alan Chalmers (1999) discusses optical illusions and then goes into the problem of induction as a basis for science. The class is then presented researchers’ findings on adolescent students’ beliefs about the nature of science (Ryan & Aikenhead, 1992).

Many in the class typically hold similar beliefs about science as those that were enumerated in the researchers’ findings. Recognizing this, these students, most of whom are practicing teachers, find themselves in a state of cognitive disequilibrium; they begin to question their prior understandings. In following class sessions, they consider various ideas about the nature of science, but meanwhile they work in teams to conduct interviews of scientists and students on how they view science. Not surprisingly, they find that scientists can have naïve views about their own craft, and some have found that their own understandings have become more sophisticated than those of the scientists they interviewed. Thus this is an assignment that can be empowering to students and even discernable in their subsequent attitudes and behavior. One teacher in the class who interviewed a polymer chemist and two high school students reported these results:

...the scientist and the students both believe there is a scientific method that scientists use when they conduct investigations and experiments. The scientist believes that when carrying out an investigation, most of the steps of the scientific method are used Science educators (however) should emphasize to their students that no research method is applied universally by all scientists. Both the students and the scientist also possess misconceptions about what constitutes a theory and what constitutes a law. After reviewing some current science textbooks, I feel as though these concepts are not clearly distinguished. (Melinda Sellars, personal communication, 11/15/03)

Reflections on One’s Own Biography

The following strategy for fostering critical-constructivist thinking was designed as the first class assignment for a teacher education course in science methods, but it is adaptable to social studies and social foundations of education as well.² Each student is asked to write a

critical autobiography (Moscovici, Nichols, Habib, Tippins, & Sullivan, 1994) focusing on the socio-cultural aspects of their own experience as science learners, both in and outside of school. Reflecting on their own upbringing can help students become aware of their own epistemological positionality, as well as become aware that learning (which most students typically understand as a strictly personal and psychological affair) is really a *social* experience. Interestingly, a surprising number of white, middle-class students naively will report that socio-cultural factors have had no influence on their science learning!

Another methods course assignment with similar consciousness-raising potential is the reflective journal (Koch, 1999). Students preparing to become teachers can reflect upon the role of language in our profession, especially regarding how the language of teaching is imbued with metaphors that separate content from method, feelings from thoughts, objectivity from subjectivity, teaching from learning and, ultimately, teachers from students. Meier (1992) suggests that conditions need to be created for teachers to change how they view teaching and learning, to develop new practices consistent with these understandings, and to develop collegial work habits to replace the overly private and individualistic work culture that presently defines teaching. In believing that “teachers must lead the way to their own liberation” (p. 599), she places the onus for making these structural changes on the teachers themselves. To us, this means that teachers must be willing and able to both deconstruct and reconstruct the contingent constructions that have been continually reified throughout their lives.

Finally, we offer an example of curriculum framed by constructivist thinking; in this case it is of a small progressive high school located in a metropolitan area of about 300,000 in Virginia. Community High School (CHS) is situated in the city center in the midst of local cultural and political action. The curriculum was planned over a two-year period and organized for 60 grades 9-12 students as a “museum school” (King, 1998; Bentley, 2007). As of this writing CHS is in its fifth year of operation. Students are involved in projects and investigations involving the cultural institutions and social service agencies of the local community. The school director and its teachers were selected based on their socio-cultural awareness and for their interest in fostering a critical consciousness in the student body. The deconstruction and reconstruction of premises is a strong component of all courses. A ninth grade science course, for example, was designed with a history and philosophy of science emphasis. The results so far have been encouraging, with high student retention. To learn more, visit the school Web site at <http://www.communityhigh.net>

Conclusion

Though constructivism remains the “in” theory in education, what prevails among educators today is the most trivial of the many interpretations of constructivism—simply that meanings are constructed. The critical constructivism we advocate places its emphasis on reflection, imagination, social consciousness, and democratic citizenship. We believe this interpretation should be a central theoretical referent for all educational practitioners. In preservice teacher education, critical constructivism should lie at the center of discussions about the nature of learning, teaching, curriculum and schooling—as a sociopolitical process.

Without this kind of referent, teachers-to-be rarely become perplexed by epistemological considerations or become aware of their political consequences. We advocate a critical constructivist pedagogy that enables students to continually shape and reshape their own conceptual biographies through the development of intellectual tools and attitudes about the social basis of knowledge, a pedagogy that enables students to better understand society’s official knowledge as it relates to their own indigenous knowledges, thus developing for themselves a new *rapport au savoir*.

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