The Role of Peirce's Pragmatism in Education

O papel do pragmatismo de Peirce na educação

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Abstract: While Charles Sanders Peirce did not have what we might think of in the 21st century as an established academic teaching career, he spent much of his scholarly efforts on constructing articles, textbooks, lessons, lectures and schemes that would promote a fertile framework for genuine inquiry within a "scientific community of scholars." What sort of a model for education does pragmatism, after the manner of Charles Peirce's pragmaticism, offer? How would the infusion of a pragmatic mode of inquiry into education affect the way teaching and learning are understood and practiced? In this paper, I will conceptualize the educational system that is suggested by Charles Peirce's pragmaticisim and evaluate the differences between a pragmaticist educational scheme and several major current non-pragmaticist models.

Key-words: Peirce, pragmaticism, scientific community, education, constructivism.

Resumo: Embora não tenha tido o que podemos conceber, no século XXI, como uma carreira docente acadêmica estabelecida, Charles Sanders Peirce dedicou muito de seus esforços como estudioso preparando artigos, livros-textos, lições, palestras e esquemas que iriam promover um arcabouço fértil para a investigação genuína em uma "comunidade científica de pesquisadores". Que tipo de modelo para a educação o pragmaticismo de Charles Peirce oferece? Como a infusão de um modo de investigação pragmático na educação afetaria a maneira pela qual o ensino e o aprendizado são compreendidos e praticados? Neste artigo, eu conceitualizarei o sistema educacional sugerido pelo pragmaticismo de Charles Peirce e avaliarei as diferenças entre um esquema educacional pragmaticista e vários dos principais modelos não-pragmaticistas atuais.

Palavras-chave: Peirce, pragmaticismo, comunidade científica, educação, construtivismo.

The plan of this paper

My primary academic "day job" is as director of a university Center for Teaching Excellence. I provide resources to faculty who wish to develop ways to teach more effectively. I plan programs that foster innovations in teaching, reflection on the

relationships between teaching and learning, and assessment of results. My initial qualifications for the job consisted of previous administrative experience; a reputation for developing new curriculum in my own courses in philosophy and in courses that I helped other faculty to originate and prepare in disciplines in the Arts and Sciences, Education, Business and Nursing; a record of "outstanding teaching"; and a penchant for using instructional technology creatively. Not once in the review of my credentials did anyone on my hiring committee so much as mention that my research on Charles Sanders Peirce might be an asset in the job. However, in analyzing my center's progress since I have been its leader, I see that the voice of pragmatism speaks with a resonant and comprehensive voice in the university.

University faculty being who they are, the critique of their own teaching styles, successes and failures is a late addition to the academic scene, and faculty are often amazed at who and what they are when they begin to assess professionally the quality of their own work. As my research has turned toward pedagogy, I have myself been pressed to find a ground for the practices that my center advocates (through me). In searching for this ground, I have observed a number of patterns in the justifications for teaching methodologies within the literature and in my own experiences with my colleagues. The plan of this paper is to examine two reputedly acutely different extremes of teaching styles and philosophies and compare them to the foundation and practice of teaching that Peirce's pragmatism recommends. Part I of this paper in an examination of how Peirce might interpret "direct instruction" and "constructivism" from the perspective of pragmatism. Part II is a proposal of how education, especially higher education, might re-conceive itself along pragmatic lines and some pros and cons of that proposal.

Part I. Direct instruction: a brief critical genealogy

In a pamphlet published in 1897, "My Pedagogic Creed," and in *Democracy and Education,* originally published in 1916, John Dewey laid a foundation for the contemporary theory of constructivism and directed a death blow at the "rote method" of teaching.

A taste of Dewey's advocacy for a new method of teaching and learning can be sampled in the following passage from *Democracy and Education*:

Not only is social life identical with communication, but all communication (and hence all genuine social life) is educative. To be a recipient of a communication is to have an enlarged and changed experience. One shares in what another has thought and felt and in so far, meagerly or amply, has his own attitude modified. Nor is the one who communicates left unaffected. Try the experiment of communicating, with fullness and accuracy, some experience to another, especially if it be somewhat complicated, and you will find your own attitude toward your experience changing; otherwise you resort to expletives and ejaculations. The experience has to be formulated in order to be communicated. To formulate requires getting outside of it, seeing it as another would see it, considering what points of contact it has with the life of another so that it may be got into such form that he can appreciate its meaning. Except in dealing with commonplaces and catch phrases one has to assimilate,

imaginatively, something of another's experience in order to tell him intelligently of one's own experience. All communication is like art. It may fairly be said, therefore, that any social arrangement that remains vitally social, or vitally shared, is educative to those who participate in it. Only when it becomes cast in a mold and runs in a routine way does it lose its educative power.

In final account, then, not only does social life demand teaching and learning for its own permanence, but the very process of living together educates. It enlarges and enlightens experience; it stimulates and enriches imagination; it creates responsibility for accuracy and vividness of statement and thought. A man really living alone (alone mentally as well as physically) would have little or no occasion to reflect upon his past experience to extract its net meaning. The inequality of achievement between the mature and the immature not only necessitates teaching the young, but the necessity of this teaching gives an immense stimulus to reducing experience to that order and form which will render it most easily communicable and hence most usable. (http://www.ilt.columbia.edu/projects/digitexts/dewey/d_e/chapter01.html)

However, the transactional and transformational nature of communication compels the conclusion that what is most easily communicable and usable by the first party, say, a teacher, is not automatically the most communicable and usable by the second party, say, a student. Communication, "cast in a mold," and running "in a routine way," loses its "educative power."

In contemporary education, rote instruction is not often explicitly said to be an acceptable technique. Rote learning is a hoary ancestor, seemingly relegated to quaint displays of antique schoolhouses in museums. "Direct instruction" is its modern offspring, which lives on in some elementary and secondary school teaching repertoires, but this offspring is really a *döppelganger*. The counterpart of "direct instruction," alive within higher education, is the "lecture method."

Advocates of the efficacy of rote instruction assumed that the facts taught and recited were beyond criticism. A further assumption was that rote instruction was accessible to immature minds which had, in fact, learned all the rest of their store of knowledge in a similar manner. "Direct instruction," one of its heirs, was "founded" in the 1960's by Siegfried Engelmann as part of President Lyndon Johnson's "Project Follow Through" under the "Great Society" war on poverty in the United States. Direct instruction is rote for the teachers as well as the students, employing highly crafted scripts with call and response interludes classified as "interaction." Defenders of direct instruction claim that its concrete results, as displayed in standardized tests, are better than the results of techniques that are "cognitive," that is, focus on reasoning or higher thinking skills. Students in a system of direct instruction may be adequate test-takers and more frequently promoted to the next school grade, but the promotion to the status of critical thinker and researcher is not even part of the direct instruction agenda.

The higher education model that is the successor of rote learning is the lecture method. This well-known and widely practiced technique is sometimes called "the sage on the stage," connoting some of its less savory aspects. The professor, who is the expert, speaks to the class on topics within his expertise. The more brilliant lecturers are supposed not to rely on their own lecture notes, but to speak extemporaneously, as if no notes had ever been prepared. The less brilliant lecturers may read from their notes. The students listen and take notes. The expertise of the

instructor is accompanied in most cases by a text that provides similar if not identical content in printed form. The topics follows a sequence reiterated in the text and designed to "cover" the "material" that will be tested at the end of the course. Testing consists of assessing whether students have absorbed the lessons of the lectures and texts, often in terms of memorization of facts and formulations of concepts, sometimes in terms of performance of "skills." The defense of this method often is that it conveys a great deal of information in a short time while other methods stall out the progress of topical sequences by getting bogged down in discussions and issues that relate to the students themselves and not to the content of the teaching. Students are often deluded that they are learning higher reasoning skills due to a confusion of form and content – lecturers often profess about thinking processes that did once involve higher reasoning skills.

These models assume that the student is a box and the teacher teaches by putting knowledge in the box. The philosophical refutation of the student qua box is ubiquitous and need not be described in its every historical moment. Obviously there is more to be said about students than that they are passive recipients of the delivery of facts.

A very succinct version of this refutation may be found in Peirce's "The Fixation of Belief." Without going into a detailed explanation of all four techniques of the fixation of belief, some generalizations about Peirce's essay can be introduced: (1) only the method of science is concerned with "truth" or a reality independent of any self, while the others betray the believer's wish to overcome the anxiety of doubt as easily and quickly as possible; and (2) the succession of the four methods Peirce describes progress toward public and away from private criteria of the acceptance of belief, toward enduring and synoptic concepts that have vast explanatory power and away from the satisfaction of immediate or idiosyncratic agendas.

The method of rote, direct instruction, or lecture, would be, in Peirce's terms, authoritarian. That is, someone other than the subsequent believer decides what the beliefs are to be, expresses them, and enforces them (through testing and the professional consequences of testing). The subsequent believer recites and reports these beliefs as loyally as possible. The beliefs do not have to sit well with the believers, nor be contingent on their own experience or that of others, nor be internally coherent with other beliefs. The call for rebellion against the rote system of education is a consequence of objections to the limitations of uncritical, authoritarian teaching and learning.

Constructivism: a brief critical genealogy

The alternative, as Dewey and his constructivist followers conceived it, is to design a system of education in which the individual student's construction of the meaning of his learning is considered a priority. In terms of Peirce's four methods of the fixation of belief, constructivism turned toward a concern with developing the conditions for nurturing the a priori method.

Constructivism, in its contemporary form, takes its inspiration from Jean Piaget, Jerome Bruner and Lev Vygotsky as well as John Dewey. Piaget's work on the stages of cognitive development recognized four levels of maturity in the development of

children's intelligence : (1) *sensorimotor* intelligence gained from sensory experiences and activity; (2) *preoperational* intelligence using symbols, pictures and words to represent ideas and objects; (3) *concrete operational* thinking using logic through applied concrete examples that express abstract concepts, and (4) *formal operational* thinking, which deals with abstract concepts in their own right. Bruner introduced the idea that learning is a social practice that began for the learner as framed by his own current knowledge. Bruner's notion of a "mental construct" that individuals form in order to incorporate new ideas is the forerunner of the contemporary constructivist notion that all knowledge is a mental construct. Vgotsky's belief that all knowledge is gained through social interaction and the integration of that experience into an individual's mental structure is similar to Bruner's. These thinkers looked on the individual's inner life as the foundation of his learning. The stage of thinking they have little theoretical comment on is when the inner life turns toward the outer world as a means of affirmation and as a plain of action.

In its contemporary form, constructivism maintains that, "as we experience something new we internalize it through our past experiences or knowledge constructs we have previously established" (Crowther 1997, 2). Saunders, in "The Constructivist Perspective: Implications and teaching strategies for science" (1992, 63-82), explicitly relates an anti-realist, a priorist attitude when he claims that:

> constructivism can be defined as that philosophical position which holds that any so-called reality is, in the most immediate and concrete sense, the mental construction of those who believe they have discovered and investigated it. In other words, what is supposedly found is an invention whose inventor is unaware of his act of invention and who considers it as something that exists independently of him; the invention then becomes the basis of his world view and actions.

This position locates constructivism in the camp of an untenable solipsism. Science is simply impossible in such a view. G.H. Wheatley frames two principles of learning through constructivism:

> Principle one states that knowledge is not passively received, but is actively built up by the cognizing subject. Ideas and thoughts cannot be communicated in the sense that meaning is packaged into words and 'sent' to another who unpacks the meaning from the sentences. That is, as much as we would like to, we cannot put ideas in students's heads, they will and must construct their own meanings. . . . Principle two states that the function of cognition is adaptative and serves the organization of the experiential world, not the ontological reality. Thus we do not find truth but construct viable explanations of our experiences. (1991, 9-21.)

Principle one expresses clear antipathy toward the "student as a box" theory of learning. Its one-sided criticism of "sent" meaning is based on the relation of knowledge to the learner's cognitive abilities and tendencies. This criticism omits the relation of knowledge to the experience of reality. Many successful practical methods for promoting critical thinking have been generated out of this constructivist theory, for example, collaborative learning, discussion, problem solving, writing to learn and peer teaching techniques that foster the interpretation and evaluation of the given phenomena. However, Wheatley's principle two steps further into a zone of contention, problematic to science and a scientific method of inquiry.

The notion that every person makes his own truth is as ancient as the Sophist Protagoras's theorem that "Man is the measure of all things." The criticism of ontological causality expressed by the constructivist conclusion that "we do not find truth but construct viable explanations of our experiences" is originally found in David Hume's *A Treatise on Human Nature* (1738). The subjective and skeptical idealism of George Berkeley's *A Treatise concerning the Principles of Human Knowledge* (1710) provides the philosophical genealogy of the foundational principles of constructivism.

A typical constructivist textbook, *Naturalistic Inquiry* (Lincoln and Guba, 1985), lays out the axioms of its "paradigm" as antithetical to positivism. For example, Axiom 1 states that, as for the nature of reality (ontology), whereas the positivist version asserts a "single tangible reality 'out there,'" the naturalist or constructivist version admits that "there are multiple constructed realities . . . [and that] inquiry into these multiple realities will inevitably diverge, so that prediction and control are unlikely outcomes" (37). Axiom 4 states that, while the positivist version is that "every action can be explained as a result (effect) of a real cause that precedes the effect temporally (or is at least simultaneous with it)," the naturalist or constructivist version declares that "all entities are in a state of mutual simultaneous shaping so that it is impossible to distinguish causes from effects" (38).

These observations indicate the philosophical bent of constructivism. Constructivism takes itself to be free from dogma. It applies its own internal criteria for belief in an a priori fashion. To a degree, then, it is free from the dogma of authority and of beliefs not derived through an internal process. However, it fails to scrutinize the general implications of its beliefs in experience. The existence of divergent multiply constructed realities is not, for the scientifically minded, a peaceful coexistence. Scientific inquiries over the last several centuries have been battlegrounds that seek triumph over "divergent multiply constructed realities." It is not particularly in the stream of things to pursue the principle of "live and let live" in the matter of these "realities"; scientists have been known to fight to the bitter end to either refute a reality they cannot bring themselves to believe or to defend a reality that they have put to the test of scientific methods. The a priori dilemma is this: just because I might come to believe something does not imply that others will come to believe the same thing. If we live in communities, a public universe of any kind, it is important to reconcile what I believe with what others believe. Try as I might to be tolerant, all I can muster is that, as long as it doesn't come to a test, people can believe anything they wish without consequences. However, a disagreement about beliefs is a test, a veritable crisis – am I wrong and the other right? Do I need to reconsider my belief? Are both of us wrong? Can both of us be right? Constructivist educational plans attend to these questions sometimes by not grading students on a standard set of criteria but encouraging them to create portfolios about their inquiries that they interpret and evaluate themselves. Furthermore, the constructivist teacher is theoretically not supposed to assert any authoritative ontological, epistemological or causal claims about "how it is," since it isn't theoretically any one way or any one person's way. How do constructivists deal with differences in methods and outcomes of inquiries? The only way these can be reconciled theoretically is to isolate the differing parties from each other and not deal with their differences, and to support this practice with the claim that the universe is so diverse that everyone's construction of reality is acceptable. Some constructivists go so far as to claim that there is no

reality until it is constructed by some individual. Others postulate a social reality that is presumably constructed by a *set* of beliefs, some contradictory or even hostile to one another. The possibility that no one is an ultimate authority just because they think they are *and* that anyone may want to seek to go beyond both authority *and* an a priori acceptance of beliefs seems not to have occurred within constructivism.

Therefore, the dilemma of constructivism is this: what if some individual experimentally chose to "construct" reality such that it is independent of the individual, the community, and changing ideas about it? Further suppose that that reality, the independent kind, were to be understood to be in a process of evolution, independent of the approximations that thinkers could think about it? In other words, it might be expected that even while ideas about the world change, the world changes as well, not only as a *result* of changing ideas (could this be a sneaky brand of causality in constructivism?), but in its own right as well. Suppose one "constructed" an inquiry in which the hypothesis is that knowledge approximates the truth about reality, that individual personal perspectives and constructions are acceptable since they *may* approximate reality as it might be known were some rational being or beings to put this knowledge to the most minute and scrupulous tests over a long run of time? Suppose the inquirer in question were to derive a method for developing and scrutinizing the kind of knowledge that could approximate reality? In the constructivist notion of education, research and reality, this is the one experimental "construction" that would never be permitted. For here, the constructivist dogma barks loudly that we are bound by theory not to believe what we think is actually true about an independent reality, but only that it is "true for me." The fact that the definition of "true for me" defies any consistent formulation by being fabulously self-contradictory is of interest certainly not to constructivism, but evidently only to logicians of the realist stripe. The idea that one could experimentally determine the truth about an independent reality is impossible in terms of constructivism: it is outside its paradigm.

Peirce's pragmatism is such an experimental method.

Part II. Pragmatism: a scientific method of research, teaching and learning

In Peirce's notes for *Pragmatism as a Principle and Method of Right Thinking*, his 1903 Harvard Lectures, he wrote passages that revealed his thoughts about giving the lectures. These asides are not irrelevant to the mission of discovering his educational philosophy. He was highly critical of Harvard philosophy students, suspecting that their professors had little or no interest in logic. If he were to be asked to "give a young gentleman a liberal education in 100 lessons," he proposed to devote 50 lessons to teaching a small branch thoroughly, "say perhaps to boiling an egg," that would leave the gentleman nevermore guilty of the "ridiculous conceit of fancying that he knows English, for example." Of the remaining 50, he would distribute them among mathematics, esthetics, ethics, metaphysics, psychology, languages, history, geography, biology, astronomy, geology, physical geography, law, divinity, medicine and other applied sciences, and, of these, 36 would be in logic, a "mightily important three-eighths." For, he claimed, "a liberal education ought to be a living organism and logic may truly be said to be the heart of it" (Peirce 1997, 123).

Elsewhere, he gives his "processes of forming philosophical opinions" and his "method of discussing with myself a philosophical question" (41). These consist in a dozen or so steps that start with some question in philosophy and progress through a sequence of writing and reviewing all that can be said and thought about it, organizing and re-organizing, structuring and re-structuring the subject, and digesting, criticizing it and then coming up with other connections it may have to additional conceptions. His process can be characterized as "thinking with his pen in hand," creating a kind of diagrammatic representation of thoughts. When he has thoroughly digested his question and can do nothing further with it, he might attempt to make its expression public. But, Peirce warns, he wants his hearers to think for themselves:

> Certainly, in philosophy what a man does not think out for himself he never understands at all. Nothing can be learned out of books or lectures. They have to be treated not as oracles but simply as facts to be studied like any other facts. That, at any rate, is the way in which I would have you treat my lectures. Call no man master, or at any rate not me. (47)

How are facts to be studied then? What perspectives on teaching and learning are suggested by pragmatism?

Three significant elements constitute a Peircean pragmaticist education: (1) the dependence of the sciences on logic within the architectonic of knowledge; (2) the categorical nature of thought; and (3) the application of the categories to reality.

Logic is a normative science along with the other sciences foundational to logic, normative science "in general being the science of the laws of conformity of things to ends." Normative science, in turn, rests upon Phenomenology, the science of the Universal Phenomenon discerned through its "ubiquitous elements," the three categories. Logic's three branches correspond to the three categories of Phenomenology, discovering and modeling the reasoning that is representative of the relations between Firstness, Secondness and Thirdness. Firstness refers to the phenomena of feeling, in representative terms, to perception; Secondness refers to the element of a phenomenon of force or struggle, in representative terms, to reaction; and Thirdness is a medium between a Second and its First, a representation, general or law in representative terms.

The corresponding branches of logic are abduction, deduction and induction. Abduction originates an idea; deduction examines the possible arguments related to the idea; induction examines the degree to which the arguments are borne out in experience. Pragmatism is the working out of representations from start to finish. Peirce originally phrased the pragmatic maxim: "Consider what effects that might conceivably have practical bearings we conceive the object of our conception to have: then, our conception of those effects is the whole of our conception of the object" (111). Logic, then, is the foundation for research in any other science.

Peirce's major pragmatic advance over the dilemma of constructivism lies in his resolve about the reality of generals, in the form of the regularities, uniformities and continuities in nature, that is, the laws of nature. The logical process by which a general comes to be revealed begins with an abduction, a proposal of possible regularities that call for deductive predictions and inductive tests relative to the proposal. Teachers who use either direct instruction or student-centered constructivism deny the desirability or possibility of such a method. Direct instruction teaches already

discovered laws as dogmas while constructivism denies the existence of all such laws. Peirce advocates instruction in logic in all of its three moments: abduction, deduction and induction. None of these steps is really possible except on the basis of the reality of the laws of nature.

How would a student learn to think well in a pragmatic program of education? First, it should be said that the exploration of ideas advocated by constructivism is not without merit. As a point of comparison with Peirce's logical moments, constructivism has inspired a variety of contemporary teaching and learning techniques that fulfill some of the conditions needed for a thinker to derive abductions. Writing to learn, discussion, and experiential learning techniques foster an environment in which students take responsibility for posing and solving problems of their own devising. "Response papers," journals and portfolios permit students to explore what they already know, discover what they need to know and how they might go about learning what they want to know. Brainstorming and discussion are ways to foster the expression of nascent thoughts, guesses and hypotheses. Exposure to or immersion in experience produces an intimacy with the phenomena that students seek to understand, thus an immediacy to their attempts to become acquainted with the structures and patterns of nature. Laboratory or field experience in natural sciences, immersion within cultures in social science and languages, and exposure to artifacts in history and archaeology are examples of rich sources of experience from which to derive firsthand guesses about the nature of things, and to understand how others may have derived their own guesses under similar circumstances.

Abductions are originated by paying attention to reality. The value of the abductive step, in any case, would be to narrow the field of possible inferences that should be tested in order to exclude any that it would be ludicrous to test. The worth of any given abduction rests on the results of its subsequent testing, not especially in the personal satisfaction it gives to its abductor. An inquirer might be very pleased indeed to have been the one to have arrived at an abduction that was successfully tested thereafter, but his pleasure is a consequence of these additional tests, not a test of belief in and of itself.

As for deduction and induction, students at all levels of contemporary education are familiar with laboratory experiments. Here is ample opportunity to introduce the branches of logic that deal in predictions and the responses of natural phenomena to inferences that prove or disprove their validity. A pragmatic advance over current educational methods would be to take "teachable moments" in classroom laboratory experiments to discern the deductive structures of thought inherent in experimental designs and in the analyses of their results. For example, following a demonstration and discussion of an inference about the causal relationship between two phenomena, it would be a small step to show how the form of deduction, *modus tollens*, is used as the basis of "falsification experiments" and how a similar but fallacious form of argument, affirming the consequent, leads to results that can be demonstrated to be invalid through counterexamples. Of course, the impact of counterexamples depends on a student's belief that an actual causal relationship works a particular way and definitely not some other way.

In the final stage of the logic of an inquiry, induction, a general law or regularity, predicted to be the case by deduction, is tested. This kind of logic often is said to capture a degree of probability that a set of premises leads to a particular conclusion.

Inductive inferences are said to be strong or weak, depending on the calculation of the degree of probability; cogent or noncogent, depending on whether the premises are thought to be true or false.

How does an induction test the predictive power of a deduction? The conclusion of a deduction supposed to be free of logical fallacies, moves to the status of the premise of an induction. Following the deduction that concludes that, for example, "Socrates is mortal," the inductive inquirer looks to see whether Socrates indeed dies when given the hemlock. His death is found to be a logical necessity in the deduction. Does nature resist or permit this conclusion? In this particular inference, the probability will be 1 should Socrates actually die, 0 if he does not. Every induction's *generic* conclusion is that its premise is manifested in reality. How much, if at all, the inductive inference manifests itself in experience is the test of its strength. The argument,

> All men are women.
> Socrates is a man.
> Therefore, Socrates is a woman.

has the identical necessity of the former argument, but when tested against experience with the inductive query "Just how much is it the case that Socrates is a woman?" the conclusion would likely have been found to have a probability of 0. Of course, a myriad of inductive arguments yield fractional ratios of probability, and the interpretation of these results may have several outcomes, not the least of which is that the regularity of a phenomenon occurring in experience is variable because the phenomenon itself is, in reality, not entirely or absolutely regular.

A deductive argument can tell us nothing about its actual applicability to reality. An inductive argument will tell us how reality may be approximated. The objection is proposed that inductive arguments cannot provide certainty. I believe it is on this basis that constructivists encourage the construction of a multiplicity of realities in thought. It is a rather challenging task to play the serene and neutral facilitator to students who suffer when confronted with uncertainty. But while it is true that scientific investigators may not be able to get to the very end of the testing of some inductive arguments, there are common comparisons that can inform us as to whether we have approximated well or badly. The testing of poor inductive inferences finds conflicting evidence against their conclusions, or a conspicuous absence of confluence with experience is revealed in the testing process. For example, in the historical case of the search for the élan vital or essence of life, its existence was posited, and no experience of it was ever established; the nonexistence of the élan vital was posited and the experiences of centuries of researchers lent support to that conclusion. Can these researchers have overlooked something in experience that would help resurrect the belief in the élan vital? Perhaps. However, at this point, the belief in the élan vital would have no ground whatsoever except through *a priori* reasoning.

It should be apparent by now that a pragmatic education, using a logical approach to finding "what effects that might conceivably have practical bearings we conceive the object of our conception to have" would instill habits of mind in students that scientists have to possess in some measure. The discoveries of science, no small influence on all of our lives, would then not seem to be merely "constructions of reality," but conclusions that came about through a rigorous process involving the engagement of thought with reality. Pragmatism's ability to

influence the student's conception of reality, and engagement with it, would significantly improve modern education.

Therefore, I suggest that the spirit of pragmatism become manifest is the following ways in the classroom: (1) logic should be taught from the earliest age possible and continued throughout higher education. Logic would be understood to include both the discovery of logical structures and their formulations within systems of logic as well as the application of logical formulations to reality. (2) Logic should be applied as a method to "consider what effects that might conceivably have practical bearings we conceive the object of our conception to have" in every case of inquiry. Historical cases in which logic has been partially or fully applied, for example in the history of science, should be critically presented by teachers and students in order to understand how inquirers proceeded from initial hypotheses to deductive predictions to inductively tested conclusions. Students should have opportunities to practice the method of pragmatism in their own investigations in every discipline. (3) Care should be taken to contextualize each inquiry, historical or current, as to the degree to which "our conception of those effects is the whole of our conception of the object." That is, scrutiny of the completeness or incompleteness of our knowledge about a given object should be scrupulously practiced and disclosed to students. Students should be given opportunities to be aware of how far investigations into given phenomena have gone and how far it is desirable we might go as a community of scholars. In turn, a student's state of knowledge relative to the "whole of [a] conception of [an] object" should be periodically assessed and the assessment used as a means of guiding further study.

Is this kind of education for everyone? Would pragmatic classrooms look different than they do now? Do these suggestions imply that teachers would utilize a very different kind of curriculum and very different sorts of instructional materials? Would the education of teachers themselves be different? What sorts of students would be created within a pragmatic system of education? How would a pragmatic system of education affect the professional, civic, and spiritual futures of these students as they entered the world beyond school?

I cannot answer whether this kind of education is for everyone. Given the imperfections of this world, it is doubtful that everyone or even many are ready to become astute reasoners with all that this might imply. Peirce was persuaded that reasoning was "not of the first importance to success in life" given that there are so few strong reasoners in the world and so many people successful in life despite that fact (Peirce 1898, 40).

Doubtless, however, the features of a pragmatic education, whatever its scope, would be distinct. The emerging changes that would result from a program to promote "right thinking" would first of all be apparent in the attitude of its students. The "frame" of realism is a wake-up call: teachers are not the judges of truth; reality is. Reality is not a single linear progression that can be learned in the first two decades of life. Reality is complex and evolutionary, with regularities and irregularities that play out in a number of ways, none of which is bound by a formal necessity or an authoritative fiat which is readily apparent to a single observer: a community of scholars over a sufficient period of time is needed to digest, discover and revise approximations of it. Peirce's notion was that students who took his "liberal education in 100 lessons" with 36 in logic would emerge with a healthy appreciation for the

effort it takes to acquire genuine knowledge. Gaining knowledge is hard work. The pragmatically educated student would understand that it is so and not mistake shortcuts to the fixation of belief for scientific reasoning and, further, not be satisfied with less than scientific reasoning as a ground for beliefs.

The profession of teaching would take on distinctive changes. Peirce noted that students first learning logic are often stymied by questions and problems that their teachers have long ago become inured to. He describes a typical sort of progression thus:

The pupil meets with a difficulty in Euclid. Two to one the reason is that there is a logical flaw. The boy, however, is conscious only of a mysterious hindrance. What his difficulty is he cannot tell the teacher; the teacher must teach him. But the teacher probably never really saw the true logic of the passage. But he thinks he does because, owing to long familiarity, he has lost the sense of coming up against an invisible barrier that the boy feels. Had the teacher ever really conquered the logical difficulty himself, of course he would recognize just what it was, and thus would fulfill the first condition, at least, of being helpful. But not having conquered the difficulty, but only having worn out the sense of difficulty by familiarity, he simply cannot understand why the boy should feel any difficulty; and all he can do is to exclaim, "Oh, these stupid, stupid boys!" As if a physician should exclaim, "Oh, these horrid patients, they won't get well!" (40)

So, the teachers themselves would have to be smarter! How would a good teacher do his job? Peirce said this:

But suppose, by some extraordinary conjunction of the planets, a really good teacher of reasoning were to be appointed, what would be his first care? It would be to guard his scholars from that malady with which logic is usually infested, so that unless it runs off them like water from a duck, it is sure to make them the very worst of reasoners, namely, unfair reasoners, and what is worse, unconsciously unfair, for the rest of their lives. The good teacher will therefore take the utmost pains to prevent the scholars getting puffed up with their logical acquirements. He will wish to impregnate them with the right way of looking at reasoning before they shall be aware that they have learned anything; and he will not mind giving considerable time to that, for it is worth a great deal. (40)

Peirce observed that while most men and women are modest enough about the characteristics that make them fine human beings, "beyond all, with the exception of those who, being trained in logic, follow its rules and thus do not trust their direct reasoning powers at all, everybody else ridiculously overrates his own logic" (40). Logic is not a natural acquisition, so training in logic would be a requirement for teachers as well as students.

What kind of curriculum and instructional materials would a pragmatic education require? This would partially depend on which "objects of our conception" a student or teacher wished to emphasize or explore. Experience would be the fulcrum of teaching regardless of content. This does not mean that every student would have to experience personally every object in the curriculum, but that any lesson about any object would include reference to its manifestation in the experience of inquirers. Therefore, it would be plausible to study even such abstract subjects as the history of philosophy in a pragmatic way. Through reference to primary sources created by philosophers, by studying the experience of thinking about philosophical topics that

these philosophers wrote about, and by experiencing thinking about philosophical issues themselves, students could gain an experiential knowledge of the history of philosophy. In less abstract fields of study, many topics, such as natural sciences, are already taught experientially. The arts and literature can be taught not only by having students engage in writing, painting, sculpting, performance or other arts, but by studying artifacts from the perspective of the experiences of the authors and artists.

In addition to emphasizing the tests of experience, the curriculum would guide the learner to an understanding of how topics of study are situated within the architectonic of all knowledge as well as within the hierarchy of concepts within single branches of knowledge. Should a topic be studied that is not stable in its role within the architectonic of knowledge, this fact would be disclosed. The fact that a topic occupies a liminal or threshold, status within the architectonic of knowledge as a whole or within a field, is an appropriate area for study in itself and would be acknowledged.

The history of educational methods shows a diverse range of experimental attitudes and programs. Currently, education is itself one of those fields in which there is a multiplicity of philosophies and practices of teaching and learning. It is not a single paradigmatic entity. Education is an "object of our conception" whose whole is not entirely known or understood. Neither direct instruction nor constructivism have the scientific grounding to warrant a continued belief that the aims of education can be met through these methods. This is sufficient justification that the proposed pragmatic method of education is worth a set of submissions to the branches of logic in order to find the "effects that might conceivably have practical bearings we conceive the object of our conception to have" in order to gain a "conception of those effects [as] the whole of our conception of the object." And of course, the "practical bearings" would have to be the fruits of the experiment of enacting a pragmatic system of education; otherwise this proposal merely looks "true to me," as an a priori reasoner, alone in my inner satisfaction with the notion.

So, I invite you to join the experiment with me, based on this outline, and investigate how close pragmatistic teaching and learning approximates the kind of education that promotes the comprehension of reality.

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