EDUCATING FOR CREATIVITY: A CHALLENGE FOR THE TWENTY-FIRST CENTURY

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Abstract

Over the last several decades educational reform has been a subject of intense discussions and debates in the United States and in other countries. Despite numerous proposals and initiatives, no major new direction has emerged, and the state of American education today is little different from where it was three decades ago. At the same time, there is a growing pressure due to enormous changes in many spheres of our life—most importantly in technology, information, and economy--to make our education more relevant to the demands of our time. The demand for creativity and knowledge is arguably the one that particularly stands out in modern society. As a result, the idea to make the process of creation and creativity more central to our educational practice is widespread. This article examines some problems that stand in the way of this change and offers the way to solve these problems. The article also outlines the contours on a new educational practice that centers on the process of creation.

Keywords: The process of creation, teaching, learning, equilibration, and production of disequilibrium.

Introduction

Since the dawn of the Modern era the idea of progress has been integral to our civilization. Constant advancement, improvement, and growth have been consistent and self-conscious pursuits in modern society. The result has been an unprecedented evolution that we have experienced over several centuries. The pace of change does not subside but continues to accelerate.

Education has been an important part of the progressive agenda. Changes in the way we educate our young have accompanied and productively contributed to every transformation of our society that we have experienced. Education played a crucial role in the transition to the modern industrial society by training the new labor force and preparing young people to become functioning and productive members of the emerging economic, social, and political order.

At the present time our civilization is undergoing a profound transformation that many describe as post-industrial. The rapidly expanding use of machines, robots, computers--all associated with what is called the artificial intelligence (AI) revolution--is increasingly replacing humans in performing various routine and non-routine tasks. We are still trying to come to grips with the full extent and impact of this revolution, but many argue that it will exceed in its magnitude all previous transformations.

The prevailing and widespread sentiment is that our educational system is not doing nearly enough to meet the needs of modern society and that education should play a very important role in the current transformation. Many education professionals, politicians, public figures and activists, business leaders, and government officials argue in support of stronger connections between our educational system and society at large (Holden, 2010; Laguardia and Pearl, 2009; Power, 2005; New Day for Learning, 2007; Hess, 2008; Prats-Monne, 2015; Tierney, 2013). This sentiment was the principal motivation for the neo-liberal reforms of education (A Nation at Risk, 1983; No

Child Left Behind, 2001; Race to the Top, 2009; Talburt, 2005; Sturges, 2015). The very same sentiment inspires also those who criticize neo-liberal reformers and advocate alternative approaches to education change (Rebertson, 2005; Carter, 2012; Suspitsyna, 2012; Verger and Bonal, 2012; Zhao, 2012).

There is no shortage of proposals for what should be changed and how. They deal with every aspect of our educational system: from governance and administrative structure to curriculum and conditions of employment, to teaching methodology and classroom dynamics. Some of them have been tried, but the results are not satisfactory. Several decades of hot debates have not produced anything approximating a distinct new direction for our educational system.

This article will focus on the process of creation as a major candidate for defining the new direction in American education that would meet the needs of the 21st century. It will examine controversies in the current educational practice relevant to creativity and discuss a possible solution. Finally, the article will outline the educational practice that integrates the process of creation as its central organizing principle.

Creativity and American Education

As has been mentioned, creativity has been and remains one of the major candidates for defining the new direction in American education. It is worth reminding that the need for technological innovation and entrepreneurship sparked discussions of educational reforms back in the early 1980s. In the wake of the stagflation crisis, the newly elected President Reagan reversed the priorities of the post-war consensus and introduced neo-liberal policies that were designed to restore American competitiveness and reassert the role of the U.S. as the world leader.

Initially, President Reagan and his government harangued the market forces that the new policies were supposed to enhance as the principal vehicle of change. However, as the miracle of the market forces began to wane, the government turned its attention to education and innovation as a solution for economic growth. In 1983, the special commission created by then Secretary of Education T. H. Bell published its report "A Nation At Risk: The Imperative For Educational Reform" that outlined the problems in the American educational system and made recommendations for addressing them. Among proposed steps the report emphasized the need to foster creativity and entrepreneurship in young people of America (A Nation at Risk, 1983).

The report sparked much activity and produced a flurry of proposals on how to improve American education. Several other efforts followed in the wake of the report: the standards movement that eventually morphed into the reauthorization of the Elementary and Secondary Education Act, better known as "No Child Left Behind" under President Bush, the Race to the Top program under President Obama, and the Common Core Standards Initiative. Although creativity under the guise of entrepreneurship was still part of the discussions related to reforms, pragmatic and specific issues--such as standards, competencies, administrative structure, and work conditions—largely overshadowed it. Eventually, discussions of educational practice focused on enhancing creativity were largely confined to the narrow domain of art and design education (Patston, 2018). As has been mentioned, despite decades of debates and discussions, the American educational system is today roughly where it was thirty years ago (AIR, 2018).

Discussions of education as a venue for fostering creativity go back to the 19th century when the ideas of German philosopher Friedrich Froebel and Swiss educator Johann Heinrich Pestalozzi attracted attention of prominent American educators, philosophers, and philanthropists including Elizabeth Peabody, Mrs. Horace Mann, Mrs.

Nathaniel Hawthorne, Ralph Waldo Emerson, the Alcott family, William Ellery Channing, and others (Feldman and Benjamin, 2006, p. 320). The 1960s and 1970s witnessed a revival of discussions on education and creativity largely under the influence of the ideas of Swiss psychologist and the founder of genetic epistemology Jean Piaget and later the cultural-historical theory of Russian psychologist Lev Vygotsky (Feldman and Benjamin, 2006). More recently discussions of creativity and education evolved along two largely disconnected tracks. Creativity has attracted a good number of psychologists who focus on trying to understand what creativity is, what personality traits contribute to enhancing creativity, and the conditions than make creativity possible. However, the impact of this theoretical research on educational practice, as noted by Feldman and Benjamin, has been "recognized as 'diffuse and ineffectual' despite the best intentions of psychologists and educators" (Feldman and Benjamin, p. 331).

At the present time creativity remains perhaps the only major idea that can potentially provide a new direction for American education. The well-publicized article "The Creativity Crisis" by Po Bronson and Ashley Merryman that appeared in *Newsweek* in 2010 reinvigorated discussions about the need to foster creativity in America (Bronson and Merryman, 2010). Contributors to these discussions stressed that our society needs to be more creative and innovative in order to solve the problems it faces in today's world (Thorp and Goldstein, 2010). Discussing the bleak prospects for the world economy, Eric Schmidt, CEO of Google, has expressed a view that succinctly summarizes what many business people, researchers, and politicians feel: "We are going to have to innovate our way out of this thing and our great research universities will have to lead the way" (Thorp and Goldstein, 2010, p. 1). Echoing a similar sentiment, Michael Porter has stressed that innovation and education should be an integral part of the overall economic strategy in America (Thorp and Holden, p. 1). Similar discussions are taking place in China and other countries (Starko, 2013, p. 54).

A large number of researchers and practitioners in the field of education raise the issue of the role of the educational system in fostering creativity and innovation in students (Schmidt, 2010; Swallow, 2012; Spendlove, 2008; Simonton, 2012; Shaheen, 2010). They recognize that creativity and innovation already have some place in our education. Many schools, colleges and universities offer courses in the arts that involve creativity. Many teachers engage in creative and innovative practices. However, critics feel that our educational system is not doing nearly enough in this regard. They call for a more central integration of creativity into our educational practice (Lamb-Sinclair, 2018; Berrett, 2013; Burnard, 2006; Coate and Boulos, 2012; Collard and Looney, 2014; Daud, 2018; Fischer and Golden, 2018; Guo and Woulfin, 2016; Haefeli, 2016; Henrickse, Mishra, and Fisser, 2016; Gerold, 2018; Jones, 2010; Klawe, 2018).

The Controversy over Teaching and Learning
Making creativity central to our educational practice has proven to be difficult. Issues relevant to integrating creativity--such as, the definition of creativity, its measurement, conditions that enhance creativity, and the personality traits that are conducive to creativity--still remain controversial subjects. The integration of creativity in education depends on their resolution.

Perhaps the most serious issue that is relevant to the integration of creativity is the controversy that has been raging for years between two major approaches in educational practice. An act of creation has two distinct features: it engages self-activity, or agency, on one hand, and it also involves transcendence, that is, an encounter with something that has not existed prior to the act of creation. The dividing line in this controversy related to creation and creativity is between teaching, or transmission of knowledge from the teacher to the student, and

learning, as the activity that originates with the student. Learning involves the exercise of agency by students; but teaching provides a possibility of transcendence, that is, encountering something totally new to students, that students did not know before they were exposed to it. In the current conception, the two do not seem to mesh easily: in teaching, knowledge appears to come from outside the student's mind, and in learning, the student is the source of meaning-making and knowledge.

The main objective of the learning approach is to engage students in meaning-making and knowledge production. This approach has several varieties, such as reflective learning, situated learning, distributed learning, problem-oriented learning and some others. The learning approach is decidedly student-centered. In her succinct definition of learning, Holly Inglis writes: "Learning is about actively creating meaning and order out of our experiences as learners see, do, and connect." The role of the teacher is not to be the source and the principal transmitter from whom students receive knowledge. Knowledge in this case does not come from outside the student. As Inglis describes, "The true learning occurs not because of the external information, or stimuli, but because of the inner cognitive work that is provoked by the developmental need of the learner to integrate information and make meaning and order out of their world (Inglis, 2014, p. 1)."

Over the last few decades the learning approach has gained much prominence in education. It has dominated educational research, policy, and practice. Gert Biesta, one of the major critics of this approach, underscores its dramatic expansion by describing the widespread application of this conceptual approach as "learnification" of education (Biesta, 2014; Biesta, 2013). Learning has become a central concept for our social practice. In the age of knowledge economy, learning and even lifelong learning has emerged as a panacea for resolving many contemporary problems and a key to the future progress of our civilization. One can certainly sense the tone of urgency in the following advocacy of the need for learning:

> There is a need to learn new ways of thinking to match the new kinds of problems that we face.
> The central challenge of our time then is to transform the way people think of themselves and
> what they are capable of. It is only by changing the sense students have of themselves as
> learners that they can begin to develop their capacities and realise their potential (Ranson, et al.,
> 1996, p. 11).

Discussions of learning are no longer confined to the educational sphere and its institutions. Learning has entered the discourse at world public forums and in international organizations. The UNESCO report from the 2010 Shanghai International Forum on Lifelong Learning includes the following impassioned appeal:

> We are now living in a fast-changing and complex social, economic and political world to which
> we need to adapt by increasingly rapidly acquiring new knowledge, skills and attitudes in a wide
> range of contexts. An individual will not be able to meet life challenges unless he or she
> becomes a lifelong learner, and a society will not be sustainable unless it becomes a learning
> society (Yang and Valdés-Cotera, 2001).

The dramatic expansion of the learning approach has not been unproblematic and has met with some poignant criticism and opposition. Gert Biesta has been perhaps one of the most vocal and astute critics of the "learnification" of education. His main criticism is that learning limits existential possibilities that education has to offer; it denies students an opportunity to confront something that is radically new and that transcends their experience. In other words, Biesta's argument is that education should offer existential situations in which students encounter transcendence. He points out that education

> . . . is perhaps not just about growing and deepening what is already there [in students' mind], but that education can also be understood as an encounter with something that is radically new, something that students precisely do not already have. Moreover, it is possible to think of education then as an encounter with something that comes to you without reason, so to speak, because if it is something that is really new, that really comes from the outside, students may not yet have any "anchor points" for connecting with what is coming to them, and may therefore not (yet) be able to see the "reason" of what is coming to them (Biesta, 2014, p. 240).

Biesta is not a traditionalists calling for return to authoritarian forms of teaching. He devotes special attention to drawing the line between himself and traditionalists. His main argument, as he explains, is "not to suggest that students should have no voice in what goes on—as this would turn education (back) into authoritarian modes of operation—but it is crucial to see that the voice of the student and the voice of the teacher are very different voices that come with different responsibilities and expectations" (Biesta, 2015, p. 83). His ambition is to develop an argument for teaching and the teacher that is explicitly progressive, in order to counter conservative calls for a return of the teacher as a figure of authority and control (Biesta, 2012a, p. 36). He recognizes that learning holds an important emancipatory potential but the concept needs to be re-politicized in order to realize this potential (Biesta, 2012a; Biesta, 2014). He also does not intend to eliminate learning as a conceptual approach in educational practice. Rather, he feels that education should offer a variety of existential possibilities that both teaching and learning offer (Biesta, 2014). He is also not oblivious to the tension that exists between learning and teaching. In his proposed resolution of this tension he suggests that teachers should perform their role with a sense of irony and students should treat the knowledge they receive from the teacher as subjective truth to which they willingly grant the status of authority (Biesta, 2013b, p. 459).

Coming from someone with a strong progressive bias, Biesta's criticism of the learning approach produces a very strong impression. Fundamental changes in the way we view reality and radically new approaches have certainly been part of human experience. Moreover, unorthodox ideas and new knowledge that transcend prior experience have produced the most rapid acceleration in the evolution of our civilization and have opened many new unexpected possibilities. Indeed, denying this experience to students will be a significant omission in their education.

However, the solution that Biesta proposes is not convincing. Even assuming that he is right in his assessment, and the balance in our educational system has shifted toward learning and away from teaching that allows students to experience transcendence, his solution adds little to our educational practice. Although Biesta advocates balance between teaching and learning, he still thinks of these two conceptual approaches as quite separate from each other—the way they are currently used. Such balance would make sense only if it would lead to a synthesis. But Biesta does not envision any synthesis. One wonders about the benefits of educational practice in which students will have the experience of making meaning without transcendence and encounter radically new knowledge apart from making meaning. Without synthesis, the balance between the two approaches is not likely to make much difference. If, indeed, a synthesis is on Biesta's mind, then obviously the experience of such synthesis should be part of education. Otherwise, students will be left without much guidance as to how they can effect this synthesis.

The debates over teaching and learning indicate that there remains an unresolved tension in the two approaches--between confronting the unknown and exercising one's autonomy and agency as part of the emancipation practice.

The fact that skilled educators can use both approaches does not eliminate the problem and does not resolve the tension. There is an unmistakable paradox lurking at the heart of the teaching-learning conundrum in the current educational practice. This paradox goes to the very heart of making the process of creation central to our educational practice.   In order to resolve this paradox, our educational practice should bring together transcendence, or encounter with the unknown, and students' exercise of their agency as aspects of the same process, and not as two separate and only tangentially related activities.

Can Teaching and Learning Be Integrated?

Learning is a form of equilibration. When students engage in learning, they apply what they know to what they do not know. In other words, they include what they do not know into their mental operations, or constructs. As a result, students assimilate what is unknown to what is known; hence no encounter with the unknown actually takes place.

Learning obviously satisfies one important condition that is required for a creative act. It engages the agency of the student. However, it does not satisfy another important condition—the encounter with a new mental construct, or operation, that is totally unfamiliar to students. Radical novelty represents a disruption of balance, or disequilibrium. Therefore, one can reformulate the problem of integrating teaching and learning into the problem of integrating equilibration and the production of disequilibrium. So, can these two operations that are so different be integrated?

Humans can learn and learning is a form of equilibration. Therefore, human mind is capable of performing equilibration.   But humans are also capable of creating new mental constructs that generate new ideas. Consequently, the human mind can do both: perform equilibration and produce disequilibrium. The fact that both equilibration and the production of disequilibrium occur in human mind suggests that they should be in some way related to each other.

In his famous proof of consistency and completeness, Kurt Gödel proves that any axiomatic system is bound to contain statements that are true but at the same time their truth is indemonstrable within this system. In other words, they represent a radical novelty. The demonstration of their truth requires changing the system's original axioms. However, Gödel also proves that changing original axioms does not help in resolving the problem of consistency and completeness since the new modified axiomatic system will also contain true statements that would be indemonstrable; and thus ad infinitum: no matter how many times we change axioms and modify our axiomatic system, we can never escape the problem of the presence of true statements that cannot be justified (Nagel and Newman, 2001). Thus Gödel's proof shows that equilibration that we use in constructing axiomatic systems also produces disequilibrium, therefore, our mental operations combine equilibration and disequilibrium as aspects of the same process.

The pioneering work of Swiss psychologist and philosopher Jean Piaget on the origin of human intellect also demonstrates the close interrelationship between equilibration and the production of disequilibrium. Piaget's seminal work *The Origins of Intelligence in Children* discusses, for example, how the equilibration of sensory-motor operations (hearing, seeing, etc.) gives rise to mental images, thus opening a possibility for symbolic operations. The equilibration of incommensurable operations leads to the emergence of a new and more powerful level of organization that conserves them and their differences as its particular cases. The adaptation of the sensory-motor operations to this new level of organization enriches them and creates their symbolic equivalents

(for example, visual and sound images) (Piaget, 1998). Piaget has shown that equilibration creates a radical novelty with new properties that have not been observed prior to its emergence. In other words, Piaget demonstrates that equilibration and the production of disequilibrium are closely interrelated aspects of the same process—the process that brings about radical novelty; and this process combines both equilibrations and the production of disequilibrium.

Our capacity to produce new and more powerful levels and forms of organization is an integral part of reality from which this capacity has emerged in the course of the evolution. Humans have inherited this capacity in the course of the evolution and transformed it into a powerful tool for their advancement. As a product of the evolution, our capacity to produce new and more powerful levels and forms of organization is but a particular case of the more general process of creation of new forms that we observe at all levels of reality. Therefore, our mind and reality must share the dynamic features that make the emergence of new levels and forms of organization possible--the dynamic equilibrium, or the balance between equilibration and the production of disequilibrium.

Just like we find the dynamic interplay between equilibrium and disequilibrium in the way our mind operates, we can observe the same interplay in the processes that take place at many other levels of organization of reality: from the sub-atomic level all the way to the cosmic scale and civilization. Many, including myself, have argued that reality does not have any preference for either equilibrium or disequilibrium (Prigogine and Stengers, 1984; Wolfram, 2002; Vicsek, 2002; Carr, 2003; Shkliarevsky, 2011). Reality is constantly in the process of evolution. It is a dynamic system; and as all dynamic systems it is never either in a state of equilibrium or in a state of disequilibrium; rather, it maintains equilibrium between equilibrium and disequilibrium (Shkliarevsky, 2007, pp. 330-31). In fact, dynamic systems are always in a state best characterized as "the edge of chaos"—a phrase coined by mathematician Doyne Farmer and popularized by Stuart Kauffman (Wikipedia article The Edge of Chaos). The astrophysicist Manasse Mbonye, for example, sees the interplay of equilibrium and disequilibrium in the processes of space expansion and the creation of matter in our universe. In his view, "the universe is always in search of a dynamical equilibrium (Mboney, 2003, pp. 1-2)."

Toward a New Educational Practice

The preceding discussion makes clear that there are no principal obstacles to integrating equilibration, or learning, and the production of disequilibrium, or teaching, in our educational practice. In fact, systems in nature conserve themselves by creating new levels and forms of organization; and this process operates on the basis of balance between equilibrium and disequilibrium (Shkliarevsky, 2015, pp. 637-38). The teacher and students also constitute a system. Like any other system, this system also has to conserve itself and in order to do so, it must create new levels of organization (in this case, mental organization), which is what education is—the progressive creation of new and more powerful level of mental organization. Both teaching and learning are used in today's educational practice. However, they are used as two largely independent and separate modes. But there is no reason why the teacher-student system should not be able to combine equilibration (learning) and the production of disequilibrium (teaching) in creating new levels of mental organization. In order to make the process of creation central to educational practice, learning and teaching should become aspects of the same process.

Teaching and Learning in the Current Educational Practice

As has been indicated, in the current educational practice teaching and learning are two independent modes; that is to say, production of meaning by students does not occur at the same time as transmission of knowledge. When the teacher presents new material in class, students are largely passive recipients. They may venture a question

or two, but there is simply no opportunity for any serious meaning making. Students have to follow closely the teacher's explanations. They have to focus on understanding what the teacher says and that requires all their attention. They simply cannot possibly engage in any adaptation of their mental constructs to the new material, which is what meaning making is. Their agency remains disengaged.

As students follow the teacher's explanations, they have no chance to examine them; they generally have to take what the teacher says for granted, accept it as truth. In this case, the new material conflicts with what students already know, since it is radically new. This conflict hinders the appropriation of the new material and at the same time erodes the old knowledge, creating confusion in students' minds. Students do not understand the connection between what they know and the new knowledge to which they are exposed. Since the material is totally new, and not just a variation on old themes, the mental constructs available to students and those required for appropriating the new material are incommensurable. As a result, in order to accept new knowledge, students have to abandon what they know. The discontinuity they experience is baffling, if not indeed traumatic. It creates confusion; it hinders appropriation of the new knowledge and conservation of the old knowledge.

The conflict between the old and the new knowledge persists even when students work on appropriating the new material at home on their own. Their adaptation to the new knowledge faces several problems. When students perform this adaptation, or learning, the mental constructs they use will inevitably affect and change the material they are trying to appropriate since this material requires totally new and more powerful mental constructs. As a result, the adaptation will inevitably distort the new knowledge and students will be in no position to make correctives on their own. Students will have to rely largely on their intuition, which will give them little conscious control over the process. As a result, the appropriation is not likely to be adequate.

When students go back to the classroom and present the results of their appropriation, many of them face a possibility of being embarrassed, which makes them reluctant to contribute to class discussion. Rather than step forward and try to articulate their views, they are more likely to hold back and let other students do the talking. This attitude stifles class discussion.

When students receive new and unfamiliar material from the teacher, they will necessarily have to suspend the knowledge they have and treat the new material as a revelation—the final truth of an unknown provenance. The appropriation of this truth will require that student should simply replace the old knowledge with the new. They have no conscious and critical control over this process that does not engage their agency. Such appropriation will not conserve old mental constructs and will not empower students. Since the initial reception of the material practically does not engage students' agency, students for the most part remain detached, which makes the appropriation of the new material even more difficult.

Thus, the current educational practice does not fully engage students' agency. It also does not conserve knowledge. Students move from one level of mental organization to another without any continuity or understanding of how knowledge is created. This practice makes the process of appropriation of new knowledge stressful. Since it does not affirm their agency, students simply cannot enjoy the process that largely disempowers them.

The New Educational Practice: Integrating Teaching and Learning

As has already been indicated, the teacher and students constitute a system. The teacher occupies the global, regulatory level in this system and students are located at the local level. Like all other systems, the teacher-students system must conserve itself.

Creating new and more powerful levels of organization involves constant adaptation of the level of local interactions to the global level. Such adaptation enriches local interactions and makes them more powerful. Their re-equilibration generates a new and more powerful global level and the entire process enters a new cycle in its evolution (Shkliarevsky, 2017, pp. 30-34). Therefore, students who operate on the level of local interactions must also constantly adapt to the global level at which the teacher operates.

The global level is more powerful--in the combinatorial sense—than the level of local interactions; it offers many more possibilities than the local level. That is the reason why students have difficulty assimilating the new material presented by the teacher. Due to power differential between the two levels, students simply lack the wherewithal that would allow them to access the global level.

Since the teacher is located at the more powerful global level, he or she can observe and has full access to the level of local interactions. The teacher is aware of what students know and the mental constructs that make their knowledge possible. For this reason, the teacher can play a crucial role in providing students with access to the global level.

Knowledge systems rest on foundational propositions, or what we often call self-evident truths. The fact that we may be unaware of these truths makes no difference. They still do what they are supposed to do: shape our perceptions and define our view of reality. The knowledge that students have is no exception. Whether they are aware of it or not, their knowledge is also based on foundational assumptions, or self-evident truths.

The teacher should make them aware of this fact. The teacher and students should together engage in the identifying and critically examine the self-evident truths that provide the foundation for students' knowledge. In addition, the teacher may ask students to justify these assumptions, just to make them realize the contingent nature of such assumptions. This entire critical exercise presents no problem for students since they operate on the level that is familiar to them. The process is certainly a form of learning as it engages students' agency.

The next move is strategically very important. The teacher should expose students to radical novelty. As has been explained earlier, the exposure to radical novelty can be disturbing and confusing, if not indeed traumatic. The teacher's goal at this stage is to diminish confusion, make students as comfortable as possible, and most importantly, continue to engage their agency. The teacher must make sure that the encounter with the new level of organization takes place on the territory familiar to students. In order to achieve this goal, the teacher must operate within the frame that is powerful enough to include both the knowledge students have and the new knowledge as its particular cases—that is, cases that are true under specific circumstances or assumptions. The understanding of the process that creates knowledge provides such frame.

The way to present radical novelty is to express it in terms of the level of local interactions. The teacher should present it in the form of facts that disagree with the fundamental assumptions on which students base their current knowledge. These facts are products of a new and more powerful level of mental organization. When students

encounter such facts, they cannot fail to realize their incompatibility with the self-evident truths they hold. This realization is the bridge to the next strategic move: the teacher engages students in discussing the way in which the assumptions they hold should be modified to accommodate the new facts. Although this problem is undoubtedly a difficult one, there is nothing in it that students in principle are not capable of doing, especially since the teacher will guide them in their search for a solution. When the modification is completed, the teacher and students can discuss and compare the two levels of organization—the new and the old one. As one can see, this stage involves both the teacher and students. Students do not have to abandon their mental constructs. They modify them. The process of learning continues and yet the students are exposed to radical novelty. Thus the entire process combines both learning and teaching.

Students' in-class exposure to the new and more powerful level of mental organization will certainly facilitate their further appropriation of the new material at home. When they get back to class, the cooperative atmosphere established in the first class session will encourage interactions among them and between them and the teacher. Since the terrain is familiar, students will feel perfectly comfortable asking questions and making comments as the adaptation and learning continues.

This new educational practice has a number of advantages over the current one:

1. It integrates and balances teaching and learning—or equilibration and the production of disequilibrium—in one process. Students' agency is fully engaged throughout this process. The teacher presents new mental constructs to students as facts, i.e., in terms that are familiar to students, which facilitates the process of adaptation. Learning starts in the classroom where students compare and contrast their own mental constructs with the new and more powerful ones. Although the teacher guides students in this process, they fully participate in modifying their assumptions to accommodate new facts.

2. The fact that this process starts in the classroom helps students to continue this process at home on their own. They continue to adapt and work out the implications of this adaptation.

3. Students' encounter with new mental constructs occurs in the manner that engages their existing mental constructs. Therefore, the exposure to radical novelty is combined with the continued process of learning. As a result, the new level of organization does not appear to students as if by a miracle that emerges out of nowhere. Students participate in modifying their mental constructs to accommodate new facts. They fully understand where new mental constructs come from and how they are connected to their old knowledge. The experience of the connection between equilibration (learning) and the production of disequilibrium (teaching) helps to avoid the confusion and destabilization that the exposure to disequilibrium may otherwise cause.

4. The new practice fully integrates the old and the new knowledge. The old knowledge is not discarded but is conserved as a particular case of the new, more inclusive, and consequently more powerful frame.

5. The new practice familiarizes students with the notion that knowledge is constructed. They see the production of knowledge as a continuous process of creating new and more powerful levels of mental organization.

6. The entire process of knowledge creation is open and accessible to students. Through their constant exposure to this process students begin to understand it better and acquire habits and skills required for knowledge creation. As a result of this experience, students will most likely act differently in the future when encountering new and unfamiliar views. Rather than trying to prove their own point of view, they will to attempt to create a new and more powerful frame that would integrate all points of view, including their own, as its particular cases. Their attention will be focused more on the process of creation than on its products.

7. Since the new practice continually engages students and their agency, it helps them come to grips with their natural capacity to create. They enjoy this process as one that affirms their self and their life. The empowerment they experience makes the entire process of education enjoyable and efficient.

8. By exposing students to the process of creation, the new educational practice cultivates their mind. But it also prepares them to meet the needs of modern society. Thus this practice helps fulfill the dual task of education, i.e., serving the needs of the individual or those of society, that has been much debated in the history of American education. The debate between John Dewey and David Snedden, the education commissioner of Massachusetts, is perhaps the best illustration of this controversy that is still the subject of debates today (see Zehr, 1999; Abowitz, 2008; Adams and Adams, 2011; Kett, 2017).

9. The new educational practice has important political implications. It involves both the teacher and the students as equal partners in a common enterprise; it invites and encourages the participation of all involved. Such open and inclusive nature of the new educational practice has important implications for the implementation of modern democratic principles of universal inclusion and empowerment.

10. The process of creation that is integral to the new practice requires the recognition of autonomy and agency of all participants. Such recognition is the basis of true morality. Thus the new practice will foster moral education of young people.

11. Since our capacity to create is an important source of our humanity, individuals who continue to create throughout their life cycle satisfy their important existential need, which helps them live a more productive and happier life.

12. Thus, as one can see, the new educational practice serves a variety of purposes that many modern educators see as essential for our educational system.

Conclusion

Transforming our educational practice is not going to be an easy task as it will require changes in people and institutions. It will also affect other aspects of our social practice in general, as our system of education is a part of the much larger aggregation of practices that are intimately related to each other. Such transformation will take much, much more than one article or even a book. It will require efforts and contributions by many people— education professionals, students, but also politicians, media people, public figures, religious leaders, and many others. This article is just one very small step in this direction.

As has been indicated earlier, there are many pragmatic reasons for making creativity central to our educational practice. Economic and technological innovations, social changes, global transformations, and many other factors have enormously increased the importance of creativity and knowledge production in our society.

Creativity has always played an important role in the evolution of our civilization. However, the demand for creativity today is much stronger than at any other time in human history. Creativity and innovation have become perhaps the most important factors in our economy and production, our social and political relations, indeed in our whole way of life. We expect creative solutions and approaches from people in everyday situations and in common lines of employment, not just in select elite occupations. In order to satisfy this enormous demand in creativity, we need to change our education.

As this article has argued, there are no principal obstacles to making creativity central to our education. One important problem that must be solved is the problem of integration of teaching and learning that are currently used as two separate and distinct modes of education. This article has demonstrated that equilibration, or the

operation required for learning, and the production of disequilibrium that is involved in teaching are both essential aspects of the process of creation. As such, they complement, rather than oppose, each other. Moreover, the article has outlined the new educational practice that combines teaching and learning as part of the same educational process.

The outline of the new practice is very general. There is no doubt that this model requires further development, elaboration, and enrichment by both theoreticians and practitioners in the field of education and other cognate fields. Moreover, the development of the new educational practice will also require the cooperation and input from students who will bring their talent, ingenuity, and the passion for experimentation and innovation to this enterprise.

There is no doubt that the implementation of the new practice is a colossal undertaking that will require a great deal of energy and resources. But the payoff is definitely worth it. The result of this change will be generations of well-educated young people who will not only appropriate the intellectual heritage of the generations that have preceded them, but will also understand, master, and control the process that creates new levels and forms of mental organization. This knowledge and experience will allow them to be creative when they want to, not only when they can.

The ability to control one's own creativity capacity will be very important for cultivating young minds. However, it will also make them an invaluable asset for society, as the realization of their creative potential will result in new ideas, new products, new approaches and initiatives, and new and hitherto unknown ways and forms of life.

But all these benefits are not the only reason to making human capacity to create central to our educational practice. The process of creation is the most essential part of reality and is the source of its continued evolution. Enhancing our creative capacity and learning how to control it will help us use the creative potential of all humans to the fullest extent possible. Creative acts realize our potential. Creative acts empower those who perform them. In this sense, creative act is a liberating act that emancipates us and frees our essential nature. Thus the educational practice that centers on the process of creation will not only make our education more effective and efficient, but it will also contribute to one very important goal that our civilization has pursued for ages—the emancipation of humanity.

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