

Complexity and the Universe of Education

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Abstract

In this paper, I take the position that in order for education policy makers and teachers to reform teaching and learning, they must be good consumers of education research. Good consumers of education research understand that education is a complex endeavor and as such resist accepting findings that simplify or complicate teaching and learning. A second position maintained in this paper is that influences on teaching and learning are holons, a term coined by Koestler (1996). There are several categories of holons; education is considered a social holon. All holons are influenced and governed by their own sets of rules. Within the social holon of education exists other social holons such as policy and students.

In order to understand the universe of education as a complex endeavor, education researchers, policy makers and teachers must make explicit (acknowledge) the tensions (mitigating factors) between and amongst holons. Acknowledging tensions (social holons) is to respond to the influences of each holon to include the individual student. As a consequence, the interplay between who a learner and teacher are and the influencing contexts they are constantly having to negotiate in and out of the classroom on a daily basis are made explicit. Education research and policy based on the notion of cause and effect (linear) reduces adaptations and evolutions of students and teachers to simple and mechanistic human beings, ignoring the myriad of daily changes they go through. In other words, the complexities of teaching and learning are oversimplified. When tensions are not created, acknowledged or appreciated by policy makers, there can be no ebb or flow, and as such, there can be no change.

Introductory Vignette

While teaching in a public school, I had a teacher aide (TA) working with me in my so-called “bilingual classroom.” So-called because the emphasis was not on bilingualism but on learning English as a Second Language (ESL) at the expense of the learner’s mother tongue. When it came to teaching ESL, I remember assigning the students that were least fluent in English to the TA. How could I take time for these students when I had other, more fluent English speakers to teach and prepare for end-of-the-year examinations? After many years of reflecting on my experiences as a public school teacher, I have come to realize I did not have the professional ability to deal with the entire spectrum of language ability in my classroom. Perhaps this is because I was a beginning teacher and it takes years to develop an understanding of students’ perspectives. It could also be that the teacher education program I went through did not prepare me for the complexities of teaching. From my perspective today, the complexities of society had crept into my classroom and negated my professional competencies. The problem is that these complexities were there all along, and I did not recognize them because of my limited views. However, I also complicated the issue by constraining my professionalism when I evaluated students with an unconscious rubric that filtered out the knowledge that students possessed because my focus was on what was missing.

My experience is perhaps not very different from many teachers of today with one exception. Specifically, the plethora of contextual issues that today’s teacher must deal with when compared to my public school teaching days. No, I am not suggesting that the variety of contextual issues is any more or less now than it was then. My argument is more along the lines that the contextual factors that are a part of today’s classrooms far exceed the professional

capacity of teachers, resources, and the education system. For example, today's framework of accountability did not exist in my time. Additionally, the privilege I enjoyed was being able to distance myself from a contextual issue (ESL) by using in-class resources. The ability to call on resources that can help shore up any pedagogical situation that far exceed the professional capabilities of an educator is not a privilege shared by many teachers, especially in some rural and urban classrooms.

Contextual Issues

Lately, I have been working with a colleague on understanding how science teachers identify and define obstacles that they perceive as inhibiting them from teaching well (Gallard and Southerland 2008). One of the intents of the research is to identify rationales teachers use that locate the reasons for academic failure. Did teachers place blame on students or the education system itself? For example, a teacher might use a student's social and economic condition, assert that a family or parents did not care about the education of their children, and/or identify a lack of English language ability as reasons why students do not learn science. They may also point to administrative demands such as excessive paperwork or redefining learning as successfully passing an end-of-the-year standardized test. The resulting impression, after analyzing the data, is that teachers find mechanisms (rationales or justifications) to dissociate themselves from the complexities they must deal with on a daily basis. However, another way of viewing this is that students bring into classrooms problems and situations that are so overwhelming that teachers must distance themselves from them and create new owners (e.g. administration, parents, society) onto which to pass the issues. By doing so, they are then able to dismiss contextual factors that heavily influence or even negate efforts to teach and help students learn. In other words, distancing allows educators to give up ownership of many problems.

However one chooses to define the issue, the bottom line is that teachers are overwhelmed when the difficulties of society enter their classroom, and teachers are at a loss as to what to do with many students. I do not want to give the impression that society is not an inherent aspect of education, school, and the classroom. Society is not an object that is brought in, but rather, it is an embedded aspect of any reality. Consciousness of such takes time and experience. As teachers gain experience, they become aware enough of the issues to include society as a component of their teaching reality. Yet, teachers may consider such factors as extras they should not need to address. Given the simplified definition of knowledge, can you blame them? I cannot. Most school districts currently define knowledge as academic success and failure provided by a one-stop solution called high stakes accountability as represented through standardized testing (Eisner 1998; Fullan and others 2006; Opfer and others 2008).

What I consider oversimplification reminds me of an experience I had while teaching a science methods course. During a discussion on classroom management, a student was complaining about the lack of respect she received from students while student teaching. I distinctly remember her saying: "When I graduate and get paid as a teacher, they will respect me." I remember thinking how she had simplified the notion of student-teacher interaction by reducing it to a paycheck. Is it possible that teaching and learning can be so easily reduced? If so, then why are we requiring our science preservice students to spend at least 120 hours in classrooms observing, teaching, and interacting with students to ensure our student teachers understand teaching and learning before we allow them to do full-time internships?

The notion of oversimplification has led me to question if education researchers and policy makers also view education as a very simple endeavor by reducing or defining the same

into a series of compartmentalized problems? Do they not understand the implications of mitigating factors when they think of teaching and learning in general and of science specifically? Do education researchers, as well, disown themselves from the issues embedded in the phenomena being studied and provide solutions to problems that have not been fully defined? I believe the answer to these questions is yes for education researchers, policy makers, and policy enforcers. I suggest that the framework for their understanding of education is to approach it as a simple system where predictability as defined by a cause and effect mentality, or the finding of simple solutions, is the cultural soup de jour (Fleener 2005; Davis and Samara 2006; Davis and others 2008). For example, Fleener (2005) says it well, “Beliefs in universal truth, objective measures, social progress, and the power of individual rationality are consequences of an emphasis on the scientific method as the paragon of rationality. These beliefs form the cornerstones of modernity that affect all aspects of our social lives including our educational, political, economic, and social institutions” (7). The fact that education is viewed as such, rather than as a complex system that changes every minute and hour, is one of the key problems in education research and policy. Eisner (1998) reminds us there is a culture of education research that is contributing to such a practice: “Our research tradition is more in keeping with Taylorism, the scientific management of human behavior, than with interpretive or qualitative orientations to the improvement of teaching” (13).

Please do not confuse my use of Eisner’s statement with a call for interpretive or qualitative study as the answer. It is not! My point is that education research should not be about management of human behavior but understanding it from multiple perspectives and influences. Being and interacting in human society is intricate. Understanding just how intricate humans are would help policy makers, the public, and educators understand what happens when education is enacted. Specifically, understanding based on the complexities involved in teaching would help paint pictures of the multiple realities within which education is situated. A filter needs to be created by consumers of research that discerns whether certain issues, such as class, culture, socioeconomic status, gender, language, and values, have been made explicit or included in methodological designs and/or education policy. To do so would be to follow Fullan’s (2007) suggestion that the starting point for reform needs to be the individual learner. I extend this idea to education research, education policy, teacher education, and educators. However, I do not feel this is possible until all parties discern and make explicit the influencing contextual factors on student learning. This means that education researchers and policy makers need to disclose what has been excluded, justify the exclusions, and explain the implications of these exclusions in their findings or proposal.

Complexity

Over the years, as I observed more and more of society enter school, I began to use the filter of *problematic* as a way to make sense. Since I viewed education as being a series of problems, it was natural for me to try to find or offer solutions to teachers through research and writing that were very simplistic. I was cognizant of contextual factors that made teaching (and thus learning) problematic for some students, but I never made a connection to the teacher, classroom, and student or society at large. I could only offer trite solutions such as making classrooms more gender friendly. My solutions were trite because they were void of influencing factors such as the inequality that exists between males and females in society at large. So what if classrooms were gender friendly when the moment the last bell rang students walked into a world that was not? My thinking has now evolved to a place where I cannot separate the notions

of context and problems from each other and thus have decided to focus on the notion of complexity. This has led me to complexity theory, or as Davis and Sumara (2006) call it, complexity thinking. Davis and Sumara state, “In this writing, we position complexity thinking somewhere between a belief in a fixed and fully knowable universe and a fear that meaning and reality are so dynamic that attempts to explicate are little more than self-delusions” (4). Consequently, I can no longer use the terms *problematic* and *complexity* as if they are synonymous when approaching education and its surrounding issues.

I am not trying to oversimplify the issue by promoting the idea that pedagogical issues are not complicated or problematic. They are! However, I am trying to underscore the idea that something being complicated or problematic is not synonymous with the word complex. According to Davis and Sumara, “The behaviors of simple and complicated systems are mechanical. They can be thoroughly described and reasonably predicted on the basis of precise rules, whereas the rules that govern complex systems can vary from one system to the next” (11). They list several qualities that an issue must have in order for it to be thought of as being complex. One of them is “Nested Structure” or “...complex unities which are often composed of and often comprise other unities that might be properly identified as complex—that is, as giving rise to new patterns of activities and new rules of behavior” (5). For me, this means that a teacher cannot simply make his or her classroom more gender friendly because issues of gender inequity are an insidious sociologically inherent aspect or thread of society that implicitly influences the classroom. This also means that if an education researcher has not made explicit how gender inequity in society influenced their research, findings, and implications, then they are also distancing themselves from the problem and - at best - presenting an “objective” distorted picture to the public, policy makers, and teacher. Using a broader perspective to initiate education reform or enact teaching and learning without confronting head-on the inequalities, prejudices, and discriminatory practices in which education takes place is an attempt to sweep the complexities of society under the carpet. A consequence of using this perspective initiates a state of denial that these same issues cannot be found in today’s classrooms.

In short, it is my belief that education research that is **not complex** is an obstacle to any meaningful reform or teaching. Fullan (1993) addresses the notion of complexity by situating it within education reform efforts or organizational change. He states:

How is change complex? Take any educational policy or problem and start listing all the forces that could figure in the solution and that would need to be influenced to make for productive change. Then, take the idea that unplanned factors are inevitable – government policy changes or gets constantly redefined, key leaders leave, important contact people are shifted to another role, new technology is invented, immigration increases, recession reduces available resources, a bitter conflict erupts, and so on. Finally realize that every new variable that enters the equation – those unpredictable but inevitable noise factors – produce ten other ramifications, which in turn produces tens of other reactions and on and on. (19)

There are aspects of society that are woven together, much like a spider’s web, which envelope the education arena to include policy, reform efforts, research, learning, teaching, and the preparation of future teachers. However, reinforcing Fullan’s point of connections and influences and Davis and Samara’s notions of nested structures, education research, or policy, when complex, are like the construction of threads of a spider’s web. However, education research or policy is limiting if it lacks painting a complete picture of the connections between

and among influences on teaching and learning in and out of the classroom. Another way of looking at the difference between the spider's web and education research is that the spider is very clear as to the function of the engineering of a web: to feed so that it has the nutrition to fully develop itself. To this end, whether the web is influenced in the middle or on one of the outer threads, the moment the tension is disturbed, the spider receives the message through its sensory abilities because the individual cells are connected in such a manner that one informs the other. Webs are elaborate, and their construction covers the whole of the feeding territory. It is sensitive enough to discern between a raindrop and prey. Perhaps education research needs to understand better its function, which I believe, is to provide the sustenance necessary for the improvement of teaching and learning.

The key word is *tension*, and the key action is acknowledgement. Much like each strand of a spider's web, the number of tensions brought to awareness and put on the table for discussion or decision making by researchers and the consumers of education research are critical to providing a complex view of the issues. As an example, professional development experiences such as teacher or other education workshops must be inclusive of multiple tensions. Those providing the professional development occurrences acknowledging their existence accomplish this. If the intent is to improve learning, then I believe that, at a minimum, tensions between what the research says, the beliefs and attitudes of participants, the contextual factors of the classroom of each teacher, as well as their tacit knowledge need to be created, sustained and constantly renewed individually and in a community. An operational example is the framework of the Leadership Standards for Principals and Vice-Principals in British Columbia (2007). Using Fullan's (2003) notion of moral purpose as the theoretical framework, tensions are acknowledged amongst and across moral stewardship, instructional leadership, organizational capacity and relationships. In my view, the underlying catalyst is their belief that school leaders are learners. I find that by positioning school leaders as learners, a tension is created using their attitudes and beliefs about leadership as the starting point. It is not explicit what they mean by being a learner, but it does imply that there is a belief that one of the qualities of leadership is not to assume expertise but to always be informed by the multiple contexts teachers deal with every day. For policy makers, school administrators, and teachers, multiple contexts can serve as critical tensions between their attitudes and beliefs about accountability, knowing, learning, and students. One of these tension-causing multiple contexts is the diversity of students in a classroom and how or if they are made to feel included.

Let us take a specific population in the United States: Latinos/as. I deliberately use this population for several reasons. One is that I am a Latino and a member of the diaspora of Latinos/as who have left their homeland but have maintained their culture and language in another country despite pressures to assimilate. The word *maintained* is key because it implies a difference between those Latinos/as who are members of a diaspora and those who have temporarily migrated to the United States for short-term work purposes. We have to work to maintain who we are over generations while short-term immigrants go home and reconfirm who they are. Second, because I am Latino, I cannot extricate myself from my influences and myself. As such, when I, as anyone else, analyze education research and education policy I always use an experiential filter. Specifically, I look for clues that assist me in determining if the research that influenced the policy, as well as the policy itself, is inclusive of the class, cultural, economic, historical, linguistic, and political issues that have influenced **my** place/position in my world. This is an issue of identity of self, which determines how inclusive I have been made in the thinking of members of the academy as well as policy-makers and teachers. I am not the only

Latino explicit about the notion of inclusiveness: many Latino/a students who enter a classroom look for signs of inclusiveness, although perhaps more implicitly.

I cannot speak for others in asserting that the greatest majority of the time, I do not find **me** in education research, policy, or teaching. Missing are critical contextual factors that lead to under-representation of Latinos/as in the sciences such as class, culture, language, and power or hegemonic issues (Rakow and Bermudez 1993; Rodriguez 2001; Gallard Martínez, in-press). I posit that rather than looking at us, as well as the whole of teaching and learning, in a more complex manner, a simplistic or more problematic set of filters dominate. For example, if “they” learn English, “they” will succeed in school. If “they” attend and graduate from school, “they” will become productive citizens. What all of these and others ideas have in common are simplicity and naiveté because they fail to account for the societal phenomena in which education research, policy, reform, and teaching and learning take place. The societal phenomena that I am referring to can be found in answering the following questions. Do all non-English speaking people who learn English succeed? If not, why not? If “they” attend and graduate from school, will “they” become productive citizens? If not, why not? If more gender friendly teaching methods in science classrooms are incorporated, will this increase the number of females in the sciences? If not, why not? To do education research, develop education policy, initiate education reform, or enact teaching and learning without confronting head-on the inequalities, prejudices, and discriminatory practices in which education takes place is an attempt to sweep the woes of society under the carpet or maintain a state of denial.

This is precisely what happens with grand movements that result in outcome-based-policy such as the role of testing in high stakes accountability. Outcome-based education policy for me is policy that is mono-cultural, mono-economical, mono-historical, and mono-sociological. This is to argue that the epistemological, ontological and axiological underpinnings are inclusive of only one world-view which, when enacted, creates a power struggle with other world-views or realities. Outcome-based policy by its simplistic nature ignores the complexities of the world. This is because there are competing tensions about the function of education that have not been made explicit between and amongst administrators, parents, policy makers, students, and teachers. Some may see education as a vehicle for improving society, others improving economics or developing literacy, still others as a means of improving themselves. Regardless of how the function of education is defined, unless these competing tensions are acknowledged, negotiated and a common vision developed they will drain valuable energy and resources. For example, a critical function of the *No Child Left Behind Act of 2001* is to use education to close the gap between the achievers and underachievers as measured by standardized tests (Opfer and others 2008). The intent is admirable, but the reality is not so wonderful. Should it be expected that a policy such as the *No Child Left Behind Act of 2001* be successful if poverty, class differences, and education expectations based on one’s gender, nation of origin, skin color, and/or SES are not tackled at the same time? To do this, one would have to recognize the complex connections and their influences on all pedagogical acts, which is Davis and Samara’s (2006) notion of nested structures. The following figure is an attempt to identify societal structures that are nested within each and, as such, are critical influencing factors.

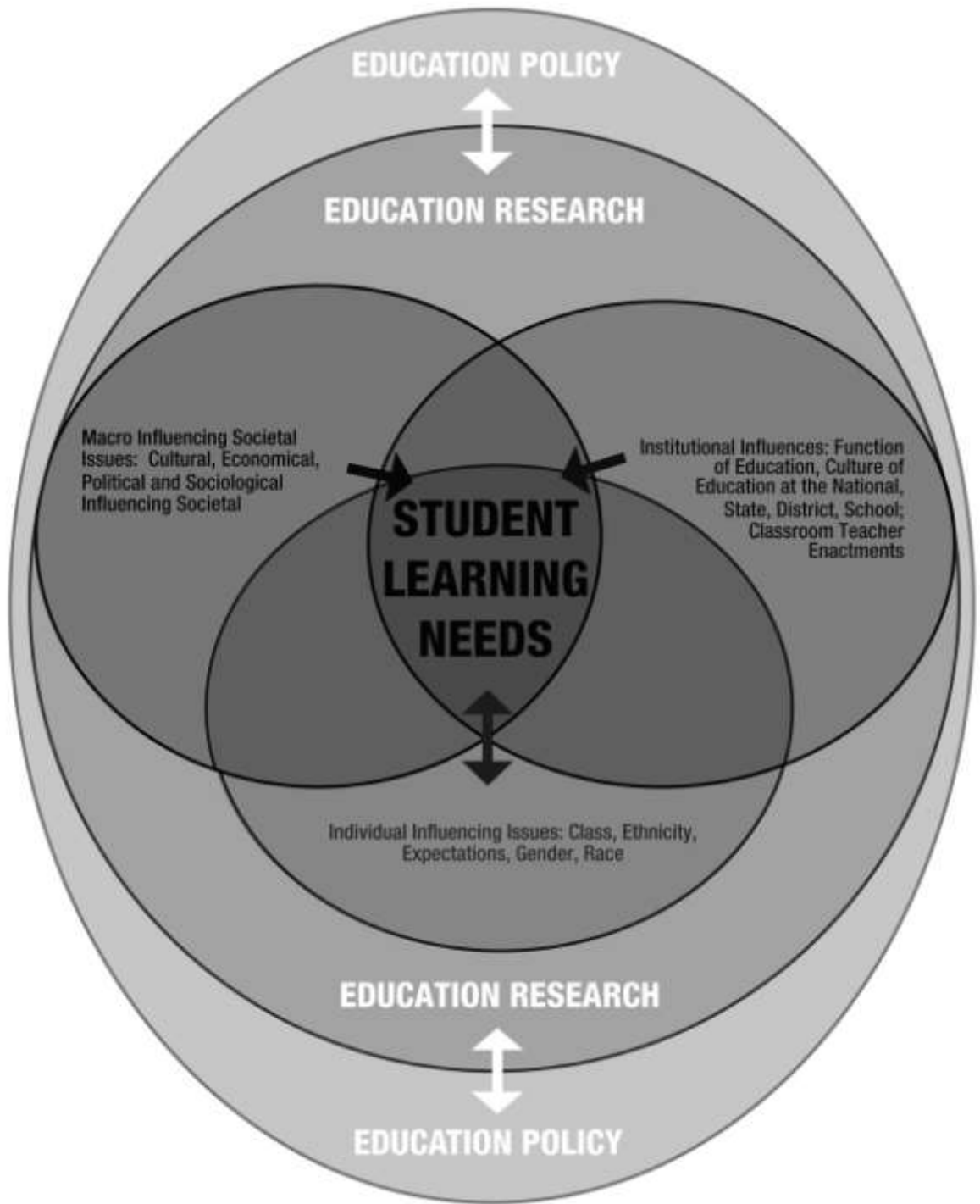


Figure 1. These are macro contextual influences on learning and the learner. It is not meant to be exhaustive. Each circle is a social holon with its hierarchy (Koestler 1967). Learning and the learner are not isolated nor insulated neither from societal holons nor from themselves. Student learning needs are in a state of constant flux, thus the two-way arrows. The two-way arrow between education policy and research is to denote that a constant influence exists between them. The one-way arrows suggest that some issues are so complex that society itself would have to be turned inside out and reconceptualized.

The intent of this figure is to give the reader an idea of macro contextual influences on learning and thus the learner. It is not meant to be exhaustive. Each circle is a social holon (Koestler 1967). Koestler states, “In social behaviour, the canon of a social holon represents not only constraints imposed on its actions, but also embodies maxims of conduct, moral imperatives and systems of value” (344). He adds, “Parts and wholes in an absolute sense do not exist in the domain of life. The concept of the holon is intended to reconcile the atomistic and holistic approaches” (341).

The genesis or inspiration for Figure 1 is the quote: “Humans are not self-contained, insulated, or isolated beings, but are situated in grander social, cultural, and ecological systems” (Davis and others 2008, 7). The impression I want to give in the diagram is that institutional and societal issues (holons) are subsumed influentially and yet are apart and/or can belong in part to other systems. Koestler (1967) refers to these as holons. He says, “More generally, the term ‘holon’ may be applied to any stable biological or social sub-whole which displays rule-governed behavior and/or Gestalt-constancy” (341). He argues that an individual can be a holon as well as a nation. There are two underpinnings to the notion of a holon: hierarchies and the Janus effect. Koestler posits, “We do not know what forms of life have evolved on other planets in the universe, but we can safely assume that *wherever there is life, it must be hierarchically organized*” (47). In addition, “the members of a hierarchy, like the Roman god Janus, all have two faces looking in opposite directions: the face turned towards the subordinate levels is that of a self-contained whole; the face turned upward towards the apex, that of a dependent part” (48). In terms of education, it is critical to understand that if a student is a holon, then the Janus effect is inward and outward because there is a hierarchical organization which in this case is society at the top and education as a sub-heading. This means that they must balance who they are as well as how they belong in the scheme of society. This also means that if education is a holon, it must also balance the whole of its citizenship (a holon also) as well as how each individual holon (student) can maintain who they are and still contribute to the whole. A student as a holon is consistent with Fullan’s (2006) notion of starting with the learner, which is at the center of the figure.

Returning to the notion of nested structures (Davis and Samara 2006) and my notion of a spider’s web, Davis and others (2008) offer the notion of network structures, which can be centralized, decentralized, or distributed. I posit that Figure 1 is a decentralized network because “it consists of clusters that combine into grander clusters, and this sort of structure is manifest in all living systems and in ecosystems” (Davis and others 2008, 57). Also: “At every level, knowing is seen as a complex process of co-evolution—that is, of agents (whether species, societies, social groups, persons, cells, or ideas) adapting to and affecting one another and their dynamic circumstances” (57).

All students, regardless of age, gender, race, and socioeconomic status, have a history, a present, and a future that is situated within a set of socially constructed societal expectations that create limitations for some and not others. In other words, they have an identity. What is missing from education research is a lack of admission that there is a set of socially constructed societal expectations that parallel both society and teaching and learning, which, as a consequence, serve to continue to enfranchise and disenfranchise the same students. For example, in a review of literature for the teaching and learning of science for Latino/a populations, I found very little evidence of complexity. Indeed, much research talked about or reported in their findings a Latino/a population, but it did not mention, for example, how language ability influenced their

findings. In a chapter entitled “We are more different than alike: latinos/latinas-hispanics,” I wrote that:

Teaching and learning science is not complicated but complex because identity is critical to the academic success of Latinos(as). Identity is critical because Latinos(as) can incorporate themselves into the learning process if they are understood and accepted. However, as long as researchers and science teachers treat teaching and learning science as a way to contrast differences between Latino(as) and an Anglo society, it will always be complicated. A complex framework for analysis or making sense that has as its center point the notion of identity is critically needed. Identity is the same as acceptance, and this means that a tension between understanding us as we are versus how you think we should be must be created. However, until it is made clear by the bulk of my colleagues how they incorporated culture, economics, language, and sociological issues, which are part and parcel of the past and present of the disenfranchised, then we are simply subsets contrasted against Anglo values and interpretations, which is a hegemony in and of itself. (Gallard Martínez in-press)

Concluding Remarks

All nations are constantly looking for ways to improve their education system. The underpinnings of these efforts are the beliefs of Secretaries or Ministers of Education about the function of education. New education policy is continuously formulated and a great part of its framework is education research as well as la política vigente (current political influences) (Gallard Martínez, In-press) and beliefs about the functions of education. However, this is only a part of the picture because in time, a teacher in a very confined space enacts education policy: the four walls of a classroom and education policy that limits the potentials of the education system by ignoring influencing contexts. For example, let us take three distinct populations (parent, administrator, and teacher) and the tensions created between and amongst them about the function of education. If they are not clear of each other’s position as to the function of education, then it is my belief that what will result is a struggle of power.

It is the acting out of education that raises a critical question: How successful can a teacher be expected to be if the education policy they are enacting is void of society’s nested structures? Carnoy and Levin (1985) state, “On the whole, members of racial minorities and low-income groups are less likely to do well in school, and they are also less likely to do well in the job market” (1). Further, if you define success as students scoring As on standardized tests designed more for holding districts accountable and students and teachers hostage, then the notion of complexity is not important; you have denied the full potential of knowing by limiting the notion of knowledge to some and not others. Carnoy and Levin (1985) add, “The educational system is not an instrument of the capitalist class. It is the product of conflict between the dominant and the dominated” (50). Demographically, it is the very same pattern of success and failure in the job market that defines student success and failure in standardized high stakes testing in today’s education arena. One can only wonder if success and failure speaks to the reproduction of labor relations (Bowles and Gintis 1976).

Can educators be expected to create a world in which there are only winners? No, and to think so is trivializing the issue of just how complex teaching and learning is. However, I do believe that what is within our reach is to start with the learner and demand that education research be inclusive of the structures within which the learner is situated. Accordingly, it is imperative that education research be framed by the notion of complexity. The ultimate goal

would be such that when the research reaches classroom teachers, it has multiple implication platforms that can be used to put the emphasis of teaching on a learner and not a class. No, I am not trying to make teaching any harder than it already is. I am suggesting the opposite: we should embrace just how difficult it is rather than trying to make teaching simpler.

Earlier, I documented what complexity means to Davis and Samara, as well as Fullan. What does it mean to me? For me, complexity is equivalent to creating tensions that when enacted result in inclusiveness or identity of student and society. Accordingly, if we use the learner as the starting point and understand all that they bring to the learning table, then their identity is included and permeates pedagogical decisions. I am not talking of the oversimplified and trite phrase: starting where they are. Teachers cannot start where students are if the research or information passed on is based on another starting point: the convenience of the researcher. By conveniently packaging his or her research exclusive of outside tensions, the researcher presents a very simplified picture to the education community as well as those on the perimeter such as education policy makers and the public regarding the phenomena they study and their recommended courses of action. Perhaps this notion of researcher's convenience is another form of tension that has axiological, epistemological and ontological implications: Cause-effect-solution within a cocoon of positivism or neo-positivism.

An example is when accountability is defined solely in quantitative terms. In a Florida town, a middle school went from being an "F" to a "C" school. Incense is now being burned at the altar of the Test Scores God. Yahoo, look students are learning!

What is wrong with this picture is the absence of certain influencing and/or contextual issues that are not factored in to present a complex picture to the consumers of this information. The students who attend this school¹ are 85% Black, 10% White, 2% Multiracial, 2% Hispanic, <1% Asian/Pacific Islander, <1% American Indian/Alaskan Native. Seventy three percent (73%) of the students are eligible for free or reduced-price lunch program, 20% of students have disabilities, <1% of the students are labeled as gifted. Race and SES are the obvious contextual issues. At another level, Blacks and the poor do not do as well as Whites who are middle class and above on standardized tests used by school districts to determine learning. Still at another level, what do the principal, teachers and staff of this school know that allows the least likely to succeed on the test used by Florida to measure learning succeed? Probing deeper, what in-school and in-class reforms took place that contributed to this success? Did the culture of the school change to include teachers' attitudes and beliefs? Are there effective consequences that test scores do not reflect? For example, have students been turned on to reading? What personal sacrifices did all of the actors involved make, if any? Each of the questions, and many more, are influencing tensions connected to the school's success. Accordingly, if the school wants to keep improving in their final grade, these connecting tensions (lenses for making sense), as well as the tacit knowledge of the actors, must be made explicit. Simple pictures about education only lead to simple thinking and simple solutions. This is very important to consider especially when issuing mandates such as the *No Child Left Behind Act of 2001*, which uses a complicated vision of education rather than a complex one. The assumption is that all contexts are the same and thus can be dealt with in a simplistic manner. Another view is that perhaps policy makers in particular have such limited views of education accountability that anything other than scores is difficult for them to conceive.

¹ In order to maintain the anonymity of this school I have deliberately excluded the source for this information, which are twofold: district and school websites.

A vigorous debate should take place about the difference between complication and complexity in the education community. When the education system is looked upon as being complicated, I believe a reduction to manageable and discreet parts occurs which leads to oversimplification of the same. Reducing a phenomenon to its least common denominator works well in mathematics. However, using the notion of complication and the resulting simplification as a framework for making sense of education can only lead to thinking that parallels the framework: simple and mechanistic. The problem lies in not understanding that there are aspects of the education system that can be complicated but that teaching and learning is always complex because it requires constant adaptation and evolution of human beings. By this I mean the interplay between who a learner and teacher are and the influencing contexts they negotiate on a daily basis, which leads to constant change. An education research model that is based on the notion of cause and effect (linear) reduces adaptations and evolutions of students and teachers to simple and mechanistic human beings, ignoring the myriad of daily changes they go through. When tensions are not created, acknowledged or appreciated by policy makers there can be no ebb or flow and as such, there can be no change. Accordingly, education reform policy that is based on the stagnancy of a linear education research model is limited in its ability to advance learning in society because it is exclusive of the socially constructed multiple realities that learners bring to the classroom. However, education policy framed around the notion that humans are constantly adapting and evolving their identity will contribute to evolving learning in society because it is inclusive of the individual learner and his or her needs.

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