

# Neoliberalism in Historical Light: How Business Models Displaced Science Education Goals in Two Eras.

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## Abstract

*Although a growing body of work addresses the current role of neoliberalism in displacing democratic equality as a goal of public education, attempts to parse such impacts rarely draw from historical accounts. At least one tenet of neoliberalism--the application of business models to public institutions—was also pervasive at the turn of the 20<sup>th</sup> century. A comparison between the two eras sheds needed light on the mechanisms by which business models displace educational goals. Using science education as a context, this paper draws from historical, theoretical and empirical studies to demonstrate how business paradigms disrupt science education goals related to preparation for democratic participation and equity. As evidence, this paper draw upon historical accounts, as well as findings from a mixed-methods study of how accountability and related institutionalization of business models impacts equity in elementary science education. Institutional theory provides a framework for interpreting the mechanisms of disruption in both eras.*

## Key words

Neoliberalism, Science education; Institutional theory; Equity

“... The problem with public education is it’s not operated effectively...It’s got to be about whether students, teachers and administrators are performing. That’s a core principle of accountability. It applies in a business community and it applies just as well in the academic communities.” --Joel Klein, Chancellor of New York City schools, November 10, 2010<sup>i</sup>

“One may easily trace an analogy between these fundamentals of the science of industrial management and the

organization of a public school system.” –Joseph S. Taylor, New York City school superintendent, 1912<sup>ii</sup>

The application of neoliberalism to educational management has born increasing scrutiny by scholars worldwide (e.g., Apple, 2001; Doherty, 2007; Giroux & Giroux, 2009; Ravitch, 2010; Small, 2011). They argue that the conflation of Friedman-based economic rationality and politics has resulted in the wholesale application of private sector management approaches to the public sphere, including relying on competition, consumer choice, and other market forces for regulation of public education (Doherty, 2007; Gabbard, 2007; Small, 2011). As Doherty (2007) described, “It would be the market, not the state, which would bring about improvement in the education system” through rewarding efficiency and productivity (p. 276). In the United States neoliberal strategies implemented increasingly since the 1980’s have resulted in increasing standardization of curriculum at the national level, an accountability system to measure performance and ensure competition and efficiency, and a variety of school choice programs (Hursch, 2005).

However, although neoliberalism as defined arose in the 1970’s (Small, 2011), market and business management approaches have been seductive to educational policy makers cyclically over the last 150 years (Gabbard, 2007), and particularly at the turn of the 20<sup>th</sup> century (Cuban, 2004). Despite the historical precedence, attempts to parse the impacts of neoliberalism in education today rarely draw from historical accounts. Comparisons between the two eras shed light on the mechanisms by which private sector management approaches exerted influence on public education, simultaneously illuminating the spaces of acquiescence and resistance. This article thus grounds the discussion of recent neoliberalism in the historical—specifically how the infusion of educational policy with business model paradigms in two time periods displaced science education goals related to equity and preparation for democratic citizenship. As evidence, I draw upon both historical accounts and findings from my mixed-methods study of the roles of accountability and related institutionalization of business models in determining equity in elementary science education. Institutional theory provides a framework for interpreting the mechanisms of displacement--how

schools as organizations respond to the forces embedded in societal movements such as neoliberalism.

### **Neoliberalism: An historical comparison**

Many aspects of neoliberalism have deep roots in Western history. With the growth of capitalism, aspects of what is today labeled neoliberalism influenced politics and law in the United Kingdom and the United States over the last several hundred years (Gabbard, 2007). This process led to the infusion of state law with capitalist ideologies, resulting in poor laws (associating the poor with indolence), privatization of the commons, and the argument that eliminating restrictions on trade and commerce is in the best interest of all citizens (Gabbard, 2007; Quigley, 1996). Although the ability of industry to establish the cooperation of the state waxed and waned with the political challenges afforded by the labor movement and other populist democratic efforts (Gabbard, 2007), the turn of the 20<sup>th</sup> century was a period of industry ascendance, wherein business and industrial values held a position of influence resulting in a saturation of public institutions with business practices (Callahan, 1964). Hence, although neoliberalism is characterized by conditions specific to the late 20<sup>th</sup> century such as globalization, many of the ideologies foundational to neoliberalism were applied during the turn of the 20<sup>th</sup> century, extolled as scientific management, business models, or efficiency.

In order to understand the displacement of science education goals in two eras, this paper focuses on aspects of neoliberalism common to both eras--specifically the application of business models to public institutions. In education, business models in both eras have included increased standardization, accumulation of power at higher levels of governance<sup>iii</sup>, measures aimed at increasing efficiency, and a focus on social mobility and work preparation through individual merit (Callahan, 1964; Cuban, 2004; Doherty 2007; Hirsch, 2005) Although choice and privatization are key elements of current neoliberal paradigms, because these practices were less pervasive at the turn of the century, they are omitted from this analysis.

At the turn of the 20<sup>th</sup> century, the pervasive influence of business ideology in education was characterized by efficiency, productivity and a mission to prepare students for work (Callahan,

1964, Kliebard, 1987; Montgomery, 1994). What Callahan (1964) termed *the cult of efficiency* was being applied across entire school systems, utilizing the language of scientific management to inspire regimentation in the school day: “Our schools are, in a sense, factories in which the raw products [children] are to be shaped and fashioned into products to meet the various demands of life” (Cubberley, 1916; quoted in Callahan, 1964, p 97). The reforms were implemented in part to increase production (processing large numbers of students), and decrease the cost of schools, which were the repository of taxes and thus the ire of taxpayers (Montgomery, 1994). In addition, students were to be sorted into categories directly related to their future roles—both social and vocational (Kliebard, 1987). In order to accomplish such productivity and efficiency, according to the business leaders of the early 1900’s, schools should be “saturated with accountability” (Montgomery, 1994, p 134), giving rise the nascent standardized testing systems.

Starting in the late 1970’s, business ideology again permeated the rhetoric around education in the United States, with arguably similar (stated) goals, including justification of public funding (Ravitch, 2010), preparation for work, and social mobility by individual merit (Carter, 2005; Labaree, 1997). Leaders in government, business, and education continually invoked business models as the only possible way to fix schools (Ravitch, 2010), leading to centralized control, standardization, and a focus on “outcomes” (Cuban, 2004; Hursh & Martina, 2003). Accountability has become a primary tool in that push, on one hand associated with the rhetoric of equity and achievement for all, on the other as a tool for centralizing control, measuring production, and justifying school activities—a business model to restore America’s competitive edge in the international arena (Cuban, 2004; Madaus & Kellaghan, 1993). Through standardized testing of all students, accountability would provide a measure of school performance to the public, thus fostering competition. When coupled with school choice, market forces could then effectively increase school productivity and create the conditions for higher achievement (Doherty, 2007).

The business model in each era differed slightly in both rhetoric and application. In the early 1900’s, reformers focused on cost reduction, output, and sorting students into various careers (Callahan, 1964). Although career preparation and cost are part of the

rhetoric of today's reforms, the reforms rely more on accountability for outcomes and social mobility through individual merit. Despite these differences, similar ideologies and trends underlie the two movements. Both were likely driven by a combination of stressors—such as increased international competition (Cuban, 2004), rising immigration (Callahan, 1964), and economic uncertainty. In addition, ideological movements in each time period provided justification for business model approaches: in the case of the early 1900's, the social efficiency movement and the firm establishment of positivism were used as justification for factory models in which children and teachers were measured, judged, and sorted “objectively” (Usher, 1998). In recent times, neoliberalism and a return to post-positivist ways of interpreting social phenomena again justify the reduction of students to scores and teaching to scripts. In both time periods, government turned to business leaders to take schools out of crisis and into productivity (Cuban, 2004). Business leaders applied their familiar principles: competition, standardization, and accountability, with uncertain results for education.

### **Goals for Science Education in Two Eras**

Educational goals have been informed historically by a three-way tension between democratic equality (preparing responsible citizens within an equitable society), social efficiency (training workers), and social mobility (allowing individuals to compete for position) (Labaree, 1997). Democratic equality can be further separated into citizenship (preparing effective and responsible citizens for participation in a democracy) and equity (fairness in the distribution of educational goods for the purpose of social and political equality) (Labaree, 1997). Several scholars have made the case that during times of business model ascendancy in both eras, the goals of citizenship and equity gives way to those of social mobility and social efficiency (Callahan, 1964; Doherty, 2007; Labaree, 1997; Small, 2011). That a set of policies would reduce equity is no small charge, especially in an era when policy makers use the rhetoric of equity to forward neoliberal or business model reforms such as in the “No Child Left Behind Act” in the United States (US Department of Education, September 2002). Yet, although scholars have examined

the role of neoliberalism in fostering some goals at the expense of others, few have compared across time periods<sup>iv</sup>.

Drawing from research, historical accounts, and policies regarding elementary science education in the United States, this paper presents an examination of whether and how business models displaced educational goals of citizenship and equity across the two eras. The case comparison allows analysis to move beyond present manifestations of neoliberalism, providing the opportunity to clarify and understand explanatory mechanisms across historical time points. Elementary science education offers a salient case because in the United States, current policy language emphasizes both democratic citizenship and equity as goals for science education, and because elementary science education is particularly vulnerable to business model approaches such as accountability mechanisms. To frame the analysis of whether business models displaced science education goals, the next paragraph lays out current and past goals as described in policy and historical documents.

### **Science Education Goals at the Turn of the 20<sup>th</sup> Century**

At the turn of the century, goals for science education fell into an amalgam of progressive project-based learning and preparation for work (Cuban, 2013). Equity was clearly a goal for some educators, including Dewey (1916). Inquiry as an instructional practice was advocated by progressives as a key element of science education, which in turn was argued by Dewey (1916) as undergirding democratic participation.

**Science Education Goals Currently.** Currently, U.S. federal policy documents describe science literacy for all as a key goal for science education (PCAST, 2010) necessary for responsible democratic participation in a highly techno-scientific society (NRC, 2012; PCAST, 2010). Science literacy in turn relies in large part on opportunity to participate in inquiry activities (such as labs) that involve students in both decision making and critical thinking (Abd-El-Khalick, et al., 2004; Forbes, et al., 2013). As in other subjects, equity in science education implies equal access to excellent science education across student populations in K-12 and beyond, as well as specific supports for bridging from student prior knowledge to science epistemologies (Calabrese Barton, 2002; Lee, et al., 2007).

Based on this evidence, it can be argued that equity and the ability to participate in democratic citizenship was a stated goal for science education in both time periods. Both are dependent on opportunities for authentic inquiry in which all students have the opportunity to engage in sense-making around scientific practices and content (NRC 2012). The next section lays out evidence as to whether and how these goals were displaced by business models in each era.

## **Effects of Business Models on Science Education: A Comparison of Two Eras**

### **Turn of the 20<sup>th</sup> Century**

At the turn of the century, scientific management leaders were pushing for efficiency in schools, characterized by cost-saving procedures, mechanistic coursework, and evaluation (Cuban, 1993). At the same time, progressives were advocating implementation of child centered practices such as activity centers and project based learning. How these competing forces played out in classrooms is difficult to determine, but several noted historians have presented compelling evidence that the efficiency paradigm exerted the more pervasive influence (Cuban, 1993; DeBoer, 1991; Kliebard, 1987), displacing progressive science education goals through efficiency-based school organization, scientific management, and testing.

Organizationally, efficiency measures such as the bolting of desks to the floor and crowded classes with over 40 students encouraged a teacher-centered, mechanistic instructional practice (Cuban, 1993). Fact oriented texts bereft of inquiry procedures contributed to the lack of what progressives considered to be excellent science instructional practices, aligning with scientific management paradigms that largely considered teacher-centered mode of instruction to be (ironically) both “scientific” and efficient (Cuban 1993). In addition, eerily familiar scheduling emphasizing the basics (math and reading) left science education largely out of the K-8<sup>th</sup> grade curriculum (Cuban, 1993)<sup>v</sup>. For example, the Washington DC school administration handed down a schedule which dictated 3.5 hours a day for arithmetic in 3<sup>rd</sup> and 4<sup>th</sup> grade. Ten other subjects had to be fit into the 5.5 hour day, leaving little time for science.

Exams instituted at the high school level in some districts impacted science education by inducing an emphasis on factual rather than procedural knowledge (DeBoer, 1991). For example, in 1925 in the New York City School District, half of high school teachers saw the Regents Exams as encouraging drill, memorization and cramming (Cuban, 1993). Thus, aside from high school laboratories, business models made inquiry based science difficult to carry out, and instead incentivized the rote and mechanistic learning already in place (Cuban, 1993). Together these processes displaced inquiry-related science education goals.

### **Science Education Currently**

In addition to the literature, the discussion of current science education draws from a mixed-methods study of elementary science in four districts<sup>vi</sup>. The broad study focused on the following research questions: 1) What is the relationship between accountability systems and teacher science instructional practice? 2) What is the role of districts as organizations in mediating this relationship? 2) How do environmental contexts mediate organizational response?

#### **Study of Science Education Goal Displacement: Methods.**

Two distinct approaches were used to first quantitatively examine the predictors of differentiation in elementary science education instructional time and methods, and second qualitatively analyze the nature and process by which these mechanisms exert influence. The study consisted of a survey of teachers (N=200) across 20 schools in one district, a corresponding qualitative case study involving interviews of two district administrators, four principals, and twenty teachers in the same district, and focus group interviews of 34 teachers and administrators in three additional districts.

**Quantitative:** The substantive role of a district in interpreting and setting policy can create statistical noise in trying to understand the *school level effects* of policy when sampling across many districts. Thus this study is focused on one district selected to be typical of California districts (mean is close to the state mean in FRL, API and percent minority), with a wide range of demographics. Random stratified sampling procedure was used to select half of the elementary schools based on API. School response rate was 90% (18 schools); teacher response rate was 71% (200 teachers). The survey

was based on Dorph, et al.'s (2011) instrument, supplemented with questions developed through a focus group process (Rea & Parker, 2005). Content validity was established through the use of six focus groups of teachers and administrators across three districts (Krueger, 1994). Face validity was tested through cognitive interviews and expert review.

Survey data were analyzed using hierarchical linear modeling to determine the comparative roles of accountability pressure, poverty, and various teacher traits in predicting amount of science education and science instructional practices. Reliability statistics are reported by variable (Table 1). Each variable was tested for assumptions violations prior to HLM modeling. HLM ensures residuals of the dependent variables are independent and normally distributed at level 2. In cases of non-normal distributions non-linear transformations were considered. All level 1 variables except grade were centered on the school mean. Prior to centering all variables were tested for interactions; none were significant. Data was examined for outliers through Cook's D, resulting in the removal of three data points. A multi-level model results in level 1 and 2 equations, each with an uncorrelated error term (Raudenbush & Bryk, 2002). Slopes of level 1 variables were fixed at level 2 to portray how group means (intercepts) vary across schools.

Table 1  
*Description of Main Variables*

Variable	Role	Description	Nature	Reliability/Validity
Percent hands-on	Dependent	Percent of time teachers report students doing hands-on or laboratory activities (other choices include textbook, lecture, audio-visual, and demonstration)	Continuous 0-100%	In comparison with preferred percent: .797; Correlation with interview data r = .842
SE context	2 <sup>nd</sup> level Predictor	A composite of school FRL and percent underrepresented students	Continuous 0-100	Obtained: www.ed-data.k12.ca.us
AYP pressure	2 <sup>nd</sup> level Predictor	Consequences are tied to each year a school does not make AYP, thus this variable is the years out of six the school did not meet AYP	Continuous 0-6	Validated through teacher interviews; obtained www.ed-data.k12.ca.us
GRADE	Covariate	Grade level taught, reported by teacher	Dummy variables	
PD hours	1 <sup>st</sup> level Predictor	Science professional development hours over the last three years	Composite scale.	Validated through interviews.
Years taught	1 <sup>st</sup> level Predictor	Reported years taught (1-3, 4-6, 7-9, 10-15, 15 or more)		
Degree	1 <sup>st</sup> level Predictor	Whether they have a science degree, reported by teacher	Binary variable	
Attitude	1 <sup>st</sup> level Predictor	Average of Likert ratings for four question scale	Composite scale.	Cronbach's alpha = .817.

**Qualitative.** Following the salience of poverty context in the literature, three districts were selected across California through a purposive sampling procedure (Knapp & Plecki, 2001) to represent a high poverty context (1), a low poverty context (2), and a district with a wide poverty distribution (3) (Table1). The percent of students on Free and Reduced Lunch ranged from an average of 24% to an average of 56%, the percent underrepresented (non-White or Asian) students ranged from an average of 28% to an average of 74%. Participants were solicited through the district central office. Table 2 reports numbers of participants.

Table 2  
Focus Group Participants

District Group	# of participants	# of schools represented	Length of interview, hours
District 1 admin	4	3	1.1
District 1 teachers	7	5	1
District 2 admin	8	4	1.2
District 2 teachers	5 in separate interviews	2	2
District 3 admin	4 principals 1 administrator separately	4	1.3 .7
District 3 teachers	7	3	1.3
<b>Total</b>	<b>34</b>	<b>14</b>	<b>8.6</b>

Teachers and administrators were interviewed separately to triangulate data and to check perspectives across organizational levels (Rea & Parker, 2005). The one-hour, standardized, semi-structured interviews (Spradley, 1979) pertained to factors that influence the implementation of science education. Interview data were analyzed using an iterative inductive and deductive coding process with the purpose of understanding the institutional processes that underpin policy influence on science education.

An iterative three phase analysis allowed the research to be responsive to emic definitions while making epistemological contributions to extant theory (Eisenhardt, 1989; Strauss, 1987). First, an inductive open coding of transcribed interviews (Strauss, 1987) generated a list of institutional pressures. Differentiation in organizational response began to emerge, especially in terms of levels of agency. In Phase II a second round of axial codes was constructed from both theoretical definitions and first round emic perspectives (Strauss, 1987; Eisenhardt, 1989), then tested on two interviews from each district to establish the applicability of each construct for each case (Eisenhardt, 1989). In addition, a profile of each participating school and district was created, based on comparisons across participants as well as observations, demographic, and testing data<sup>1</sup> (Eisenhardt, 1989). Phase III analysis considered conflicting theories as potential constructs. Theories that demonstrated explanatory value

<sup>1</sup> <http://www.ed-data.k12.ca.us/Pages/Home.aspx>

were retained. The resulting list of constructs was re-applied to all interviews in a deductive process (Eisenhardt, 1989).

**Study of Science Education Goal Displacement: Results.**

The findings revealed that, similar to historical displacement of science education goals, current applications of the business models in these settings have contributed to inequitable distribution of science education and less inquiry-based science instruction, confirming and building on previous studies (CEP, 2007; Marx & Harris, 2006). In the empirical case presented here, analysis of survey data across 20 schools painted a picture of stark inequities: Students at elementary schools in lower income neighborhoods (the percent of students who applied for Free and Reduced Lunch averaged 88%) received one quarter the hands-on science education as students at higher income schools (Free and Reduced Lunch average 44%) in the same district. Multi-level regression analysis of variance revealed that accountability pressure had the most substantive relationship with the distribution of instructional approaches, beyond measured teacher traits (professional development, degree, attitude and experience) and student socio-economic context (Hayes & Trexler, in press). As one lower income school principal stated, “I don’t see teachers that say I don’t feel like teaching science...If it’s anything, it’s ‘we can’t because...we have to bring up our reading scores.’”

Analysis of qualitative focus group and interview data revealed that, similar to impacts at the turn of the century, tighter scheduling and scripted teaching associated with the organizational aspect of business models contributed to decreases in inquiry based science education. For example, in one lower income district the teachers who once integrated science into English Language Arts could no longer do so when the subject became structured around test preparation. In another district, the need to raise English Language Learners’ test scores led to an adoption of a scripted curriculum; teachers there who previously integrated science into their English Language Development (ELD) curriculum had to drop it in favor of text-based academic language acquisition:

“We are expected to group kids by their ELD level, so they’re not in their regular classroom, they’re grouped with like kids...And there’s a curriculum, so you could otherwise teach ELD through science but now there’s a curriculum to follow also” (Lower income school principal).

Likewise, their summer school focus shifted from enrichment, involving science education, to remediation.

In contrast, schools in a wealthier district maintained their independence, due in part to being less fettered by low test scores. In addition, they were able to draw on other community and institutional resources, such as local businesses and parents, to support science education. Parent pressure played a key role in establishing science labs across all elementary schools in the district. In that district, one school principal mentioned leveraging parents to apply for science magnet status, which might additionally result in more funding: “Now we’re looking into what is it going to entail for us to apply for [official science magnet] status. Because that gets the corporate matching...So it’s more like escalating the parents [to apply]....I already have the support, and the parents are so excited about it.”

### **Discussion**

This paper asks whether a case comparison of business model application across two eras can illuminate whether and how business models displace educational goals of citizenship and equity in science education. As to whether the displacement occurred: In both eras, scripted curriculum, accountability systems, and an efficient focus on “the basics” associated with business models displaced science education goals founded on generating science literacy through inquiry. At the turn of the 20<sup>th</sup> century, principles of “scientific management” and efficiency resulted in rigid scheduling, crowded classrooms, and fixed furniture—contributing to a focus on direct instruction. Accountability systems in both time periods reduced student-based inquiry instruction in favor of fact-based, teacher-centered instruction. In addition, accountability currently has contributed to an increasingly differentiated access to science education, undermining the equity claimed by proponents of business models. Ironically, rarely did current ideologues from the business or policy communities put forth the notion that excellent science education was not a priority; on the contrary, many current business leaders tout the importance of science education<sup>vii</sup>.

As to how the displacement occurred, institutional theory provides a framework for understanding the key mechanisms. First, measurement systems, such as accountability, create a resonant

feedback loop affecting instruction (Etzioni, 1964), displacing longer term or more difficult to measure goals (i.e. focus on facts displaces a focus on critical thinking) (Etzioni, 1964). This is demonstrated in the increased teacher-focused rote instruction in schools impacted by accountability. Second, since schools tend to be isomorphic to the institutions that exert the greatest control over them (DiMaggio & Powell, 1983) a tighter coupling to state institutions (through centralization, standardization, and resource control) induces a permeability to societal trends such as the application of business or management ideology. This permeability is demonstrated historically in efficiency measures such as top-down, rigid scheduling. In addition, the current empirical case shows that schools in higher poverty context—that are more dependent on state institutions for resources—may be more permeable to the effects of ideologies that have pervaded those institutions (Pfeffer & Salancik, 1978). Conversely, schools less dependent on the state due to additional resources (such as parent funding) are less permeable to the larger institutions (the state) more permeable to local interests (the parents) (Weik, 1976). Thus wealthier schools' ability to resist accountability and draw on other resources meant they were less permeable to business model approaches emphasizing efficiency, rigid schedules, and scripted teaching, and more able to respond to local interests in favor of science education. Moreover, because poorer schools are more tightly coupled to federal and state institutions due to resource dependence and accountability, societal ideologies are able to permeate more effectively.

In sum, business models in both eras contributed to a displacement of educational goals of citizenship and equity in science education. These models operate through institutional mechanisms that tightly couple schools to the state, inducing greater permeability to pervasive business ideologies, especially in poorer, resource dependent schools. Understanding this process historically provides a foundation for educators and policy makers to mitigate the effects of neoliberalism currently.

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<sup>i</sup> Retiring NYC Schools Chief Reflects on his Tenure. All Things Considered Nov. 10, 2010. Interview by Melissa Block.

<sup>ii</sup> As quoted in Callahan, 1964, p 103.

<sup>iii</sup> Increased governmental control invokes an inherent contradiction in neoliberalism that advocates for efficiency through decentralization yet demands standardization and regulation (Hirsch, 2007). The result for education in the United States has been increased centralization of curriculum standards as well as national mandates for accountability measures.

<sup>iv</sup> With some exceptions (e.g. Cuban, 2004)

<sup>v</sup> The push toward back-to-basics curriculum derived from a slightly different but often aligned conservative movement toward “excellence in education” focused on reproducing the knowledge and values of Western culture (in recent eras championed by E.D. Hirsch).

<sup>vi</sup> A dissertation study published by U.C. Davis in 2014.

<sup>vii</sup> e.g. Tapping America’s Potential, a 2005 report by “fifteen of our country’s most prominent business organizations,” including the Business Round Table