RETHINKING U.S. EDUCATION POLICY:
FOUR PARADIGMS OF THE KNOWLEDGE ECONOMY

BY

DANIEL ARAYA

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Educational Policy Studies
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2014

Urbana, Illinois

Doctoral Committee:
Professor Nicholas Burbules, Chair
Professor Michael A. Peters, Director of Research
Professor Bill Cope
Professor Leonard Waks
Abstract

It is no coincidence that rising demand for advanced education has developed in parallel with the globalization of a market economy. Theories on “human capital formation” are increasingly seen as the key to expanding economic growth and advancing creativity and innovation. At the same time, mounting concern about rising competition has triggered a wide-ranging debate about the kinds of skills and competencies needed for a knowledge economy. More recently, accelerating technological innovation has now called into question the value of conventional thinking on education. Many economists point to the strong likelihood that advanced artificial intelligence and robotics will begin displacing much of the global workforce by as early as the middle of this century. Today, 25 percent of adults around the world are either unemployed or underemployed. Indeed, in the United States rising numbers of university graduates face a very weak labor market and rising levels of student debt. This research study examines policy proposals for rethinking U.S. education policy in light of the globalization of the capitalist market and contradictory forecasts on the knowledge economy. It examines the genealogy of the discourses on postindustrial society and explores “paradigms” of the knowledge economy that now shape public policies in the United States. Drawing on discussions of the “Creative Economy”, the “Network Economy”, and the “Green Economy”, it critiques U.S. educational policies authored by the Obama Administration and considers the need for a new educational policy framework that is better adapted to an era of accelerating innovation.
Acknowledgements

I want to begin by thanking Dr. Michael A. Peters for his mentorship and friendship over the course of my graduate studies at the University of Illinois at Urbana-Champaign. I also want to thank Dr. Nick Burbules for his patience and direction in guiding this dissertation towards completion—long after it should have been completed. Last but not least, I want to thank my parents, Moira and Araya, for their love and support during my graduate studies.
Table of Contents

INTRODUCTION...........................................................................................................1

CHAPTER ONE: U.S. Education Policy as Economic Policy.....................................14

CHAPTER TWO: Research Focus..............................................................................28

CHAPTER THREE: The Knowledge Economy in Context.......................................39

CHAPTER FOUR: Theorizing the Knowledge Economy..........................................61

CHAPTER FIVE: Document Analysis.....................................................................86

CHAPTER SIX: Interviews and Findings.................................................................118

CHAPTER SEVEN: Conclusion..............................................................................152

Bibliography............................................................................................................171

Appendix A Abbreviations and Acronyms.............................................................195

Appendix B Interview Protocol.............................................................................197
INTRODUCTION

Educating for Innovation

Much as 20th century educational systems were constructed as social platforms for an expanding industrial society, so today 21st century educational systems are seen as instrumental to the rise of postindustrial societies (Goldin & Katz, 2008; Lauder et al., 2008). It is no coincidence, for example, that rising demand for advanced education has developed in parallel with discussions on the need for knowledge-based innovation. Indeed, contemporary economic theory explicitly links investments in education and training to the expanding economic growth and a knowledge-based economy (Becker, 1964; 1975). As the so-called “Smiling Curve” of added value production illustrates (Diagram 1), “thick profits” are now concentrated in industries that require higher-level skill and capabilities. The importance of training in science, technology, engineering and math (STEM) subjects, for example, has emerged as a common policy framework shaping a policy discourse on the need for educational reform.

Diagram 1: The “Smiling Curve”

---

1 The term “postindustrial society” was first popularized by Daniel Bell (1973) to describe the growing economic importance of knowledge and learning in the context of a service-based economy.
Across OECD\textsuperscript{2} countries, mounting demand to augment “human capital” has triggered a wide-ranging debate about the kinds of skills and competencies needed to drive a “global knowledge economy” (OECD, 1996; Lundvall and Johnson, 1994). Building on a long history of innovation strategy (Freeman, 1987; 1995; Lundvall, 1992), education is now increasingly interpreted as a vehicle for expanding economic growth, replenishing labor capacity, and reinforcing long-term investments in high-value goods and services. At the same time, approximately 25 percent of adults around the world are either unemployed or underemployed (Rifkin, 2014: 121). Indeed, a growing body of literature on the accelerating advancement of information and communication technologies (ICTs) has called into question many of the central assumptions driving contemporary educational reform policies across OECD countries.

As MIT\textsuperscript{3} economists Brynjolfsson and McAfee (2014) demonstrate, automation has become a daunting challenge for industrialized economies with a potential to impact wide segments of the labor force. Consider that between 1995 and 2002, 22 million manufacturing jobs were entirely eliminated worldwide even as global production increased by 30 percent (Rifkin, 2014: 124). Indeed, data from the U.S. Bureau of Labor Statistics shows that civilian labor-force participation has been declining significantly since 2009 (Bureau of Labor Statistics, 2014). As a recent article in the Economist (2014) observes:

> Over the past three decades, labour’s share of output has shrunk globally from 64% to 59%. Meanwhile, the share of income going to the top 1% in America has risen from around 9% in the 1970s to 22% today. Unemployment is at alarming levels in much of the rich world, and not just for cyclical reasons. In 2000, 65% of working-age Americans were in work; since then the proportion has fallen, during good years as well as bad, to the current level of 59%.

Brynjolfsson and McAfee (2014) argue that increases in unemployment in the United States and other advanced economies are attributed almost entirely to a decline in

\textsuperscript{2} Organization for Economic Cooperation and Development
\textsuperscript{3} Massachusetts Institute of Technology
demand for labor due to the introduction of labor-replacing technology. Indeed, a recent Oxford University study suggests that nearly half of all occupations in the United States could be automated over the next two decades (Frey and Osborne, 2013). In their book, *The Second Machine Age*, Brynjolfsson and McAfee highlight the dramatic changes to the management of capitalist production in the wake of accelerating technological innovation. Beyond the industrial revolution or “the first machine age”, the locus of this second machine age is the increasing pace of computing capacity (Kurzweil, 2006).

While the speed of computing (per unit cost) doubled every three years between 1910 and 1950, and doubled every two years between 1950 and 1966, computing capacity is now doubling every year.

According to Brynjolfsson and McAfee, advanced industrialized economies are entering a new era much less dependent on a human labor force to produce the goods and services for the global economy. Beyond routine, codifiable tasks, computers are now becoming adept at higher cognitive functions such as language processing and data analysis. Indeed, the growing gap of inequality may represent a harbinger of more extreme economic polarization to come (Ghose et al., 2009). The obvious question then is how might education policy respond to the declining value of formal education in the face of technological automation? The Organization for Economic Cooperation and Development (2013), for example, has emphasized the need for promoting competitive proficiencies overlapping advanced skills in literacy, numeracy, and problem-solving. But will these skills be sufficient to overcome technological automation over the long-term?

Brynjolfsson and McAfee are not the first economists to suggest that technological innovation is linked to mass unemployment and rising inequality. Indeed in the 1930s, the economist John Maynard Keynes coined the term “technological unemployment” to describe what he foresaw as the coming mass displacement of workers by machines. What is most surprising about recent research into technological automation, however, is its growing reach. Indeed, what is perhaps particularly perplexing is that the growing
productivity generated by technological innovation has essentially become decoupled from jobs and income (Diagram 2).

Diagram 2

Source: Rotman, 2013.

In contrast to the perception that it is only low-skilled labor that is vulnerable to automation, theories in technological unemployment argue just the opposite. According to Moravec’s (1988) paradox, it is cognitive labor that is more easily displaced by exponentially advancing computerization, because computers excel at logistical
reasoning. Put differently, high-level reasoning requires very little computation, while low-level sensorimotor skills require enormous computation. Indeed, factory automation remains specialized and expensive because robots still remain largely dedicated machines that lack manual dexterity (Brynjolfsson and McAfee, 2014, p. 29).

While policymakers in OECD countries have tended to focus on globalization and rising competition from developing countries, the truth is that something even more fundamental is transforming the global labor market. Building on the combined power of digitization, exponential technological change, and recombinant innovation, technology is now displacing large segments of the labor force altogether. The main policy response to technological unemployment has been to focus on restructuring the education system to manage against labor redundancy. But given rising unemployment across all segments of the labor force, one wonders whether this really makes sense.

Rifkin (2014), for example, agrees that automation is dramatically reducing and restructuring the labor force within advanced industrialized societies. Unlike Brynjolfsson and McAfee, however, he does not see educational reform as a way to mitigate this transformation— in fact, just the opposite.

The wholesale substitution of intelligent technology for mass labor and salaried professional labor is beginning to disrupt the workings of the capitalist system. The question economists are so fearful to entertain is, what happens to market capitalism when productivity gains, brought on by intelligent technology, continue to reduce the need for human labor? What we are seeing is the unbundling of productivity from employment. Instead of the former facilitating the latter, it is now eliminating it. (p. 132)

In The Zero-Marginal Cost Society, Rifkin (2014) lays out the paradoxical consequences of Moore's law (i.e., the exponential growth of digital technologies). In his view, the consequence of advanced computing is a precipitous decline in the value of markets for managing goods and services. Accordingly, technological forces are gradually outpacing market-based capitalism. Focusing on the decline of marginal cost due to accelerating technological innovation, Rifkin concludes that the slow unraveling of the profit rate is
forcing capitalist societies to restructure around commons-based social production. Building on a convergence of exponentially evolving technologies (i.e., distributed green energy, artificial intelligence and robotics, 3D printing, and Internet-driven logistics), he argues that this new era will be configured around social collaboration and laterally scaling networks. Put simply, we are entering a post-capitalist era in which education will become increasingly decoupled from economic productivity.

The Daunting Challenge of Educational Reform

As these and other forecasts on changes in post-industrial society demonstrate, reforming education today is proving to be a daunting task. Indeed, the basic premise of reforming education for the knowledge economy (KE) becomes highly uncertain when one considers the increasingly advanced capacities of artificial intelligence (AI). Where Brynjolfsson and McAfee advocate the redesign of education alongside exponentially advancing technologies, critics respond that the scale of change ahead outstrips the need for cognitive capacities of human labor. Building on this debate, the central argument of this dissertation research is that contemporary U.S. educational reform policies are based upon contradictory readings of the “knowledge economy” rooted in ambiguous forecasts on the evolution of postindustrial society.

Conflating discourses on KE, educational reform is now married to contradictory assumptions about the nature and function of education in the 21st century. In truth, it has become commonplace to interpret educational reform policy in terms of rudimentary definitions of the knowledge economy that presuppose the tempo, scope, and trajectory of postindustrial society. Perhaps the most prominent notion today is that formal education should now be retooled for market-based performance linked to neoclassical models of economy (Slaughter and Leslie, 1997; Slaughter and Rhoades, 2004; Aronowitz, 2000). Despite these narrow and often monolithic readings of KE, however, there remain open questions about the purpose and function of formal education in the 21st century.

Today, the policy rhetoric on KE forms a kind of conceptual prism through which educational policies are largely refracted. Indeed, the concept of KE has subsumed
overlapping discussions on the future of advanced economies in the context of ambiguous policy forecasts (OECD, 1996; Lundvall and Johnson, 1994). Nascent studies on “21st century skills”, for example, beg the question: Do information processing skills make countries successful, or do successful countries produce information-processing skills (Ponniah, 2013)?

Advances in technological innovation have introduced massive changes across the global political and economic landscape. Rising calls to rejuvenate education systems in support of advanced skills and capabilities, for example, suggest the need for substantial investments in education in order to transform bureaucratic and stratified systems of learning. And yet, as Newfield (2008) asks, why are so many postindustrial societies constraining and cheapening the research and educational systems upon which their future prosperity is said to depend? Beyond educational factories designed to batch-process knowledge transmission, this research study suggests that the challenge today is to rethink the design and purpose of education.

Just as the first high schools in the United States emerged in response to the socioeconomic needs of a rapidly industrializing 19th century society, so today must schooling become fitted to the needs of a 21st century society. As Waks (2013) points out, retrofitting “factory schools” with advanced technologies is not a solution. Expanding on the Deweyan notion of education as sociocultural initiation, he argues that new technologies embody inherent logics that require a rethinking of institutions and social practices. Beyond conventional transmission schooling built for the industrial age, network driven technologies reflect a new era with very different needs and capacities (Blinder, 2008).

The main goal of this dissertation research is to analyze four overlapping models of KE in order to better appreciate the challenging task of developing coherent educational reform policies for the 21st century. Advancing on the work of Peters (2009, 2010), this research explores four “paradigms” of the knowledge economy and considers their import for shaping U.S. educational policy reform. More than mere philosophies of
economy, the paradigms of KE examined in this study inform a fledgling metaparadigm that seeks to define the era in which we live. Indeed, the Oxford English Dictionary defines the meaning of the word paradigm as "a typical example or pattern of something”. Much as Kuhn (1962) used the term to describe preconceptions that situate and condition scientific disciplines, I view the paradigms of KE as contending epistemological frameworks that are competing to displace mass industrial society as a master frame of reference. Embodying quasi-metaphysical assumptions about the nature and goals of human social development, each paradigm of KE represents a unique conceptualization of the future. Rather than incommensurate systems, however, I argue that each paradigm of KE is in reality a dimension or feature of an emerging metaparadigm that is rooted in a rapidly evolving technological society.

Examing the genealogy of KE in the context of forecasts on postindustrial society, this dissertation research is intended as a contribution to scholarship on the political economy of education. It seeks to promote alternative approaches to guiding U.S. education policy reform, and attempts to analyze the political currents that now drive public policy. In addition to neoliberal readings of KE, for example, this dissertation examines three alternative discourses on KE that suggest distinct programs for educational reform. These paradigms of KE include:


*The Green Economy*, as articulated by Brian Milani (2000), Jeremy Rifkin (2011), Herman Daly (1996; 2010), and others.

Moving beyond neoclassical policy constructions of educational reform and building on scholarship in critical educational theory, this study is interested in exploring a new policy framework for situating U.S. educational reform. Informed by research data, that includes public policy texts on U.S. education under the Obama Administration, and
interviews with scholars and experts whose research and thinking is directly connected to the study of KE and education, this study explores sociopolitical proposals for rethinking U.S. education.

**Research**

Advancing on the work of critical educationalists (e.g. Giroux, 2001; 2003; Apple, 2006, Rizvi and Lingard, 2010; Spring, 2010), this study seeks to link proposals on educational policy to the need for a new sociopolitical framework that might situate educational reform. Despite a growing recognition of a changing economic milieu, for example, much of the educational reform discourse in the U.S. today misreads the challenges facing the country. Indeed, the discussion around U.S. educational reform assumes that the primary challenge facing education today is related to efficiency and cost. Rather than problems of cost, however, this study suggests that the real challenge facing U.S. education today is related to the quality and fit. In an era in which access to knowledge and information has become highly democratized, the industrial model of schooling now needs to be reconceived.

Waks (2013), for example, offers a pointed critique of contemporary U.S. educational reform. As he explains, schools have long been organized in parallel with the centralized hierarchy found in the factory. Indeed, the “first American high school was established in Boston in 1821, just as the first American mechanized factory was established in the same place” (p. 33). In this way, the U.S. high school was a direct response to need for both skilled manual labor and an evolving managerial class. The overarching theme of the factory paradigm has been that of “adjusting means to ends” in order to improve efficiency (measured in terms of the ratio of predetermined ends per unit of input). Initiating students into a highly articulated industrial order, the factory school paradigm can be defined simply in terms of egg-cart classrooms driven by didactic instruction and assessment, or what (Tyack and Tobin, 1994) have described as the “grammar” of schooling:

(i) Annualized age-graded schools organized into non-departmentalized elementary and departmentalized secondary and tertiary levels;
(ii) Students organized in roughly identical “egg-crate” classrooms (radiating out from central corridors).

(iii) A certified professional teacher in each classroom; dispensing

(iv) Standard, pre-determined subject matter contents, analyzed into goals, objectives and competencies (hereinafter referred to as SOC) pre-sequenced in a curriculum, using predominantly.

(v) Didactic instructional methods, chiefly lecture-discussions and seat-work on prepared worksheets.

(vi) Assessment of learning by periodic subject matter tests based primarily upon memory and application of the standard subject matters of the curriculum, while

(vii) Education as scholastics, facilitating learning of basic academic skills and disciplines in support of sorting for stratified occupational roles.

Throughout this study, I argue that the rhetoric on KE has emerged as a kind of policy prism through which educational reform policies are now refracted. My thesis question is simply this: What is the import of these paradigms of knowledge economy for shaping U.S. education policy? Drawing insights from the “Creative Economy”, the “Network Economy”, and the “Green Economy” as discrete and competing hermeneutical systems, this research study explores policy proposals for rethinking and transforming U.S. education. Beyond interpretations of KE that reduce its significance to neoliberalism, I consider the long history of shifting notions of KE.

This research is highly critical of the influence of neoliberalism as a policy framework in on U.S. education. Notwithstanding this criticism, the main purpose of this study is to rethink U.S. educational reform in light of theories on the global knowledge economy. Over the past two decades, the term “knowledge economy” has largely subsumed overlapping discussions on shifts in capitalist economy, but as Peters (2009) points out, not all conceptions of KE are simply variations on neoliberal political economy. While some discourses on KE predate neoliberalism, others in fact critique it. Informed by experts on the study of education and the knowledge economy, this research is intended as a contribution to policy scholarship on the political economy of education. These
research data include educational reform policies proposed by the Obama Administration, and interviews with experts whose work bridges research on the knowledge economy and education. In order to understand the impact of KE on U.S. public policy, I analyze three policy documents introduced by the Obama Administration. This includes two policy documents published by the U.S. Department of Education, and one policy document published by the National Economic Council:


The second research domain includes interviews with experts in the fields of public policy and education. This includes interviews with senior policymakers, scholars, and researchers whose work directly overlaps the political economy of education. My goal in using qualitative inquiry is to better understand and interpret the interlocking narratives that now shape conceptualizations of education for postindustrial society.

**Structure of the Study**

In Chapter 1, *U.S. Education Policy as Economic Policy*, I attempt to situate education policy in terms of changes in global political economy, particularly the rise of emerging economies. As I demonstrate, widespread concern about rejuvenating the U.S. economy overlaps mounting anxiety about a decline in the quality of U.S. education. Correlating national economic challenges with the poor state of U.S. schools, education policy has become increasingly focused on neoliberal social policies. Beyond the era of neoliberalism, I underscore the need to reconsider the value of government-led investments in the context of social development and Social Investment policy.
In Chapter 2, *Research Focus*, I outline the dissertation’s research focus, including my interest in developing a critical analysis of US education policy. In addition to neoclassical interpretations of KE, I examine variations in the discursive models of KE with the purpose better appreciating the need for change in contemporary U.S. education policy. Examining national public policy documents and interviews with experts on KE, the goal of this dissertation is to develop education policy research that is informed by a detailed study of the paradigms of KE discourse. I begin by exploring the neoclassical model of KE (Paradigm 1) that now frames U.S. education policy, and follow with a detailed study of the Network Economy (Paradigm 2), the Creative Economy (Paradigm 3), and the Green Economy (Paradigm 4). I argue that all four paradigms are linked together by a shared emphasis on social transformation that maintains an intellectual hold on the social imaginary of postindustrial societies.

In Chapter 3, *The Knowledge Economy in Context*, I explore the evolution of the concepts and policies that animate the discussion on KE and examine the background literature supporting this research study. I attempt to interpret current U.S. education policies in terms of the broader global economic landscape in which these policies are embedded.

In Chapter 4, *Theorizing the Knowledge Economy*, I trace the genealogy of KE as a metadiscourse, looking specifically at the discursive strands that promote KE as a framework for public policy. Building on Peters (2009, 2010), I probe four contemporary expressions of KE and consider their import for shaping education policy. In addition to neoclassical accounts of KE (Paradigm 1), I examine the Network Economy (Paradigm 2), the Creative Economy (Paradigm 3), and the Green Economy (Paradigm 4). Framing these discourses as dimensions of KE, I seek to demonstrate that contemporary U.S. educational policy misreads both the complexity and ambiguity underlying shifts in the global economic landscape.

In chapters 5, *Document Analysis*, I examine public documents produced by the Obama Administration. Against an historic background of neoliberal public policies, I argue that recent debates about U.S. education are largely framed by economic discourses linked to
globalization and the need for national systems of innovation. This data is viewed as support for interrogating the scope of neoliberal social policies and for rethinking educational reform. My goal in applying qualitative inquiry to these documents is to develop a nuanced scholarship on KE that appreciates the need for multiple readings on educational reform.

In chapter 6, Interviews and Findings, I offer my interpretation of the findings of this research dissertation supported by interviews with experts on KE including Richard Florida, Michel Bauwens, Sam Pitroda, Cathy Davidson, Donald Brinkman, Tony Wagner, and Tony Seba. I elaborate on these findings and suggest that educational reform needs to move beyond incremental improvements in transmitting basic academic skills in order to adapt to emergent needs associated with technological innovation and a global knowledge economy.

In chapter 7, Conclusion, I consider the measures necessary to shape education in postindustrial societies, and offer recommendations related to shaping both near and long-term education policy in the United States. Informed by the multiple readings of KE, I make conclusions regarding the State structures that now frame and shape contemporary educational policies. Most importantly, I highlight the need for a post-market State framework rooted in theories on social investment theory and the long-term transformation of capitalist economy.
CHAPTER ONE:
U.S. Education Policy as Economic Policy

The Neoliberal Paradigm of the Knowledge Economy

The common view today is that the “knowledge economy” implies an economy and society “organized around the production of knowledge in the same sense that an agrarian society is organized around agricultural production and an industrial society is organized around manufacture” (Bereiter, 2002, p.2). Taken literally, a knowledge-based society suggests a social order focused on human creativity and innovation in the context of scaffolding knowledge discovery (Bereiter, 2002b). Although it may be true that economic growth and expansion have always depended upon knowledge and innovation, what has changed today is the pace at which innovation is now required to drive economic expansion (Bell, 1973; Schumpeter, 1976 [1942]; Drucker, 1985; Chesbrough, 2003). Growing interest in reforming education for knowledge-based societies directly overlaps rising economic challenges faced by OECD countries. Despite this interest, the common view today is that contemporary schools remain fixed to an industrial era characterized by a Fordist system of mass production. Building on this understanding it stands to reason that education systems designed for the industrial era are now under a borage of criticism that spans the political spectrum.

Beyond the era of “U.S. predominance”, the United States now faces increasing pressure to adapt to a very different era in globalization. Notwithstanding the substantial geopolitical influence of the U.S., Europe and Japan, the economic power of China and other newly industrialized economies (NIEs) has grown considerably (Nolan and Pack, 2003). It is now obvious for example that a shift in the topography of mass production has begun reshaping the geopolitical landscape. Estimates building on the 2008 financial crash indicate that China could be the largest economy in the world by as early as 2020, and perhaps twice the size of the U.S. by 2050. According to a 2012 forecast by the U.S. National Intelligence Council, “the U.S., European, and Japanese share of global income is projected to fall from 56 percent today to well under half by 2030”:
Asia will have surpassed North America and Europe combined in terms of global power, based upon GDP, population size, military spending, and technological investment. China alone will probably have the largest economy, surpassing that of the United States a few years before 2030. In a tectonic shift, the health of the global economy increasingly will be linked to how well the developing world does—more so than the traditional West. In addition to China, India, and Brazil, regional players such as Colombia, Indonesia, Nigeria, South Africa, and Turkey will become especially important to the global economy. Meanwhile, the economies of Europe, Japan, and Russia are likely to continue their slow relative declines. (National Intelligence Council, 2012, p. iv)

In response to Asia’s growing GDP (gross domestic product), economists and policymakers in advanced economies have focused their attention on the need to transform an outdated education system. Recent interest among macroeconomists in the potential of education to stoke economic growth, for example, builds on theories of endogenous growth, especially New Growth Theory (Romer, 1986; 1990).

Widespread concern about rejuvenating the U.S. economy overlaps mounting anxiety about a decline in the quality of U.S. education. Correlating national economic challenges with the poor state of U.S. schools, education policy has become increasingly focused on centralizing U.S. education, tightening standards, and introducing prescribed methods of instruction. Indeed, public documents over the past three decades beginning with the seminal A Nation at Risk: The Imperative for Education Reform (National Commission on Excellence in Education, 1983), have become touchstones in the debate on improving educational performance. As state and federal policymakers have moved to construct multi-level systems of government-driven accountability, high-profile political struggles to shape national curriculum have made testing and accountability the main levers of educational reform (Ravitch, 2011).

---

4 Framing this decline in terms of low quality education, the report offers five recommendations for reforming education. These include: (1) adding "five new basics" to the school curriculum (four years of English, three years of math, three years of science, three years of social studies, and half a year of computer science in high school); (2) more rigorous and measurable standards be adopted; (3) an extension of the school year in order to make more time for learning the "New Basics"; (4) teacher improvement through enhanced preparation and professionalization; (5) accountability.
Once the global leader in mass education, secondary school enrollment rates in the U.S. have been stagnating since the 1970s. Meanwhile, wage differentials have expanded substantially. Much of this change can be directly linked to the rise of neoliberal social policies in the U.S. and UK (United Kingdom) and a corresponding inflation in the costs of education. Empirical data comparing OECD countries indicates that market driven solutions to expanding education– especially higher education- has resulted in marked inequality:

Countries with substantial slow downs in the growth of skilled supplies– the United States and United Kingdom– had large increases in educational wage differentials and overall wage inequality after 1980. In contrast, nations with educational supplies that continued to grow rapidly, such as France and Germany, had almost no increase in educational (or occupational) wage differentials and more modest increases in overall wage inequality.

Institutional factors, to be sure, have played a role in the different inequality experiences among rich nations. Market forces towards increased inequality after 1980 were reinforced in the United States and the United Kingdom starting under the administrations of President Reagan and Prime Minister Thatcher by the decline of the unions and the erosion of other labor market institutions that once protected low- and middle- income workers. However, the greater growth of wage inequality in the United States has been substantially driven by the slow down in skill-supply growth combined with flexible wage-setting institutions and a less generous social safety net. (Golden & Katz, 2008, p. 329)

Critical scholars on education suggest that contemporary education policies are too narrowly focused on accountability frameworks that excessively reduce schooling to worker training (Apple, 2006; McLaren, 2007). The overriding criticism is that educational reform does not focus on “educating” citizens but rather, on merely training workers. They argue that education has been supplanted by systems of testing and compliance that combine a growing distrust of teachers with a national testing regime.

Linked to an unprecedented expansion in charter schooling, for example, the Bush and Obama Administrations have focused on testing as a foundation to upgrading and standardizing US schooling (Kumashiro, 2012; Spring, 2008). Darling-Hammond (2010) makes the case that an extreme focus on test scores has resulted in declining
competencies in writing, reading, critical thinking, research, and computer skills. More to the point, she argues that the problems with U.S. education are systemic: Decades of sanctioning low performance has deceived the public into believing that reform is taking place, when in reality inequality has simply expanded.

Since the 1970s, levels of economic inequality have widened substantially in the U.S., and this is closely correlated with a decline in levels of education especially among racial and ethnic minorities. In their excellent study on contemporary U.S. education Golden & Katz (2008) observe:

Educational attainment in the United States was high for most of the twentieth century by the standards of other nations, and the increase in years of education was substantial for most of the century. However, gains in educational attainment in Europe and parts of Asia in the past three decades have been simply staggering. Younger cohorts in these nations have considerably more education than do older cohorts, and many of the younger cohorts have higher education levels than exist in the United States. The U.S. educational system would appear to be flagging not only in terms of quantity but also in terms of quality. (p. 43)

In truth, the “crisis of education” has been a driving motif of U.S. educational policy for many decades (Spring, 2008). Extending back through No Child Left Behind Act (2001), the National Commission on Excellence in Education report (1983) and the National Defense Education Act (1958), the primary rationale for the expanded role of federal and state governments in education has been the need to drive U.S. economic growth (McDonnell & Weatherford, 2011). Ironically however, despite the clear need to reform the U.S. education system, there is in fact no obvious correlation between the quality of education and a country’s economic competitiveness (Sahlberg, 2006). The truth is that the U.S. has never done particularly well on international tests (Ravitch, 2011: 249). For this reason, many now argue that low-test scores have had no tangible impact on U.S. economic growth or the country’s capacity for innovation. Going back to 1964, for example, the U.S. placed 11th out of 12 industrialized countries in the First International
Mathematics Study (Waks, 2013). And despite low-quality schools, workforce productivity has increased substantially though the 1990s (Bernstein & Mishel, 2007).

In the years since the publication of A Nation as Risk (ANAR), debates over the form and shape of U.S. educational reform have become highly charged. Critics on the Left contend that ANAR’s singular obsession with schools has been used to deflect political attention from policy failures in other domains. The Coleman Report (1966), for example, observed that family background was a far more significant factor in student achievement than school quality. Indeed, a subsequent federally funded report, the Sandia Report (1990), contradicted many of the conclusions of ANAR (indicating that SAT scores had actually gone up over the latter half of the twentieth century).

Rizvi & Lingard (2010) argue that educational reform initiatives today are overly subsumed by neoliberal economic policies that emphasize the need to leverage human capital in support of the global “competition state” (Cerny, 1990). This shift reflects a move from the nationalized welfare state of Keynesian to the competition state of neoliberal globalization. But it is also paradigmatic of the broad transformation in public policy beginning in the late 1970s. Supported by the economic philosophy of thinkers like Friedrich von Hayek (1944, 1960) and Milton Friedman (1962), social policy has been increasingly shaped by a “negative” theory of the state. With the elections of Margaret Thatcher in the UK and Ronald Reagan in the U.S., market-driven reforms to state bureaucracy in the form of the “New Public Management” and the “audit society” became the new paradigm of government and what many would describe as the Anglo-Saxon model of political economy (Power, 1996).

5 According to critics, the report was in fact wrong on several counts: “First, it wrongly concluded that student achievement was declining. Second, it placed the blame on schools for national economic problems over which schools have relatively little influence. Third, it ignored the responsibility of the nation's other social and economic institutions for learning” (Rothstein, 2008).

6 In many ways, ANAR was a response to the many “radical” educational reforms introduced in the 1960s and 1970s that were felt to have been responsible for declining educational quality. While reforms stemmed from a desire to advance racial equity and class justice, declining SAT scores in the mid-1970s, emboldened many conservatives to focus on the “standards” movement.
For its advocates, neoliberal policies reflect an economic philosophy that rejects government intervention in favor of market expansion. For its critics, neoliberalism refers less to an economic philosophy and more to a political project: Namely, the growing power of transnational corporations and the dilution of the state. To understand the influence of neoliberalism on education over the past three decades, it is important to appreciate the rise of “stagflation” (the simultaneous expansion of unemployment and inflation). In answer to the economic crisis of the 1970s, neoliberalism positioned itself as the authority on globalization in the context of economic reform. Theorists argued that poor government planning and an overly generous welfare state hindered the organic capacities of self-regulating markets. In response to the “failure” of Keynesian economics, theorists on neoliberalism began promoting policy reforms that simultaneously reduced government while expanding trade.

Where Keynesianism assumed that inflation and recession were mutually exclusive, neoliberalism argued that stagflation and unemployment were due to market distortions. Rooted in a persuasive argument for the power of self-organizing markets, globalization was viewed as the solution to the economic stagnation. Moving policymaking beyond its postwar emphasis on steering markets, neoliberal economists argued that government intervention undermined growth through trade. Building on neoclassical economics, neoliberal social policies focused on deregulating labor markets, lowering payroll taxes, and reducing labor costs. Accordingly, social spending and state intervention were seen to be in conflict with economic prosperity. Social expenditures were now seen as a cost to future economic growth rather than as protection against economic instability. Rather than mortgaging the wellbeing of future generations, government managed social policy was downplayed in favor of policies that leveraged economic growth.

Where education policy may have been closely linked to discourses on social justice and/or national cohesion in the postwar period, education policy is now more commonly interpreted as a feature of discussions on market growth and the “refinement” of human resources. As Garrison (2012: 370) cleverly notes,
The marvelous industrial idea of the nineteenth century was the refinement of natural resources into standardized, hence readily interchangeable and replaceable, parts for the national production function. The marvelous postindustrial idea of the twenty-first century is the refinement of human resources into standardized, hence readily interchangeable and replaceable, parts for the global production function. Schools serve as the site for smelting and refining human resources.

Schooling as Human Capital Formation

Notwithstanding current interest in educational reform, the idea that education contributes to economic growth is by no means new. William Petty (chief economist to Oliver Cromwell) argued that the value of England’s stock market was attributable to its people rather than simply its hard physical assets (Marber, 2014). Indeed, over two centuries ago, Adam Smith (1776) suggested that economic growth was in fact driven by worker capacities. It was not really until the 1960s, however, that economists began to systematically incorporate the idea of learning and labor quality into theories on economic performance. Economists like Theodore Schultz began using the metaphor of “capital” (a long-standing concept in economics) to explain the role of education and expertise in supporting growth. Evolving out of the work of Mincer (1958), Becker (1964) and Schultz (1961, 1964, 1971), human capital theory (HCT) proposed that capitalist organizations could advance worker performance and improve productivity by investing in high skills and training.

Where neoclassical economic theory views knowledge as exogenous (or external) to growth, theories on endogenous growth position knowledge and innovation at the center. Endogenous Growth Theory (EGT) is distinct from neoclassical theory, however, in that growth is seen as the “endogenous outcome of an economic system, not the result of forces that impinge from outside” (Romer, 1994: 4). This is partly in response to Solow’s (1957) work and its focus on knowledge and innovation (technology). Although classical

---

7 Smith wrote, the “improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labor, and which, though it costs a certain expense, repays that expense with a profit.”
economics recognizes the need for active investments in education on the grounds that education enables positive externalities, EGT holds that the value of skilled labor rises as human capital increasingly drives economic expansion. Where conventional economic theory attempts to capture and define the value of labor in terms of market transactions, HCT makes the claim that investments in education can directly enhance growth. Principles underlying HCT, for example, include techno-scientific innovation, the codification of knowledge through information and communication technologies (ICTs), the commodification of knowledge through intellectual property regimes, and the production and circulation of knowledge by and through knowledge networks (Peters, 2009).

In the U.S., economic discourse has become increasingly fixed on the need to introduce new models of education and lifelong learning (LLL)8 for the purpose of stimulating future growth. Indeed, domestic policy under President Obama has focused on STEM education as a key pillar in rebuilding the U.S. economy:

With strong educational foundations, Americans will create the leading ideas of the 21st century and ensure that these ideas diffuse throughout the American workforce. On many metrics, however, including grade-level proficiency and college graduation rates, America has slipped behind other countries. We must reform our education and workforce training systems to ensure Americans are qualified for the jobs of tomorrow. This imperative underpins the Obama Administration’s focus on education reform in general and in science, technology, engineering, and math (STEM) education in particular. It is also imperative to extend STEM educational and career opportunities to women and minority groups that are underrepresented in these areas, so that all Americans can find quality jobs and lead our innovative economy in the decades ahead. (White House, 2011, p.15)

While there is general consensus about the importance of human capital to KE, there is less agreement on its definition and scope. Despite the obvious importance of skilled labor as a means to advance economic competitiveness, there remain lingering questions

---

8 Lifelong learning policy is largely a construction of international policy organizations. Beginning in the 1970’s, policy proposals introduced by intergovernmental organizations (IGOs) such as the OECD (2004), the European Commission (2003), and the World Bank (2005) began pushing for the continuous building of knowledge and skills for the sake of social and economic development.
with regard to enhancing human capital development (Berry and Glaeser, 2005). Indeed, in an era in which knowledge has become increasingly available via a global digital commons, questions about formal schooling are becoming less essential. Mellander & Florida (2007: 3), for example, point to three divergent theories on human capital development. As they observe, the first theory “argues that universities play a key role in creating initial advantages in human capital, which becomes cumulative and self-reinforcing over time”. Beyond formal education, however, a second theory on human capital development, “argues that [urban] amenities play a role in attracting and retaining highly-educated, high-skill households”. Put differently, urban planning attracts high-skill labor. Beyond education and urban planning, a third theory on human capital development “argues that tolerance and openness to diversity” facilitate the absorptive capacity for importing the necessary skills for economic expansion.

As Rizvi and Lingard (2010) explain, it is no longer even possible to understand education policy in OECD countries without appreciating the central role of human capital development. Multifaceted policies and programs introduced at the global level have reinforced public policies geared to stoking human capital performance in the context of increased market competition. International performance indicators such as the OECD’s Program for International Student Assessment (PISA) have become critical instruments for tracking “educational quality” in order to measure, assess, and forecast future economic competitiveness.

A proliferation of auditing and evaluation programs, for example, has reduced the professional autonomy of teachers, and facilitated an extensive focus on “basic skills” linked to high stakes testing (Means, 2011: 220). Questions about how to improve U.S. education now invariably converge on discussions about standards and assessment, anchored to market-driven pressures to measure and predict human capital performance. While it may be true that schooling has been tied to economic development since the very formation of common schools in the early nineteenth century (Waks, 2013), substantial changes have emerged in the mission and expectation of public education. Critical scholars argue that neoliberal education policies have reduced schooling to a kind of
“factory training” in which any ideal of creativity or individuality has been sacrificed in favor of corporate efficiency (Garrison, 2012).

As education systems have become larger and more complex, many OECD governments have begun looking to market-based solutions to manage demand. This massification of education has also meant widespread investments in market-based strategies for achieving accountability and broad-based standardization of curricula. U.S. education policies, for example, have become dominated by extensive market integration and widespread privatization efforts in the form of voucher initiatives, charter schools, and growing experiments with for-profit secondary education (Rizvi and Lingard, 2010; Saltman, 2003, 2007). Rizvi and Lingard explain it this way:

The focus on human capital formation for greater competitiveness has created a demand for more robust regimes of testing. Within nation-states, testing has increasingly reshaped notions of worthwhile knowledge as well as pedagogical practices and has affected teacher professionalism. But beyond testing at the national level, international comparisons have also become important. In policy terms, comparative performance on testing regimes such as PISA has even become a surrogate measure for determining the quality and effectiveness of national education systems. Indeed, it is no longer possible to understand education policy without an appreciation of the central role that testing and accountability regimes now play in policy development and evaluation. (Rizvi and Lingard, 2010, p. 14)

**Education as Entrepreneurship**

More recent responses to growing global unemployment and a widespread desire for educational reform includes a sustained focus on tighter coupling of education to entrepreneurship (Zhao, 2009, 2012a, 2012b). The growing critique of industrial education systems is that they are locked into an outworn industrial paradigm that focuses too narrowly on the retention of information rather than the application of knowledge through innovation. One of the key challenges facing advanced economies today, it is assumed, is the critical importance of sustained innovation in the context of knowledge discovery. The basic idea is that formal schooling now requires a more vigorous theory on the value of creativity and entrepreneurship in order to ultimately rejuvenate economies in OECD countries. Indeed, a 2012 Scandinavian study on improving
education across Nordic countries points to the acute need to develop educational systems that stimulate creativity and entrepreneurship. Explicitly critiquing the use of testing to measure learning, it recommends altering established evaluation systems to accommodate entrepreneurial practice in conjunction with a national platform for innovation (Chiu, 2012, pp. 49-50).

This does not simply mean developing more “start-ups”. Rather, it means joining notions of entrepreneurship to educational programs that promote creativity and innovation. Indeed, economic and demographic challenges facing OECD economies— including the contraction of traditional and public sector employment— suggest the need “for wider participation in entrepreneurship education” (Rae, 2010, p. 605). In Rae’s terminology, this is “bounded” entrepreneurship. That is, entrepreneurial stewardship that focuses on solving problems and providing services of wider social value than the market alone can provide. This includes education, community, health, nutrition, and the environment. Rae points to four forces driving this change (pp. 592-3):

1) A changing economic and cultural milieu in which social movements now impinge on outmoded economic models.
2) Changing expectations about social responsibility among younger generations facing chronic unemployment.
3) Changes in technological affordances supporting education including personalization, digital media, and practice-based learning.
4) Changes in the financial and economic structure of education.

Like Rae, Gibb (2002) argues that education systems now need to refocus on the skills and capacities of entrepreneurship linked to theories of social practice (Bourdieu, 1972). From his perspective, the category of entrepreneurship itself is better framed in interdisciplinary terms overlapping embedded social relationships as “communities-of-practice” (Lave & Wenger, 1998). He argues that business schools provide an inadequate basis for shaping entrepreneurship education because of a narrow focus on corporatized markets (neoliberalism). Rather than continuing to promote a “dysfuctional ideology of
the 'heroic' entrepreneur” (Gibb, 2002: 234; Stronach, 1990), he calls for an expanded notion of entrepreneurship that includes micro enterprise, nongovernmental organizations (NGOs), public foundations, and community organization:

Arguably therefore, there is a major need to take entrepreneurship out of the locker room of economics, remove it from the metatheoretical models of Schumpeter et al. and place it in a wider inter-disciplinary context built upon a more pluralistic and diffused view of society and of the cultural nature of markets. Closer understanding of notions of trust, ethics, morality and the way they shape institutions and organizations and lead to informal ‘ways of doing things’ is the key to recognition that needs can be articulated, and supply response developed, without the notion of price being dominant. Moving enterprise and entrepreneurship away from their equivalence with market liberalization (du Gay 2000; Fournier and Grey 1999) allows the entrepreneurial concept to engage more effectively with wider issues of sustainable enterprise development within the context of cultures, social issues and environment. (Gibb, 2002, p. 251)

More than simply adding in entrepreneurial training to education, this means changing the nature of education itself so that students are increasingly empowered to design and direct their own learning practices. Indeed, building on Gibb (2002), Rae (2010) points to the need for a fundamental break with didactic teaching and learning methods to transform the culture of education as “programmed knowledge” (Christensen, 1997; Christensen et al., 2008).

**Conclusion: Paradigm Making and Paradigm Breaking**

While I whole-heartedly agree that the transmission model alone can no longer be support education in a global knowledge economy, I suspect that the problems associated with a post-industrial era are far more substantial than entrepreneurship-based education can resolve. The continued influence of neoliberalism has made practical revisions to policymaking especially challenging. Indeed, the “policy schizophrenia” (Nederveen Pieterse, 2012) that sets economic policy against social policy remains deeply entrenched. Nonetheless, it remains the case that public policy reflects a history of *paradigm making* and *paradigm breaking* (Hall, 1993; Polanyi, 1944). The truth is that periods of deep and sustained policy change are often precipitated by waves of social and
economic crisis. In response to the Great Depression and World War II, for example, the era of postwar Keynesianism saw the rise of massive public investments across the U.S. and Europe (Esping-Andersen, 1990). While in the 1980s, Keynesianism was itself supplanted by economic policies based in neoclassical philosophy.

Much as the shift from Keynesianism to neoliberalism demonstrates, revolutions in political economy are in fact quite common. Beyond the era of neoliberalism, there is a growing interest in public policies that might reinvigorate OECD countries. Indeed, many now argue that the “Great Recession” has aggravated a wide range of social and economic challenges that require a new policy paradigm. As Hobsbawm (2009) suggests: “Socialism has failed. Now Capitalism is bankrupt. So what comes next”? Calls for austerity measures in Europe and the United States suggest that neoliberal policies remain in favor, but the question is for how long?

Linked to a growing admiration for the Nordic welfare state, many centrist European policymakers have begun exploring alternatives to neoliberal social policy. Beyond neoliberal interpretations of KE, there is an escalating interest in recalibrating domestic policies in advanced economies, including State-led investments in infrastructure and public goods in order to restructure neoliberal social policies (Lundvall, 2004; Palley, 2011; Cimoli et al., 2009). The 2008 crisis, for example, has highlighted a mounting disillusionment with laissez-faire economic policies.

Indeed, new conceptions about State-led socioeconomic investment have been forming as center-Left counter-responses to laissez-faire public policies since the 1990s (Blair & Shroeder, 1998). Although the history of social and economic policies in the postwar period is generally understood as a story of two waves of state transformation, Hemerijck (2012) argues that Social Investment Theory represents a third wave of welfare state transformation. In the United Kingdom (UK), Social Investment Theory is linked to Third Way politics and Tony Blair’s New Labour Government (Giddens, 1998). Moving beyond “passive” income compensation and toward “active” citizenship, Third Way social investment frames changes to the welfare state in terms of human capital
development and enhanced labor market participation (Perkins, Nelms & Smyth 2004). Where the old welfare state sought to protect people from the market, the Third Way model of social investment focuses on “tying rights to responsibilities” (Giddens, 1998). From this perspective, public investment imposes responsibilities on individuals and society to transform and enhance economic competitiveness (Lister, 2003: 437). Beyond redistributive or consumption-based social welfare (centered on benefits and rights) Giddens (1998) frames social investment in terms of *positive* welfare and a citizenry of “responsible risk takers”.

Social Investment Theory is not limited to the UK, however. In fact, many social investment scholars criticize Giddens’ approach on the basis of the need for *both* social promotion and social protection (Dobrowolsky, 2002; Featherstone, 2006; Lister, 2003; Jenson, 2010). Scholars searching for policies to supersede neoliberalism have focused on emphasizing policy measures that mitigate against mass unemployment/underemployment, particularly through education (OECD, 1996; OECD, 2006). This is partly explained in terms of the need for new social policies linked to postindustrialization. In the context of NIS strategy for example, Lundvall and Lorenz (2012) emphasize national systems of learning that promote *flexicurity* in welfare provisions in support of human capital development.⁹

---

⁹ Linking fluid labor markets to income security, Lundvall and Lorenz (2012) argue that flexible labor markets make it possible to continuously reshape the capabilities of knowledge-based societies. They note that a combination of national labor markets that promote high levels of unemployment support alongside relatively low levels of employment protection have an advantage in promoting learning and knowledge exploration across national labor systems (p. 245). In addition to liberalizing the process of hiring and firing however, Social Investment Theory emphasizes State support in education and training to ensure a consistent proliferation of knowledge and skills (p.253).
CHAPTER TWO:  
Research Focus

Introduction
This research dissertation is especially focused on the genealogy and discourses of KE that now shape forecasts on the future of U.S. society. Drawing insights from discussions on the “Creative Economy”, the “Network Economy”, and the “Green Economy”, I am interested to develop policy proposals for thinking about education for a postindustrial society. For the purposes of this study, I argue that the combination of text analysis and interview data provides a grounded methodology for informing and critiquing US educational reform policies in light of a growing educational reform movement. Most importantly, I am interested to build on alternative readings of KE in order to highlight the need for a new policy framework in interpreting and shaping education in the 21st century.

Theoretical Assumptions
As Hall (1993) suggests, policymaking is a process of social learning. Neoclassical economists for example maintain that the key to economic growth lies in liberalizing trade, privatizing state assets, and dismantling welfare state provisions. This research study suggests that there is a need for a new approach to designing social policy in advanced economies. Informed by the work of critical educationalists (e.g. Giroux, 2003; Apple, 2006, Spring, 2008), I approach policy scholarship from within the tradition of critical policy studies, paying particularly close attention to the discourses that now shape the evolution of contemporary educational reform. This involves asking questions with respect to given policies, including context, textual construction, and the means through which educational policies are implemented (Rizvi & Lingard, 2010, p. 52).

Examining the genealogy of KE in the context of forecasts on postindustrial society, I am interested in rethinking the underlying assumptions that anchor US education. While this research critiques the influence of neoliberalism on US social policy, its main goal is to reconsider the purpose and principles of US education in light of scholarship on KE and
recent theories on social investment. I argue that not all conceptions of KE are simply variations on neoliberal political economy. Moving beyond interpretations of KE that reduce its significance to neoliberalism, I am interested to deconstruct the discourses that now shape KE as a policy narrative.

Rooted in a tradition of critical policy scholarship, I recognize that policy research inherently builds on explicit and implicit assumptions. This includes specific assumptions about the selection of methodology and the subject of study. I chose qualitative research methods as my main methodological approach in order to disclose and study the “social imaginaries” that now inspire US education policy (Rizvi & Lingard, 2010). At the same time, I recognize that any methodological perspective provides only a partial viewpoint into the complex social dynamics. Underlying my assumptions about scholarship on social change is a recognition of ongoing political struggle in shaping public policy and the material practices that can give rise to new policy discourses.

I share criticism of a history of positivism in generating and legitimating policy scholarship. I realize, for example, that the ways in which we researchers make meaning is necessarily mediated by our experiences and subjective beliefs. Indeed, I recognize that my own interest in public policy is mediated by an interest in affecting social change “for the better”. My interest in carrying out this study is informed by a particular dissatisfaction with the current thinking on educational reform here in the US. Additionally, my interest in the study of KE as a global policy discourse is shaped by personal experiences living and working in the United States and other parts of the globe.

I also share the view that public policy is now interwoven with a broad range of international policymaking networks (Slaughter, 2004). Policy discourses are increasingly multilayered and rooted in socioeconomic changes across local, national, and global sites. Notwithstanding the fact that the State is responsible for designing and steering national policies, it also true that the State’s monopoly on power is buttressed against policy discourses that circulate through a global network of institutions and agencies (Rizvi and Lingard, 2010). Discourses that frame education policy today are no
longer fused to the state, but “emanate from international and supranational organizations such as the Organization for Economic Cooperation and Development (OECD), the World Bank and the European Union (EU)” (Rizvi and Lingard, 2010: 14). Organizations like the OCED now play a substantial role in affecting the broader discourse shaping the goals and purposes of national education systems.

**Qualitative Inquiry**

Part of the goal of this study is to develop a nuanced account of KE by examining the many discursive layers that together construct KE as a social imaginary. Linking this research to nascent theories on Social Investment, this study is intended as a contribution to policy scholarship on the political economy of education and seeks to help move US education policy beyond neoliberal readings of human capital theory. It is my view that deconstructing KE is critical to both analyzing the contradictions that structure contemporary discussions on educational reform, and advancing new scholarship on the political economy of education. My goal in using qualitative inquiry in this study is to understand the context and conditions shaping the intellectual trends that now drive US educational reform efforts.

As I indicated at the outset of this study, this research applies qualitative inquiry to two domains of inquiry. The first domain includes a detailed examination of national public policy documents that frame US education policy. The second domain includes interviews with experts in areas overlapping the fields of public policy and education. To appreciate the importance of the KE metanarrative in public policy, I analyze several documents introduced by the Obama Administration that highlight and use KE to justify educational reform. I examine tensions in the construction of US education policy in light of this document analysis. Looking specifically at two policy documents published by the US Department of Education, and one policy document published by the National Economic Council, this study explores contradictions in the discourse on educational policy reform. These three documents include:
In addition to this documentary evidence, the research data for this study is informed by interviews with scholars and researchers whose expertise overlaps the fields of education, economics, and public policy. My goal in using qualitative inquiry is to better understand and interpret the intellectual strands that now shape conceptualizations of education in a postindustrial society.

Although it is difficult to give a single definition of qualitative research, its key value in my view is in providing a method for questioning the ontological and epistemological assumptions underlying research problems themselves. Part of the utility of qualitative inquiry is its capacity to point to solutions that often lie outside the assumptions of conventional theoretical and methodological frameworks. Indeed, it is often these assumptions that produce the "problem" under study itself. By making assumptions explicit, scholars have the means to reexamine the embedded nature of research problems, including hidden motivations and/or deficient reasoning.

**Document Review**

Document review and analysis is used as a foundation for data collection. This documentary evidence has been used to corroborate the central hypothesis of this research study including a specific critique of the negative influence of neoliberalism on education. The documents used in this study were chosen as key illustrations of the nature and goals of educational reform policy in the Obama administration. All three
documents originate from the first term of the Obama presidency and reflect the key ideas driving President Obama’s policy agenda. The selection of documentary evidence outside the domain of education reflects a deliberate attempt to demonstrate the economic context of education policy and interrogate the thinking supporting this worldview. Documentary evidence is also augmented by research interviews as a means to “triangulate” data for this study. Together, qualitative interviews and document analysis offer a window into ongoing construction of KE policies. Moreover, the use of qualitative inquiry provides a means to deconstruct and evaluate the key economic theories promoting certain kinds of reform in U.S. education.

**Qualitative Research**

Qualitative methods were deployed for the collection and analysis of data for this dissertation. Driven by a primary research question, this research study utilizes expert interviews and the collection of official public documents in order to generate a nuanced analysis and a set of recommendations regarding educational policy processes in the US. Qualitative analysis was applied to both interview data and policy documentation. My goal in using qualitative inquiry is to deconstruct the narratives that sustain public policies on education in order to understand how economic discourses shape and inform policies on education. As Taylor and Bogdan (1998) suggest, “In-depth Interviewing” is a critical method for social science research. In-depth interviewing is about more than simply asking questions and obtaining answers; it is about learning what questions to ask and how to ask them. In-depth interview is modeled after a conversation between equals rather than a formal question-and-answer exchange. Participants include researchers, scholars, and policymakers focused on research and practice overlapping US education policy.

Since the logic underlying qualitative interviews is different from quantitative research (i.e., generalizability, random sampling, etc.), participants are chosen based on their capacity to offer compelling research data (“stories”) that authoritatively “connect” with this study and that might improve policymaking in the United States. The size of the sample in an interviewing study, for example, is something that should often be
determined toward the end of research. This is because the number of informants depends upon the speed at which all discussion on a given subject is exhausted. Interpreting qualitative research data is akin to reading a text in any other context. It requires a close reading plus judgment.

**Interviews**

Interviewing policymakers and policy experts is much like building a text that forms a narrative. Developing a capacity to interpret this text is critical to qualitative research because interview data provides a framework for *meaning making*. In Seidman’s view (2006), for example, the two major criteria for a successful interview-based field research are sufficiency (enough participants to get a strong sample of perspectives) and saturation of information (reaching a high threshold of information on the subject of inquiry). As he points out, the purpose of qualitative research is to understand the experiences of the participant, not predict or control those experiences: “Interviewing is both a research methodology and a social relationship” that guides inquiry (Seidman, 2006, p. 95). While checking with participants to verify interpretative accounts (member-checking) can inform a researchers judgment, it cannot substitute for it. In this sense, a researcher’s judgment is fundamental to driving inquiry. With this in mind, this study is supported by seven semi-structured interviews conducted with scholars and researchers in domains overlapping education policy and KE.

All interviews were subject to the same open-ended and semi-structured questions in order to elicit varied responses to a common research problem. Participants were specifically selected based on their expertise on KE and the political economy of education. Indeed, many of the interviewees in this study are noted international experts on KE. Interviewees include:

1) Richard Florida, Director of the Martin Prosperity Institute at the University of Toronto, and leading proponent on the Creative Economy.

2) Michel Bauwens, founder of the Foundation for Peer-to-Peer Alternatives, and noted
expert on the Network Economy.

3) Sam Pitroda, former Chairman of India’s National Knowledge Commission (2005–2009), Advisor to the Prime Minister of India, and founder and first chairman of India’s Telecom Commission.

4) Cathy Davidson, the John Hope Franklin Humanities Institute Professor of Interdisciplinary Studies at Duke University, a member of the National Council on the Humanities, and noted expert on digital media and learning.

5) Donald Brinkman, Program Manager at Microsoft Research in digital humanities, digital heritage, and games for learning, and former Program Manager with the Education Products Group.

6) Tony Wagner, Innovation Education Fellow at the Technology & Entrepreneurship Center at Harvard University and the founder and co-director of the Change Leadership Group at the Harvard Graduate School of Education

7) Tony Seba, Lecturer on entrepreneurship and clean energy at Stanford University and founder of numerous clean technology companies in Silicon Valley.

Research Hypotheses
This dissertation seeks to offer a comprehensive study of US education policy reform that builds on critical scholarship in education policy. This study has specifically focused on examining the influence of economic discourses on educational reform with the larger purpose of introducing recommendations about future directions for US education policy. I arrive at these recommendations through the use of a theoretical model presented in Chapter 1 that suggests the need to reexamine socioeconomic forecasts on the future of US society. My main hypothesis is that educational reform policies are undermined by superficial readings of discourses on the knowledge economy. Conflating various discourses of KE, educational reform is now rooted in complicated assumptions about the
nature and function of education in a postindustrial era. Building on the work of Peters (2010), I explore four discrete paradigms of KE and consider their import for shaping a new and emerging paradigm on educational reform.

Moving beyond neoliberal constructions of education policy and building on critical scholarship, I am interested in developing a new discursive framework for rethinking US educational reform. Building on the work of endogenous growth theory (Romer, 1990), for example, contemporary economic theory explicitly joins investments in education and training to economic development (Becker, 1964; 1975). Recognizing the continued importance of the global economy in shaping education today, I examine the origin of the theories and concepts that shape the notion of KE. Hence, the orientation of this study is supported by the following working hypotheses:

1. US education policy is informed by discourses on KE.
2. As a policy framework, educational reform policies are undermined by superficial readings of KE.
3. Conflating various discursive models of KE, educational reform is now rooted in contradictory assumptions about the nature and function of education linked to neoliberal readings of human capital theory.
4. Mapping models or paradigms of KE, scholarship can disentangle these discourses in order to introduce more effective policy proposals for transforming US education.
5. Informed by this research, education policy could begin to explore a new social policy framework that better responds to challenges confronting postindustrial societies (i.e., technological innovation, labor automation, unemployment, climate change, sustainable innovation, etc.).

**Limitations of the Research**

The application of research and scholarship to public policy has been an important feature of government policymaking in advanced economies since at least the post-war period. Policy researchers have historically been viewed as experts who provide
prescriptive solutions for managing policy development (Rizvi and Lingard, 2010). This approach to shaping public policy has changed quite substantially over the past three decades and it is important to offer cautionary remarks about the limitations of this study. My underlying interest in developing recommendations for revising the current trajectory of education policy is built upon a personal conviction about the growing importance of education to social and economic development in the twenty-first century. I also recognize that there are inherent limitations in my approach to developing recommendations for transforming U.S. education.

I recognize, for example, that the results of this research are necessarily contingent and embedded within a particular research milieu. Although there is necessarily overlap between the influences of global economic narratives on social policies in other countries around the world, I am not suggesting that that the results of this study should directly inform educational policymaking in other countries. This study is specifically focused on deconstructing the discursive strands that shape policymaking in the U.S. Through this research, I am attempting to provide a partial understanding of the role of economic discourse in framing and shaping educational policy reforms.

I also recognize that a major limit to this policy research is its scope. The wide scope of this dissertation research introduces a pronounced difficulty in including all relevant voices and perspectives and in making definitive conclusions about educational reform. In order to narrow the focus of this study, a number of voices and resources have been sacrificed in order to better hear directly from the perspectives of influential actors participating in ongoing debates on US educational policy. Further study on the subject of US educational reform would benefit from the use of case studies that examine the details of educational reform “on the ground”. Additional studies, for example, could make a stronger case against neoliberal social policies in US educational reform by introducing comparative studies of educational reforms outside the US. Other OECD countries such as Finland and South Korea could certainly offer a wealth of data for better appreciating the affordances of multiple policy trajectories.
Research Implementation

This dissertation research was conducted between January 2010 and July 2013. Qualitative interviews and document analysis were driven by theoretical questions about the influence of economic discourses on education policy. Research inquiry was also informed by questions emerging from the literature review, particularly regarding contradictions in economic discourse. Preparation for interviews involved extensive investigation of the work of leading scholars and policymakers in across multiple domains. Interviews provided a wealth of information in support of policy analysis. Interviews were semi-structured in order to provide flexibility in collecting research data and each interview provided an opportunity to identify and locate additional scholars and policy actors who might inform this research study.

The first step of the interview process involved contacting participants directly by mail. The goals and purposes of the research were outlined and the selected participants were invited to contribute their expertise to this dissertation research. Participation was entirely voluntary. All participants are well-advanced in their careers and highly respected leaders in their respective fields. Six of the participants were male and one female. Each interview took approximately 45 minutes to complete (with an agreement to potentially do follow-up interviews at a later time). Generally speaking, all seven participants were exceedingly helpful and generous with their time. All interviews in this study were recorded over the phone and later transcribed and all participants are identified by name. Each participant was notified that they could withdraw from the study at any time.

My main goal in conducting these interviews was to develop a deeper understanding of the influence of economic discourse on social policy, particularly notions of human capital development. The importance of education to economic growth has emerged as a common policy framework shaping the discourse on educational reform across OECD countries. Indeed, it is now commonplace to suggest that education policy has become a subset of economic policy (Rizvi and Lingard, 2010). Critical scholars, for example, argue that neoliberal reforms of the public sector are increasingly framed by policy texts embedded in larger economic discourses or “policy ensembles” (Ball, 2006; Foucault,
They argue that public policy reflects a constellation of normative actions and positions designed to steer the actions and behavior of discursive communities across a range of institutions (Rizvi and Lingard, 2010; Lave and Wenger, 1991). Given this critique, my research inquiry was particularly focused on the globally embedded nature of US education policy. With this in mind, questions arose about the challenges of using a methodological perspective grounded in a study of the US.

**Conclusion**

In the final chapters of this dissertation research, I explore solutions to what I regard as the limitations of contemporary U.S. education policy. I elaborate on my research findings and discuss my tentative conclusions. Corresponding to the Network Economy, the Creative Economy, and the Green Economy, I consider the potential for a new policy framework for interpreting educational reform that might transcend and include human capital theory within a broader understanding of KE. Ultimately, my goal is to develop a nuanced understanding of U.S. education policy in the era of globalization through a critical analysis of relevant policy texts supporting education reform. Despite the fact KE is most often interpreted as a single monolithic discourse, I try to show that KE is in fact many discourses intersecting a range of disciplines. Where U.S. educational policy is now largely fixed to neoliberal public policy, I map the contours of an expanded model of education policy that is informed by alternative readings of KE.
CHAPTER THREE:  
The Knowledge Economy in Context

The term “knowledge-based economy” results from a fuller recognition of the role of knowledge and technology in economic growth. Knowledge, as embodied in human beings (as “human capital”) and in technology, has always been central to economic development. But only over the last few years has its relative importance been recognised, just as that importance is growing.  

(OECD, 1996, p. 9)

Introduction

In order to unpack contemporary U.S. education policy, it is important to situate these policies in terms of the broader global economic landscape in which they are embedded (Polanyi, 1944). Given the rising demand for skilled labor, for example, it is hardly surprising that human capital development is now a widely shared policy goal across OECD countries. Studies on endogenous growth theory (EGT), for example, overlap a wide-ranging literature on learning management, learning organizations, and skill-biased technological change (SBTC)\(^\text{10}\) (Bekman, et al., 1998). Indeed, contemporary economic theory now explicitly connects investments in education and training to economic expansion (Goldin & Katz, 2008; Becker, 1964; 1975).

According to Paul Romer (1990), “the stock of human capital determines the rate of growth”. In the era of EGT, education has become a vehicle of national competitiveness in which the *global knowledge economy* is a policy axis for coordinating educational reform. It is now commonplace to suggest that education policy has become a subset of economic policy (Rizvi and Lingard, 2010). Notwithstanding the broad consensus on the value of human capital to economic growth, there is significant debate about how best to measure and define the term. Florida (2005, 2007), for example, argues that the increased

\(^{10}\) Accordingly, technological innovation is increasing the relative productivity of high-skilled labor making “skill factor bias” pivotal to growing debates around income disparity.
mobility of skilled labor has become central to understanding regional economic development. In addition to labor mobility, human capital is geographically concentrated in the U.S. because of the uneven quality of its education system. Despite the face that education as human capital now anchors policy discussions on KE, there remains a need to develop more sophisticated scholarship on meaning and definition of KE.

In this chapter, I examine the origins of the theories and concepts that shape the notion of KE. Looking specifically at the intellectual strands that shape the philosophy of KE, I consider the influence that this discourse has on contemporary education policy. Additionally, I track recent interest among macroeconomists in the potential of human capital development to stoke economic growth, and consider the pervasive influence of neoliberalism on U.S. educational reform.

**Tracing the Discourse(s) of the Knowledge Economy**

Notwithstanding the fact economic growth and expansion have always depended upon knowledge and innovation, knowledge itself is now viewed as a key form of capital. When attempting to develop a genealogy of KE, most scholars begin with Peter Drucker’s (1969) *The Age of Discontinuity* but the truth is that the discourse on KE is interwoven with much older intellectual threads that evolve across a range of disciplines, including sociology, economics, and management studies (Peters, 2001). Shaped by various theories on the evolution of capitalism, KE forms a kind of discursive mosaic that is strongly linked to associated notions of “knowledge workers” and “knowledge industries”. Indeed, the notion of KE emerges from a multifaceted set of claims that suggest that the industrial economy is being transformed by accelerating investments in science, technology and innovation (Peters, 2009). Overlapping discussions on the “information age” and “information society”, KE elides with conceptual discussions on postindustrialism and the rising importance of knowledge-intensive activities.

Indeed, tracing the evolution of the concept of KE is challenging because the history of knowledge-based production does not simply begin with the rise of post-Fordism or the notion of postindustrial society. Conventional readings of KE in fact coalesce with larger
narratives on the evolution of capitalism as a system of production (Bell, 1973). Building on Burton-Jones (1999), for example, Kenway et al. (2006) simply define KE as “knowledge capitalism”: 

The knowledge economy is a contemporary and dominant manifestation of capitalism. It is driven by the production, distribution and consumption of knowledge…Apparently, we are all moving inexorably towards an economy, and indeed society, determined and dominated by the following principles: techno-science, techno-scientific innovation, the codification of knowledge through ICTs, the commodification of knowledge through intellectual property regimes, and the production and circulation of knowledge by and through instrumental knowledge workers and networks. (pp. 4-5)

The truth is that divergent and conflicting accounts of KE undermine any monolithic characterization of the term. Indeed, the discussion on KE “sits within a complex and interconnected set of discourses that rapidly succeed, replace and overlap one another” (Peters, 2009: 126). Intersecting a broad range of terms like information economy (Porat, 1977), information revolution (Lamberton, 1974), and information age (Dizard, 1982), the literature on KE includes a wide number of terms used interchangeably and uncritically by scholars and theorists alike (Peters, 2001). Indeed, even the scholarly literature through which the concept of KE gains currency does not consistently locate the origins of the term:

While it is commonplace to locate the origin of the knowledge/information economy/society in the work of several key thinkers in the 1960s and to use this as a context for a discussion of current usage, it is less common for scholars to track the intervening development of the concepts. Academic discourses are often de-historicized and the coinage of terms or key influences not contextualized in regard to global or local or counter-discourses. (Kenway et al., 2006: 11-12)

Scholarship on KE begins from a blend multiple and overlapping discourses (including early economics literature initiated by Friedrich Hayek (1937) and Fritiz Machlup (1962) that position advanced capitalist societies as moving beyond mass industrialism. In the social sciences, Bell’s (1973) work *The Coming of Postindustrial Society* is often seen as
a major milestone in the gestation of the scholarship on KE (Dyer-Witheford, 2000; Webster, 1975). Bell himself traces the concept of knowledge society to Robert E. Lane’s (1966) article, “The decline of politics and ideology in a knowledgeable society”. Interestingly, prior to Bell’s work Machlup (1962) had already begun exploring the economics of knowledge production by sub-dividing the U.S. economy into knowledge industries (education, research and development, communications media, computers, and information services including finance, insurance, and real estate). Kerr (1963) had already begun examining the emergence of the “knowledge industry” in terms of the changing nature of the university, and the growing concentration of highly educated experts. Moreover, by 1971 Touraine (1971) had coined the term “post-industrial society” in his book of the same name\(^\text{11}\).

Indeed, as early as the 1960s, Machlup (1962) was exploring theories of KE with his research on the effects of patents on “knowledge industries”, while in East Asia, Japanese scholarship had also begun building on the ideas of the “information society” or johoka shakai (Masuda, 1968; 1980). Masuda speculated on KE as the rise of a new information-driven global consciousness and a “higher stage of social evolution”. Building on this work, Porat (1977) began exploring economic measures for an information economy, distinguishing between primary and secondary information sectors. Within the sphere of management studies, Drucker’s (1969) exposition on the rise of “knowledge workers” is a touchstone for many public policy conceptions of KE. His adoption and reworking of Machlup’s research served to anchor public policy themes on KE to notions of a coming power shift— from the owners and managers of capital to white-collar workers and specialists. Ultimately, it would be Bell’s (1973) focus on the complex transformation of industrial economy, however, that would come to shape much of the discourse on KE. For Bell, postindustrial society corresponded to new structures of economy and society in which information displaced energy, intellectual capital displaced financial capital, ICTs displaced machine technologies, and skilled labor displaced semi-skilled labor.

\(^{11}\) For Touraine (1971), post-industrial society referred to a society focused on the production of “symbolic goods” including the industrialization of all areas of cultural reproduction (health, R&D, education, etc.).
The Knowledge Economy as Policy Discourse

At the global level, KE policy discourse is rooted in major reports like the OECD’s *The Knowledge-based Economy* (1996) as a formal policy driver of the “knowledge-based society”. Divided into three sections, the report outlines the trends and implications of KE, the role of the science system to national systems of innovation (NSI), and the growing need for economic indicators (Foray, 2004). Perhaps most importantly, the OECD report categorizes the main features of KE, including knowledge distribution networks (formal and informal), the need for highly skilled labor (human capital), the importance of ICTs, the globalization of labor and economic activity, and the need for government leadership in scientific R&D.

Close to two decades since the OECD publication of *The Knowledge-based Economy* (1996), the term “knowledge economy” has largely subsumed older and related conceptions, including the information society/economy, network society, and learning economy. As Nederveen Pieterse, (2010: 404) notes,

> These ideas are extensions of the idea of postindustrial society, Toffler’s “third wave” and the knowledge economy. Technological transformation is widely viewed as a major driver of economic change; in Schumpeterian perspectives, innovation is viewed as key to the business cycle and to the fifty-year long wave or Kondratieff cycle. Thus, science and technology policies are central to economic policy. Universities play a strategic role in knowledge and science and technology upgrading. Research parks and partnerships between universities and corporations embody this approach. Patent and licensing lawyers are to convert innovations into intellectual property…

A powerful driver of public policy across supranational bodies, many of the discourses on KE have focused attention on issues of intellectual property (IP) and the global regulation of creativity and innovation through organizations like the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO). Indeed, IP rights (copyrights, patents and trademarks) are viewed as fundamental to protecting “knowledge-based capital” (KBC). Accordingly, while knowledge tends to be abundant, what is scarce is the capacity to apply knowledge to fuel innovation. As Powell and
Snellman (2004) observe, this reflects an increasing relative share of GDP attributable to “intangible” capital. This includes “a greater reliance on intellectual capabilities than on physical inputs or natural resources”, and a deliberate effort “to integrate improvements in every stage of the production process, from the R&D lab to the factory floor to the interface with customers” (Powell and Snellman, 2004: 201).

**Globalization and the Knowledge Economy**

A common concern with the scholarship on KE is a lack of analytical rigor. KE policy, for example, reflects policymaking as *futurology* in which the “knowledge economy” functions as a kind of cultural trope for promoting certain sets of policies (Peters, 2001). Indeed, KE discourse has largely become a kind of policy language-game:

> The rules of this policy language-game seem based upon the invention of new metanarratives – overarching concepts or visions of the future - as a method of picturing these changes and presenting a coherent policy narrative. Thus, the terms ‘postindustrial society’, ‘information society’ (which have been around since the late 1960s) and ‘global information economy’ abound in policy documents. More recently, the terms ‘knowledge’ and ‘learning’ - conceptualised both in relation to ‘society’ and economy - have come to occupy centre stage in national policy documents concerned with mapping the impact of global trends and encouraging greater competitiveness and more synergistic relationships between education and the economy. (Peters, 2001: 4)

“Steeped with hyperbole and laced with prediction”, KE policies are carelessly inflated by economic forecasts without regard for historical analysis or interpretation (Peters, 2001: 12). Indeed, discourses on KE have in fact supported four decades of “deindustrialization” in the U.S., resulting in significant import dependence and a chronic trade and current account deficit. The recent collapse of “financialization” as the antidote to deindustrialization has bolstered support for greater industrial intervention and major new political shifts in U.S. economic policy. Moving past debates around “strategic industries” (such as semiconductors or advanced manufacturing), U.S. public policy under the Obama Administration has refocused on innovation policy in response to the broad sweep of challenges facing the U.S. (Pages, 2010).
Confronting economic stagnation, governments across many OECD countries have begun constructing industrial policies built on top of theories of “absorptive capacity”. Accordingly, a country’s cultural capacity for openness or tolerance is seen as critical to sustaining prosperity (Florida, 2002): Tolerance for diversity and “low barriers to entry” attract and absorb skilled talent while supporting the rich environments that stoke creative innovation. Drawing a correlation between diversity and innovation, Jacobs (1961, 1969) emphasizes the role of cities and regions as platforms for the assimilation and diffusion of knowledge (Sassen, 1991). Indeed, building on Jacob’s work, Lucas (1998) highlights the clustering effect of human capital, focusing on the capacity of cities to localize and reduce the cost of knowledge transfer to enable ideas and new knowledge to arise and circulate more efficiently. As the scale and diversity of cities increase, so do the number of connections generating new ideas and innovation.

Beyond advanced economies, globalization is changing the topography of mass manufacturing, moving the locus of economic power beyond “the West”. Asia’s stock markets now account for 32 percent of global market capitalization (ahead of the United States at 30 percent and Europe at 25 percent) (Zoellick, 2010). China alone accounts for 5.4 percent. As Dicken (2011: 525) observes:

> Without doubt, the biggest single global shift reshaping the contours of the global economic map is the resurgence of East Asia to a position of global significance, commensurate with its importance before ‘the West’ overtook it in the nineteenth century. But this has not been a sudden event. Like the tectonic processes that reshape the earth’s crust, the build-up takes time before we become aware of the true magnitude of the change… The result is a shift in the center of gravity of the world economy, a shift that seems now to be on solid foundations and not a mere passing phase.

What is obvious is that as billions of people in emerging economies join the world economy, they are bringing with them a multipolar world order12. The rise of NIEs now

---

12 The paradox of the economic boom across many state capitalist societies is that wealth has largely
poses a direct challenge to rudimentary notions of KE developed in OECD countries over the past half century (Fukuyama 2012). Even adjusting for the differential power of currencies, growth in the U.S. has lagged behind global growth for the past 10 years. According to Goldman Sachs, the U.S. share of global GDP fell from 31 percent in 2000 to 27.7 percent in 2006, even as the share for BRIC countries rose to 11 percent from 7.8 percent (Gross, 2007). This tectonic shift is marked by a perceptible decline in confidence across many developed countries particularly in the U.S. Indeed, economic policy in many OECD countries is now increasingly marked by a growing fear of economic decline in the face of globalization. This fear has been exacerbated by the expanding geopolitical influence of China and the BRICs (Beattie, 2005; Araya and Marber, 2013; Nederveen Pieterse, 2011). In fact, the growing economic power of many developing economies has been striking. Consider the data: over the past two decades, developing countries have seen a substantial increase in their share of economic power, particularly in terms of their share of global GDP, their share of exports and their share of inward flows of foreign direct investment (FDI).

benefitted a super-elite (Dicken, 2011: 489-91). The extent to which state capitalist economies can generate innovation remains to be seen. What does seem certain, however, is that the "commanding heights" of state capitalism are increasingly dominated by ruling political elites and their families. This is exacerbated by the fact that since 1950, virtually all of the world’s population growth (greater than 90%) has occurred in developing countries. Add to this, more than 50% of the labor force is employed in the agricultural sector (close to 70% percent in sub-Saharan Africa). Challenges facing BRIC countries are daunting. Together, BRIC countries must provide for more than 40% of the world’s population. One-third of India’s population remains illiterate, and the bulk of China’s population is desperately poor. China's cities are among the most polluted in the world today, and the disparity between rich and poor within and between regions is substantial.

13 In many advanced economies, this growing nervousness translates as a politics of anti-immigration and rising calls to reduce or eliminate immigration altogether. This is remarkable given the increasing need for skilled labor across older industrialized economies (especially in Europe and Japan). In the U.S. this is more remarkable still because immigration has been a major source of its substantial economic growth (Saxenian, 2006; Dicken, 2011).

14 With a combined GDP of $15.4 trillion, the BRIC countries are the four largest economies outside the OECD. As one commentator has put it, “Brazil is to agriculture what India is to business offshoring and China to manufacturing: a powerhouse whose size and efficiency few competitors can match” (Beattie, 2005: 17).
Table 1. Developing countries’ share of world production, trade and foreign direct investment, 1990 and 2007

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of world GDP</td>
<td>18.4</td>
<td>26.0</td>
</tr>
<tr>
<td>Share of world exports</td>
<td>19.0</td>
<td>30.3</td>
</tr>
<tr>
<td>Share of world inward FDI stocks</td>
<td>20.6</td>
<td>28.7</td>
</tr>
</tbody>
</table>

Source: calculated from World Bank and UNCTAD data (in Dicken, 2011, p. 25)

Although it may be true that the contemporary global economic map is the outcome of a long evolution in the relationship between the structures and flows of goods, peoples, and ideas (path dependence). It would also appear to be true that old geographies of production, distribution and consumption are now being eclipsed by the rise of new geographies. As NIEs have become increasingly stronger in industrial manufacturing, advanced economies have been forced to maintain permanent cycles of innovation to *stay ahead* (Christensen, 1997; Freeman and Soete, 1997; Foster & Kaplan, 2002; Bartlett et al., 2008). The Obama Administration, for example, has applied significant political capital in promoting broad investments in frontier technologies including nanotechnology, biotechnology, additive manufacturing (3D Printing), and robotics. A key theme of the American Recovery and Reinvestment Act (ARRA), for example, has been a focus on the “Green Economy”, including the allocation of significant funds to the Department of Energy in a bid to move the U.S. beyond fossil fuels. This includes hundreds of millions of dollars allocated to firms (through matching funds and loan programs) to support the development of solar panels, electric batteries, biofuels, and other green technologies. Indeed, in 2009 the Department of Energy (DOE) “was awarded $377 million in funding for 46 new multi-million dollar energy frontier research centers (EFRCs) located at universities, national laboratories, nonprofit organisations, and private firms throughout the U.S.” (Mazzacuto, 2011, p.105).

**Beyond Neoliberalism**

Changes in the structure of globalization have challenged leaders in many developed economies to refocus on advanced manufacturing and human capital development as key
instruments in rejuvenating stalled economies. Indeed, educational reform is now part of a titanic struggle to rejuvenate OECD economies. As Fordist mass production systems have been displaced to low-cost zones in developing countries, and as de-industrialization had begun to take root in many developed economies, economic stagnation has been increasingly explained in terms of a decline in productivity and/or increased global competition.

Increased economic output has historically meant increased employment but this no longer appears to be the case. For the first time since the Great Depression, job growth over the past decade has been virtually nonexistent. Indeed, growing unemployment appears to reflect deep structural issues that will likely worsen. Brynjolfsson and McAfee (2014: 36), for example, point to the fact that the Bureau of Labor Statistics Job Opening and Labor Turnover Survey (JOLTS) reveals a dramatic decrease in hiring since 2000. Approximately 12 million jobs were lost in the U.S. between 2007-2009 with the unemployment rate reaching close to 10% of the U.S workforce. While the unemployment rate has come down since its high in 2009, there is little expectation of a substantial job recovery.

In advanced economies, unemployment now remains at record levels and financial fragility has become the norm. Brynjolfsson & McAfee (2011) note that are three leading theories for explaining this high unemployment: The first, linked to economic theories on economic cyclicality; the second, linked to theories of technological stagnation; the third, linked to theories of computer automation:

(1) The cyclical explanation suggests that deep recessions are followed by slow cyclical recoveries. Jobs are lost but eventually regained as markets move to correct themselves (Florida, 2011).

(2) The stagnation explanation suggests that advanced economies have in fact reached a “technological plateau”. Innovation has slowed or generally been less transformational on the economy generating fewer new jobs (Cowen, 2011).
(3) The automation explanation suggests that that mounting technological innovation is not slowing but expanding considerably and building on computation to automate various forms of labor. Accordingly, labor is will continue to be displaced at an accelerating rate (Rifkin, 2011).

According to a recent study (Godofsky, Zukin, & Horn, 2011), only 53% of U.S. college students graduating between 2006 and 2010 now hold full-time jobs. Outside the U.S., growing technological productivity and population growth are producing a global jobs crisis, especially for young people. As Zhao (2012b) observes:

The dire unemployment situation for youth has reached a crisis level, not only in the U.S., but globally. In July 2011, there were over four million unemployed youth in the United States, meaning that more than 18% of the 16 to 24 year-old Americans were unemployed (Bureau of Labor Statistics, 2011). In the United Kingdom, over one million youth did not have a job in 2011 (Allen, 2011). The situation in other European countries is worse…The average unemployment rate in OECD… member countries, 34 of the richest nations on Earth, was over 16% in 2010 (OECD, 2011) and was expected to reach 18% in 2011 (OECD, 2010). (p. 51)

Despite the fact that policymakers in OECD countries largely agree on the need for educational reform in support of workforce development and LLL, the substance of that reform remains poorly defined. Coupled to an instrumentalist rationale, the discourse on education as human capital development is itself supported by a neoliberal “social imaginary” that builds on market facing public policies (Rizvi and Lingard, 2010). Indeed, over the past three decades neoliberal social policies have shaped global trends on education policy.

Part of the challenge facing neoliberal interpretations of social policy, however, is an ostensive indifference towards growing inequality and deepening structural unemployment. Over the past decade, a growing number of intergovernmental organizations (IGOs) have promoted alternative policy models challenging neoliberal social policies. Policy proposals have included UNICEF’s (2000) report on rising childhood poverty, and the OECD’s Starting Strong (2006), Understanding the Social
Outcomes of Learning (2007b), and Growing Unequal (2008). Whether we are in the early stages of a “post-neoliberal era” remains to be seen. What we do know is that social inequality in the U.S. now mirrors that of the Great Depression (Piketty and Saez, 2012). Median incomes have been stagnating in real terms since the 1970s. In 1974, for example, the top one percent of families consumed nine percent of U.S. GDP. By 2007, that share had increased to 23.5 percent. In fact, since 2002 a mere 1% of U.S. households have consumed 65% of all the growth in the economy. To put this in perspective, consider the fact that between 1995 and 2007 the top 0.01% of U.S. households (14,588 families with incomes above $11,477,000) doubled their share of the national income, from 3% to 6% (Brynjolfsson & McAfee, 2011).

Perhaps the main challenge in confronting new policies on social reform today is the need to reexamine the role of the State itself. At its base, neoliberalism supports a negative theory of the state. In the context of KE, however, neoliberal economic policies are increasingly seen as outmoded (Lundvall, 2004). One of the many consequences of the 2008 financial crisis, for example, is that the U.S. economic system has been seen as having failed. After decades of the Washington Consensus15, even young economists at the World Bank appear to be moving towards Asian-styled industrial policies (see Lin and Chang, 2009; Lin & Monga, 2011). As Rae (2010) notes, a rising uncertainty about the future prosperity of advanced economies has produced a backlash against laissez faire policies:

The crisis of 2008 is markedly different from the cyclical recessions of the early 1980s and 1990s, which were followed by sustained economic growth. For whilst a gradual cyclical recovery is occurring, underlying economic fundamentals have changed permanently in the USA and UK. The relationships between banks, government, businesses and consumers have changed, with a long-term loss of confidence in the banking and financial services industry. Public debt and its financing costs will remain at high levels for a long period. Western economies

---

15 The term Washington Consensus was first coined in 1990 by the economist John Williamson to describe broad economic policy prescriptions that constituted the "standard" reform package promoted by Washington, D.C.-based institutions (particularly the IMF and the World Bank). From the 1970s through to the 1990s, the adoption of these policies was generally a precondition to receiving aid.
are in long-term economic decline in comparison with the growth economies of South East Asia. Public services, especially higher education, are experiencing significant reductions in State funding, and commitments such as guaranteed public pensions are increasingly unaffordable. (p. 595)

The reality is that the economics of innovation are not well understood. Kenway et al. (2006), for example, note the “problem of stimulus”. Neoclassical interpretations of KE rest on the assumption that commodity exchange “as a motivation for the exchange and circulation of knowledge” stokes innovation (p. 54). But as Rae (2010) points out, the growing importance of models of entrepreneurship that speed up the rate of innovation (Schumpeter’s “creative destruction”) are a much better gage of changes in postindustrial society than market-based commodity exchange. Indeed, the historic strength of the U.S. model has been its capacity to actively create markets for new technologies through government-driven social and financial investments.

Presenting a broad critique of the assumptions undergirding neoliberal economic policy, Mazzucato (2011) deconstructs the myths that have shaped Anglo-American views of the State. Noting the historical role of government in steering the U.S. innovation system, for example, she points to federal investments that continue to underwrite large swaths of the U.S. economy. This includes currently investments in domestic industries supporting defense, technology, agriculture, energy, and aerospace— including historic investments in a wide range of early-stage technologies such as jet aircraft, nuclear energy, computing, Internet technologies, lasers, and biotechnology. This also includes upwards of $700 billion (4.5% of GDP) spent annually (fiscal year 2012) on the world’s largest military (or 43 percent of the world's total spending).

As Mazzucato (2011) notes, part of the value of government-led investments has been a capacity to leverage the long-term growth cycles needed to nurture new innovations and subsequently catalyze new markets. In addition to supporting basic science, government is critical to mobilizing ideas and resources, and promoting collaboration across institutions: “In the pharmaceutical sector, for example, innovation takes up to 17 years from the beginning of an R&D project to the end; it costs about $403 million per drug;
and the failure rate is extremely high: only 1 in 10,000 compounds reach market approval phase, a success rate of 0.01 per cent” (Mazzucato, 2011: 50). Indeed, perhaps the single greatest feature of this U.S. innovation system has been its liberal use of State institutions such as DARPA (Defense Advanced Research Projects Agency), NASA (National Aeronautical Space Agency), NSF (National Science Foundation) and SBIR (Small Business Innovation Research Program) to build network capacity. In this sense, government has “been more about fixing ‘network failures’ than about ‘market failure’. It has also been about preventing ‘opportunity failures’ — government’s willingness to think big and take risks has created new opportunities and markets, whereas the private sector has shied away because of the long time horizons and the high failure rates” (p. 91).

**The U.S. National Innovation System**

Since the mid-1980s, liberalizing trade and investment policies have introduced a growing density of trade in goods, capital, and ideas at the national and global levels. Today, nearly one quarter of the $70 trillion dollar global economy results from international trade. As Marber (2014) explains:

> Over the last generation or two, the world has been transformed into a complex system of interdependent and constantly changing relationships. No longer a patchwork quilt, the global economy today is an interwoven tapestry. Global production and distribution chains mesh Brazilian iron mines, Greek ships, Chinese steelmakers, German automakers, Wall Street banks, and car dealers in Peoria. Financial markets instantly entangle California pension funds, insurers in Asia, and Cayman Island hedge funds with banks everywhere.

Since the 2008 financial crash, however, neoliberal constructions of the U.S. economy have become increasingly dubious. A decline in the social fabric supporting U.S. society has moved many scholars to openly worry about a rising “economic feudalism” undermining the social stability of the country (Saltman, 2010b; Freeman, 2012, Piketty, 2014). Indeed, real incomes in the U.S. have declined significantly over the past three decades even as income inequality has swelled. Deterioration in the Gini coefficient (the statistical measure of income equality) indicates that inequality in the U.S. labor force has
risen substantially (Marber, 2014). This growing inequality is also tied to education. In the U.S., school quality is determined by property taxes and thus real estate value. Wealthier neighborhoods necessarily spend more on education than poorer ones. Within this funding structure, good schools get better over time while the bad schools often get worse. Darling-Hammond (2010), for example, makes the case that systemic underfunding has encouraged a sharp national divide in skilled labor. Pointing to the poor state of many U.S. schools, she chronicles the mismatch between the U.S. education system and the changing demands of a global knowledge economy. Part of the problem is that high-performing countries like Singapore, Finland, and South Korea largely draw teachers from the top third of the academic pool, while in the U.S. it is most often the bottom third (Economist, 2013b).

Despite the fact that contemporary theories on the “varieties of capitalism” (Hall and Soskice, 2001) tend to reduce the U.S. to a prototypical neoliberal economy, it would be wrong to assume the U.S. lacks a history of government intervention. Indeed, a closer analysis reveals historical variations in the relative importance of market forces (Bauer, 2012). Notwithstanding a strong philosophical belief in unfettered markets, government has played an important role in U.S. economic strategy. As Bauer (2012: 105) points out, this “role has changed over time, but it continues to be multi-faceted and distributed. It is this differentiated, parallel and sometimes redundant nature of efforts that has historically fuelled the dynamism of the U.S. innovation system”. Over the course of the 20th century, for example, U.S. public policy was deeply involved in stoking new technologies across various fields. Early investments in radar, satellite and GPS, computing, digital imaging, and the Internet would shape whole industries. Indeed, Block and Keller (2011) point to developmental phases of the U.S. national innovation system (NIS) over the past century spanning historical periods including World War II, the Cold War, and most recently the era of Neoliberalism.

As Dicken (2011) notes, NIS strategy has been a policy foundation of OECD countries “ever since Britain emerged as the world’s first fully industrialized nation in the late eighteenth and early nineteenth centuries” (p. 190). In fact, industrializing countries have used innovation policy to build competitive industries for over a century. One of the
world’s poorest countries a generation ago, China has leveraged State investments to build an economy that may soon eclipse that of the United States. Scholars now argue about the reasons for China’s rapid development, but the fact is that government driven public policy has been central to China’s profound economic transformation (Araya, 2013). Perhaps the key challenge facing the U.S. today is its incapacity to move beyond neoliberalism in order to reform NIS strategy. In response to the increasing structural problems overlapping child poverty, demographic change, economic stratification, unemployment, and environmental deterioration, OECD countries are now challenged to move beyond a neoliberal policy framework.

In what might be described as the fourth phase of the U.S. innovation system, the Obama Administration has made a concerted effort to construct an explicit national innovation policy framework (Pages, 2010). In conjunction with a broad shift towards neo-Keynesian policy reforms, education is now explicitly coordinated with innovation policies that are designed to reinforce the building blocks of a broader U.S. innovation strategy. With the goal of “out-innovating, out-building, out-competing, and out-educating” the rest of the world, President Obama has promoted a broad range of initiatives in clean energy, biotechnology, nanotechnology, and space application in an effort to steer U.S. policymaking beyond the era of neoliberalism. Documents such as *A Strategy for American Innovation* (White House, 2011), for example, reflect a concerted effort to redesign NIS policy:

> By championing policies that facilitate marketplace innovation, the federal government will continue to be an essential partner in the U.S. national innovation system. To that end, the Obama Administration will take appropriate public action by supporting an environment in which innovation is rewarded and best practices are diffused, investing in a technically capable workforce, supporting basic scientific discoveries, and promoting the development of the technology platforms from which future innovations will spring. Government direction can never be a

---

16 Roughly equivalent in size to the next three largest economies (China, Japan, and Germany), the U.S. has a GDP that is larger than France, Brazil, the United Kingdom, Italy, Russia and Canada combined. It accounts for one-fifth of the world’s manufacturing, 28 percent of its services, and 8 percent of its agricultural production (Dicken, 2011).
substitute for the free market conditions that propel American innovation. But government must act to support those conditions and ensure that innovation, the engine of our prosperity, drives America further and faster towards higher quality jobs, healthier and longer lives, new opportunities and new industries, and the ever-expanding technological frontier. (p. 13)

Partly in response to fears of U.S. decline, the Obama Administration has deployed substantial funding for strategic investments in renewable energy, energy efficiency, and information technologies, funneling tens of billions of dollars into R&D (research and development). This has also included sizable investments in a new publically funded research agency modeled on DARPA (Defense Advanced Research Projects Agency) known as ARPA-E (Advanced Research Projects Agency Energy)\(^{17}\). Indeed, even prior to President Obama’s push for state intervention, the Bush Administration had begun developing substantial innovation strategy in the face of widening trade deficit. The 2007 America COMPETES\(^{18}\) Act, for example, provisioned a wide range of funding initiatives designed to bolster the “international competitiveness of the United States”. Reauthorized in 2010 and signed into law by President Obama in 2011, America COMPETES pays considerable attention to educating future STEM professionals and provides increased funding for STEM fields.

Beyond the era of neoliberalism, a renewed emphasis on the U.S. “national innovation system” is emerging as a key feature of what some analysts now describe as “gated globalization” (Economist, 2013). The term itself (Box 1) was actually first coined by Bengt-Åke Lundvall (1992) to refer to the network of institutions that jointly facilitate the creation, transfer, and diffusion of new knowledge, skills and practices (Metcalf, 1995).

\(^{17}\) ARPA-E is envisioned as the locus of energy planning and research in the United States.
\(^{18}\) American COMPETES is short for America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science.
Box 1: Definitions of “National Innovation System”

<table>
<thead>
<tr>
<th>National innovation systems: Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• “.. the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.” (Freeman, 1987)</td>
</tr>
<tr>
<td>• “.. the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ... and are either located within or rooted inside the borders of a nation state.” (Lundvall, 1992)</td>
</tr>
<tr>
<td>• “... a set of institutions whose interactions determine the innovative performance ... of national firms.” (Nelson, 1993)</td>
</tr>
<tr>
<td>• “.. the national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country.” (Patel and Pavitt, 1994)</td>
</tr>
<tr>
<td>• “.. that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies.” (Metcalfe, 1995)</td>
</tr>
</tbody>
</table>

(Source: OECD, 1997)

According to NIS theory, government-driven innovation policy is critical to promoting collaboration across institutional networks:

The national innovation systems approach stresses that the flows of technology and information among people, enterprises and institutions are key to the innovative process. Innovation and technology development are the result of a complex set of relationships among actors in the system, which includes enterprises, universities and government research institutes. For policy-makers, an understanding of the national innovation system can help identify leverage points for enhancing innovative performance and overall competitiveness. It can assist in pinpointing mismatches within the system, both among institutions and in
relation to government policies, which can thwart technology development and innovation. Policies which seek to improve networking among the actors and institutions in the system and which aim at enhancing the innovative capacity of firms, particularly their ability to identify and absorb technologies, are most valuable in this context. (OECD, 1997, p. 7)

Based on the ideas of the nineteenth century German economist Friedrich List, NIS theory builds on List’s (1909) studies of “National System of Political Economy”, particularly German industrialization vis-à-vis England. Rooted in List’s work, Lundvall (1992) and Freeman (1987) apply NIS theory to interpret post-war industrialization in Europe and Asia. Pointing to List’s emphasis on “endogenous growth” and particularly investments in new technologies, Freeman’s research drew heavily on NIS theory to account for the dramatic rise of Japan as a global economic superpower.

In the current environment, NIS theory reflects the increasing attention given to the economic role of knowledge, particularly investments in R&D, education and training, and “codified” knowledge (publications, patents, and other sources). This builds on Freeman’s (1987) work linking EGT to Schumpeter’s (1976 [1942]) ideas on entrepreneurship. Following Marx, Schumpeter argued that technological innovation (rather than price competition) is the underlying driver of capitalist economy: “By highlighting the strong uncertainty underlying technological innovation”, Schumpeter revealed the “very strong feedback effects between innovation, growth and market structure” in the context of a dynamic system (Mazzacuto, 2011: 65). Today, Schumpeter’s (1976 [1942]) thinking on entrepreneurial innovation together with Porter’s (1990) theories on industrial clusters has become the basis for innovation policy across OECD countries.

**Towards Social Investment Theory**

The value of NIS strategy to understanding the changing political economy of education today is that it offers a framework for interpreting changes in the trajectory of U.S. policymaking. As Marber (2014) observes, standard growth theories suggest that
countries that continuously invest in infrastructure and capital goods tend to outgrow countries that simply rely on consumer spending. This is not to say that NIS strategy is monolithic across OECD countries. Outside the U.S., innovation strategy has been applied through a variety of policy instruments across a range of industries. In the EU, for example, innovation policies are often linked to social market capitalism: In France, NIS policies promote public ownership over lucrative state enterprises; while in Germany NIS policies balance innovation and an advanced manufacturing base with state investments supporting competitive domestic firms (Dicken, 2011).

Where neoliberal theories on KE emphasize the importance of private investments in R&D, Lundvall and Lorenz (2012) and other NIS theorists emphasize social investment aligned to the needs of a global knowledge economy. The concept of the Social Investment State, for example, argues for the need to redesign social policy in response to the increasing pace of knowledge obsolescence. Underlying the social investment literature is a stress on active welfare policies that respond to growing social challenges facing postindustrial societies (OECD, 2006). Emerging from think tanks and ad hoc policymaking and diffused through the 2000 Lisbon Agenda, Social Investment Theory has been positioned as a counter model to welfare state retrenchment (Jenson and Saint-Martin 2003). Accordingly, the key to the future prosperity of advanced economies is a strategic transition of national labor systems into sectors that are “less exposed to global competition” (Lundvall and Lorenz, 2012, p. 237). Theorists on social investment policy argue that national and/or regional economic strategies need to be more clearly focused on long-term investments that promote professional autonomy and creative practice (Lundvall and Lorenz, 2012). Advancing on emergent social policy challenges that overlap gender equality, skills atrophy, aging demographics, immigration reform, and the need for LLL (Esping-Andersen et al., 2002), the social investment perspective rest on three principles (Jenson, 2010, p. 61):

1. Learning as the pillar of economies and societies of the future with significant policy attention to human capital, beginning with pre-school children.
(2) Future oriented policy that ameliorates conditions in the here and now through promotion of social spending designed to break the intergenerational cycle of poverty and a focus on children.

(3) Investment in community as a whole linked to child-centered policy interventions.

Taken as a whole, the literature on social investment deliberately attempts to legitimize government steering through social policy. This includes a counter response to the rise of competition from emerging economies but also the changing demographic structure of OECD labor markets (Taylor-Gooby, 2004). In administrative terms, this means policies that “prepare” individuals, families and societies to adapt to changing career patterns and new social configurations in a global knowledge economy (Hemerijck, 2011: 12).

Primarily concerned with economic sustainability, social investment policy narrows the expectations of the welfare state to focus on the relationship between the productive capacities of the active population vis-à-vis the needs of the inactive population. Uniquely, this expansion of public services is focused on supporting female labor force participation through changes to welfare provisions including quality childcare.

Hemerijck (2012) suggests that the Social Investment Theory is rooted in the Nordic “social democratic” model particularly the Swedish welfare state of the 1930s. Building on the social policies of Alva and Gunnar Myrdal (1934), State-lead support for education and healthcare is seen as a long-term investment in the future prosperity of postindustrial societies. From this perspective, the focus is on targeted provisions for the young and on their future employment (Jenson and Saint-Martin, 2003) with the belief that “Solid investments in children now will diminish welfare problems among future adults” (Esping-Andersen et al., 2002: 51). Where neoliberal theorists underscore the value of self-regulating markets, social investment theorists point to the long-term importance of articulated investments in education and social welfare.

In my view, what is new in Social Investment Theory is a timely focus on education as a necessary long-term investment. Indeed, the strength of Social Investment Theory is its emphasis on human capacitation and labor force participation as key reforms to the
Keynesian welfare state (Lundvall, 2004; Lundvall and Johnson, 1994). Overlapping theories on endogenous growth, Social Investment Theory bridges the economic need for human capital with the political and social need for expanding economic opportunity in the context of globalization. Put differently, alongside its market focus, social investment policy opens space for new discussions on pragmatic welfare policies that can respond to emergent socioeconomic challenges.

**Conclusion**

In the next chapter I explore the evolution of the concepts and policies that together form multiple discourses or paradigms of KE, and I examine the background literature supporting this dissertation research. I examine these paradigms in detail with the goal of better understanding the significance of each model for shaping new theories of U.S. education policy. Taken together, the Neoclassical Knowledge Economy, the Creative Economy, the Network Economy, and the Green Economy, each represent contingent yet contradictory intellectual discourses that promote divergent forecasts on postindustrial society. At the same time, each of these paradigms is rooted in a shared cultural narrative of social transformation that continues to shape policymaking forecasts in advanced economies.
CHAPTER FOUR: Theorizing the Knowledge Economy

Paradigms of the Knowledge Economy

As Peters (2001) notes, the art of policy scholarship often involves disentangling the discursive threads that combine to influence policy narratives. In the current milieu, U.S. educational reform is galvanized by a global policy discourse focused on competition in a global knowledge economy. Tensions between various readings of KE, however, suggest that these discourses are not monolithic. Employing different methodologies and reaching different and sometimes contradictory conclusions, discourses on KE overlap a broad range of fields and disciplines producing complicated challenges for public policymaking. Peters (2009b, pp. 2-3), for example, lists some 20 separate intellectual strands overlapping sociology, philosophy, and economics that inform multiple readings on KE (Box 2).

Box 2: Multiple discourses of KE.

<table>
<thead>
<tr>
<th>Discourse on the Knowledge Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Economic value of knowledge studies by Fritz Machlup (1962) of the production and distribution of knowledge in the U.S.;</td>
</tr>
<tr>
<td>2. Gary Becker’s (1964; 1975) analysis of human capital with reference to education;</td>
</tr>
<tr>
<td>3. An emphasis on ‘knowledge workers’ by the management theorist Peter Drucker (1969) who coined the term in 1959 and founded ‘knowledge management’;</td>
</tr>
<tr>
<td>4. Daniel Bell’s (1973) sociology of postindustrialism that emphasized the central role of knowledge of theoretical knowledge and the new science-based industries, a shift from manufacturing to services and the rise of a new technical elite;</td>
</tr>
<tr>
<td>5. Alan Touraine’s (1971) <em>The Post-industrial Society</em> hypothesized a ‘programmed society’ run by a ‘technocracy’ who control information and communication;</td>
</tr>
<tr>
<td>6. Mark Granovetter’s (1973) theorizing the role of information in the market based on weak ties and social networks;</td>
</tr>
<tr>
<td>7. Mark Porat (1977) defined ‘the information society’ for the U.S. Department of Commerce;</td>
</tr>
</tbody>
</table>
In this chapter, I explore the evolution of the concepts and policies that drive the discussion on KE and examine the background literature supporting this study. Beyond neoliberal readings of KE, I am interested to consider the implications of alternative accounts of KE in order to examine their inconsistencies and contradictions in shaping educational reform. Building on Peters (2009, 2010), I probe four contemporary expressions of KE and consider their import for shaping education policy. In addition to neoclassical accounts of KE (Paradigm 1), I examine the Network Economy (Paradigm

9. Jean-Francois Lyotard (1984) defined The Postmodern Condition as an age marked by the incredulity toward metanarratives’ and David Harvey (1989) talked of the large-scale shifts from Fordists to flexible accumulation;  

10. James Coleman’s analysis of how social capital creates human capital and the development and applications of related notions by Pierre Bourdieu (1986) and Robert Putnam (2000);  

11. The standard or received business model associated with knowledge management prevalent in the 1980s became an established discipline 1995 (Stankovsky, 2004);  

12. Paul Romer (1990) argues that growth is driven by technological change arising from intentional investment decisions where technology as an input is a nonrival, partially excludable good;  

13. The ‘new economy’ reading of the decades of the 1990s (Delong et al., 2000; Stiglitz, 1999; Hubner, 2005);  

14. The OECD’s (1994) influential model based on endogenous growth theory uses the term ‘knowledge-based economy’;  

15. Joseph Stiglitz (1999) developed the World Bank’s Knowledge for Development and Education for the Knowledge Economy based on knowledge as a public good;  

16. ‘The leaning economy’ developed by Lundvall (1994; 2001, with Johnson; 2006, with Lorenz);  

17. The digital or ‘weightless’ economy proposed by Danny Quah (2003) and others;  

18. The ‘global information society’ based on the World Summit on the Information Society (WSIS);  

19. Postmodern global systems theory based on network theory, after Manuel Castells (1946; 2006);  

20. Public policy applications and developments of the ‘knowledge economy’ concept (Rooney et al., 2003; Hearn & Rooney, 2008).
2), the Creative Economy (Paradigm 3), and the Green Economy (Paradigm 4). I trace the contours and development of these models of KE and consider their relative similarities and differences (See Table 2). Framing these discourses as dimensions of KE, I seek to demonstrate that contemporary U.S. educational policy misreads both the complexity and ambiguity underlying shifts in the global economic landscape.

Table 2: Four Paradigms of the Knowledge Economy

<table>
<thead>
<tr>
<th></th>
<th>PARADIGM 1</th>
<th>PARADIGM 2</th>
<th>PARADIGM 3</th>
<th>PARADIGM 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Actor</strong></td>
<td>Neoclassical Knowledge Economy</td>
<td>Network Economy</td>
<td>Creative Economy</td>
<td>Green Economy</td>
</tr>
<tr>
<td></td>
<td>OECD (1996)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Key Themes</strong></td>
<td>Innovation, R&amp;D, Intellectual Property</td>
<td>Peer Production, Mass Collaboration, OSS</td>
<td>Human Creativity, Intellectual Property</td>
<td>Technology, Innovation, Sustainability,</td>
</tr>
<tr>
<td><strong>Key Focus</strong></td>
<td>Human Capital</td>
<td>Networked Commons</td>
<td>Intellectual Capital</td>
<td>Natural Commons</td>
</tr>
</tbody>
</table>

The purpose of this study is not to develop an exhaustive typology of the many paradigms of KE, but rather to consider the ways in which structural changes in advanced economies inform notions of educational reform. Put differently, each form of KE represents a separate but contingent dimension of an evolving discourse on educational reform and each of these dimensions represents a unique intellectual strand into the discussion on postindustrial society.
Paradigm Two: The Network Economy

One of the more interesting features of KE theory is the debate on the “knowledge society” and the shift from mass production to information-driven services. In his book *The Post-Modern Condition* (1984), for example, Jean-François Lyotard argues that knowledge has become the principle force of production. While knowledge may be a public good in its conceptual form, it is also now critical to the global market through the use of intellectual property (IP), only becoming valuable through its translation into a commodity or good. This takes the form of *copyright* for fixed creative output such as books, music and films, *trademarks* for brand identity, *design* for product appearance, and/or *patents* for inventions. Critical scholars argue that knowledge production does not properly suit the logic of the market, however. Indeed, many prominent economists have been outspoken about the contradictory issues related to KE and the dynamics of IP.

Highlighting the value of knowledge as a public good, for example, Stiglitz, (1999) reminds us that while scarcity may be a precondition for the economics of supply and demand, knowledge itself is not a scarce resource. As a symbolic good, any number of people can construct, consume and use knowledge without necessarily depleting its’ value. Put simply, knowledge lacks the materiality to be properly defined as a rival good (Romer 1990). Many scholars prefer to speak of this interpretation of KE in terms of information capitalism (Morris-Suzuki, 1997; Castells, 2000; Hardt & Negri, 2000; Fuchs 2005) in the context of information generation, processing, and transmission (Castells, 2000: 21). Accordingly, the creation, distribution, and manipulation of information have converged with changes in technology, economy, and culture to produce a highly networked infrastructure. Castells (1997), for example, argues that the proper identification of an emerging global society is to be found in its networked social structure (Castells, 1996; 2002). This is enacted both in terms of formal institutional organizations (including political organizations) and global and civil society more broadly. In his view, the “network society” now shapes “the operation and outcomes in processes of production, experience, power, and culture”, constituting the new social morphology of our era (Castells, 2000: 500).
The notion of the network has become a predominant feature of social analysis today. Yochai Benkler (2006), for example, provides a strong framework for understanding changes in economic development in terms of networked production or a “Network Economy” (NE). Borrowing language and discourse from the Open Source Movement (OSM), he suggests that the rise of networked environments make possible a new modality of organizing production in the form of “commons-based peer production”. In his book, The Wealth of Networks: How Social Production Transforms Markets and Freedom, Benkler suggests that peer production is an alternative to the traditional modes of organization (i.e., commercial market and bureaucratic hierarchy). Accordingly, the key to understanding mass collaboration is that resources are held in common— that is, they are collectively shared, managed and produced. In contrast to systems of private property, “no single person has exclusive control over the use and disposition of any particular resource in the commons” (Benkler, 2006:61).

One of the central contradictions emerging with the affordances of so-called network economy/society is that it makes information easily reproducible, leading to a variety of freedom/control problems relating to IP. IP is a juridical concept that refers to creations of the mind for which exclusive rights are recognized. While the goal of IP protection is to incentivize creativity and invention by rewarding individuals for their work, the rise of NE has introduced an entirely different set of values and incentives. Where conventional notions of KE focus on the commodification of knowledge via IP regimes, advocates of NE have become increasingly vocal about the desirability of open source (OS) production in the context of an open source movement (OSM) (Leadbeater & Miller, 2004). OSM advocates argue that knowledge is a public good, linked to other commons-based resources like the natural environment and should be freely available. In their view, IP is in fact preventing innovation by inhibiting the free circulation of information and ideas. Lessig (2004), for example, criticizes the implied analogy between physical property and intellectual property on the grounds that while physical property may be rivalrous, intellectual works were inherently non-rivalrous (Stiglitz, 1999).
From this perspective knowledge operates expansively to defy the normal “law” of scarcity that governs most commodity markets (Lessig, 2004). The problem is that knowledge functions very differently from other commodities because it is neither physically manufactured, nor a rival good. Knowledge in its immaterial or conceptual form is purely non-rivalrous because there is essentially zero marginal costs to adding more users (Stiglitz, 1999). Knowledge can only be made into a private good by making it “excludable” through IP protection. In economic terms, knowledge is a nonrival good—meaning that one person’s use does not preclude use by another.

Kelty (2008) describes this as a new mode of democratization that he frames as a “recursive public”. In his view, the creation and governance of knowledge and intellectual production is being entirely revolutionized in the Age of the Internet:

A recursive public is a public that is vitally concerned with the material and practical maintenance and modification of the technical, legal, practical, and conceptual means of its own existence as a public; it is a collective independent of other forms of constituted power and is capable of speaking to existing forms of power through the production of actually existing alternatives. Free Software is one instance of this concept, both as it has emerged in the recent past and as it undergoes transformation and differentiation in the near future…Such publics are not inherently modifiable, but are made so—and maintained—through the practices of participants… By calling Free Software a recursive public, I am doing two things: first, I am drawing attention to the democratic and political significance of Free Software and the Internet; and second, I am suggesting that our current understanding (both academic and colloquial) of what counts as a self-governing public, or even as “the public,” is radically inadequate to understanding the contemporary reorientation of knowledge and power. (pp. 3-7)

Benkler (2006) is careful to anchor his own political arguments about NE in Kantian and Rousseauian notions of liberty in which individual autonomy is maximized through the shared ownerships of resources. Building on this political approach, Bauwens (2009) describes NE as a new mode of peer-to-peer (P2P) production:

I define 'peer to peer' as a relational dynamic that emerges through distributed
networks. Distributed' networks are networks in which the structure is such that agents and nodes can take independent action and maintain relationships 'on their own', i.e. through voluntary self-aggregation and 'without prior permission'. It is important to look at such a network from the point of view of the human: what matters is not the purity of the structure of the distributed network,' but whether or not, 'in the last analysis', such self-aggregation is made possible. Self-aggregation then naturally gives rise to the emergence of peer 'production' — the ability to create common value. In such a process, 'peer producers' can 1) voluntary assemble capital assets, which may be material or immaterial; 2) design, through mutual adaptation, participatory governance processes ('peer governance'); and 3) simultaneously make sure that the commonly created value indeed stays 'common'. This is done using new forms of 'common' property (i.e. neither private exclusionary nor public-collective), for which I use the term 'peer property'.

Bauwens develops perhaps the most comprehensive analysis of the “democratic” structure of NE. As he concludes NE instantiates a form of “unity-in-diversity”, favoring networks over hierarchies and forms a concrete “post-Enlightenment” universalism predicated upon common projects and defined in terms of 1) 'open and free' availability of raw materials; 2) shared and participatory 'processing'; and 3) commons oriented output.

P2P processes are dynamic, but not structureless. Although NE structures may maintain elements of hierarchy, their expansion is often predicated on administrative control that is 'distributed' through dense clusters of linked communication. Since communication is not top-down, feedback is systemic and integrated into the protocol of the system. Whereas participants in hierarchical systems (both public and private) are organized by the “panoptism” of an economic caste structure, participants within peer production systems are organized by “holoptism”. That is, a capacity to see the system as a whole. In principle, there is no formal filtering for participation, because “membership” is open to anyone who wishes to contribute. It is the object of cooperation itself that creates the temporary unity for project-based work.19 Equipotency (i.e. the capacity to cooperate) is

---

19 From an analytical standpoint, discussions on peer production overlap much broader research on complexity and complex systems. Central to a complexity approach is the idea that learning emerges from
verified in the process of cooperation itself. Put differently, intelligence is not located at the center but circulates throughout the system.

The sociopolitical emphasis on equity that is often built into network models of production and consumption overlaps related principles found in political socialism and communism. The overriding idea is that productive collaborations between knowledge workers or “cognitive labor” will make autonomy increasingly valuable to systems of production. Indeed, as Marx (1973) postulates, the evolution of technology may well undermine the capital and labor dichotomy enabling a fundamental shift in the mode of production. In Marx’s view, this is an emergent function of a rising “general intellect” as “a direct force of production” in the reshaping of the “conditions of the process of social life” (p. 706). Building on this view, many advocates of a “socialized knowledge economy” argue that structural mutation in the growing capacities of the general intellect will eventually subsume industrial labor as the primary driver of production and surplus value.

**The Rise of Open Education**

While conventional systems of production depend upon closed proprietary structures, commons-based peer production utilizes open networked production to harness the creative energy of mass collaborators. In the field of education, this translates as “open collective activity. In his book *Complexity and Postmodernism*, Paul Cilliers (1998: viii) defines complexity this way:

> In a complex system . . . the interaction constituents of the system, and the interaction between the system and its environment, are of such a nature that the system as a whole cannot be fully understood simply by analysing its components. Moreover, these relationships are not fixed, but shift and change, often as a result of self-organisation. This can result in novel features, usually referred to in terms of emergent properties.

Self-organisation is an emergent property of the system as a whole, enabling it “to develop or change internal structure spontaneously and adaptively in order to cope with or manipulate the environment” Cilliers (1998: 90). Much as other complex systems, network production systems avoid creative entropy by continually absorbing energy and resources from new participants. By “importing” energy across permeable boundaries, complex systems are able to continually absorb the resources needed for growth. It is this capacity for self-creation or autopoesis that gives complex systems their incredible resilience (Haynes, 2007). When this same boundary permeability is translated into the domain of networked social production, it manifests as a continually evolving “collective intelligence” (Lévy, 1997).
education” and overlaps open access (OA) science, open courseware (OCW), and open educational resources (OER). The open education (OE) movement is a relatively new phenomenon that is part of a larger trend towards openness in learning and education and is overtly linked to the affordances of digital technologies and the Internet. The term “Open Educational Resources” first came to use with UNESCO’s (United Nations Educational, Scientific and Cultural Organisation) 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries. It was at this forum that OER was first formally defined as: “The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes.” According to a follow on report by the OECD (2008b), this includes:

- Learning Content: Full courses, courseware, content modules, learning objects, collections and journals.
- Tools: Software to support the development, use, re-use and delivery of learning content including searching and organization of content, content and learning management systems, content development tools, and on-line learning communities.
- Implementation Resources: Intellectual property licenses to promote open publishing of materials, design principles of best practice, and localization of content.

The concept of open education actually predates digital technologies but its significance has grown substantially with the growth of ICTs (OECD, 2007c). The OE movement itself emerges with developments in open and distance learning (ODL) in the 20th century and is deeply tied to resource-based learning in the context of distance education. Overlapping the contemporary OS movement, OER denotes a concept that is at once legal, cultural and economic. In fact, the OER movement has been inextricably bound to many of the same IP licensing issues confronting the OS movement from the beginning (Lessig, 2004; McMartin, 2008). This is precisely because most educational content is protected under conventional copyright. For this reason, open licensing in the form of Creative Commons has been a critical substructure to both movements. As with the OS movement, the key differentiator between OER and any other educational resource is its
license. In this sense, OER is simply an educational resource that incorporates a license that facilitates reuse without first requesting permission from the copyright holder. Open Access publishing, for example, typically enables research publications of some kind to be released under an open license.

The connection between OER and Free and Open Source Software (FOSS) only converges in the late 1990s with the expansion of an Internet-mediated culture of free sharing and peer collaboration. Hilton et al. (2010), for example, define OER in terms of the four “R’s” of openness, each R representing an increasing level of openness:

- **Reuse**—This is the most basic level of openness. People can use all or part of the work for their own purposes (e.g. download a copy of a song to listen to at a later time).
- **Redistribute**—People can share the work with others (e.g. email a digital article to a colleague).
- **Revise**—People can modify, translate, or change the form the work takes (e.g. take a book written in English and turn it into a Spanish audio book).
- **Remix**—Take two or more existing resources and combine them to create a new resource (e.g. take audio lectures from a course and combine them with a video from another course)

**Paradigm Three: The Creative Economy**

Beyond NE, there is another highly influential paradigm of the knowledge economy described in terms of the inordinate value of creativity and human ingenuity. Tracing the contours of the Creative Economy (CE), one finds a unique discourse that both compliments and undermines competing notions of KE. For the Creative Economy, competitive advantage is increasingly derived from investments in intellectual property (Howkins, 2001). While for advocates of openness, creativity is achieved through the commons-based peer production. For advocates of CE, copyright is the “organizing principle” and perhaps the very basis for defining the Creative Economy (Towse, 2005). Unlike the discourse on NE, IP rights are viewed as critical to rewarding the ideas of entrepreneurs and innovators. Where the P2P and the OS movements celebrate common property and the widest possible latitude for shared use, CE is almost exclusively framed by the need to recoup capital investments by and through IP. IP is critical to CE because
it enables individual creativity to be exclusively owned and sold in the market as a key capital asset. As John Howkins (2001) writes: “Managing creativity involves knowing, first, when to exploit the non-rivalrous nature of ideas and, second, when to assert intellectual property rights and make one’s ideas-as-products rivalrous. These two decision points are the crux of the management process.”

**Tracing the Creative Economy**

Linking discussions on CE to broad structural mutations in the technologies underlying contemporary high-technology capitalism, there are at least four common threads linking the discourse on CE:

1) The diffusion of ICTs and consequent transformations in Fordist production.
2) The growing significance of a global market and globally fragmented production systems.
3) The increasing importance of highly educated workers or human capital within continuous cycles of creative innovation.
4) The rise of alternative centers of production outside advanced industrial countries.

Generally speaking there are two strongly overlapping modalities for understanding what is meant by the “creative economy.” The first modality argues that *creative industries* and the cultural sector more broadly, represent a highly energized and growing portion of the broader economy (Hesmondhalgh, 2002; Hartley, 2005). The second modality explores creativity as an *axial principle* underlying post-industrial shifts linked to globalization (Florida, 2002). Looking at both modalities in detail, we see significant differences of scale.

**Creative Industries**

The first modality of CE is linked to discussions on “creative industries”, including industries overlapping publishing, music, visual/performing arts, film, media, architecture, advertising and design. Since the 1990s, policymakers and inter-governmental organizations such as UNESCO have developed fairly elaborate definitions
of creative industries in the context of broader national innovation strategy. The evolution of the terms “cultural industries” and “creative industries” has been traced fairly extensively (Cunningham, 2001; Hesmondhalgh, 2002; Hesmondhalgh & Pratt, 2005) and is underpinned by a diversity of policy initiatives. Indeed, the idea of creative industries has existed for some time, beginning with Adorno and Horkheimer’s (1944/1977) early neo-Marxist critiques of mass media and the “culture industry” and evolving into a complex, though highly contested discourse on the nature and function of art and culture in the global economy.

Cunningham (2001) distinguishes between the culture industries and creative industries this way: where the “classic” cultural industries are a product of the technological advances of the early twentieth century, the creative industries arise from the technological change of the late twentieth and early twenty-first centuries. In this new revised view, culture is abandoned as elitist and exclusive, while “creativity” is embraced as democratic and inclusive (Galloway & Dunlop, 2007, p. 19). Much of this thinking builds on a rejection of class-based distinctions between the cultural industries—produced for commercial entertainment (film, publishing, music), and the subsidized “arts” (visual and performing arts, museums and galleries) (Horkheimer and Adorno, 2002).

While developed economies produce and consume the lion’s share of the global market in creative products and services, many developing countries, particularly countries in Asia, are beginning to see growing returns. One striking example of this emerging pattern is the increasing dominance of Asia in the area of technology-related creative goods, such as computers, cameras, televisions, and audiovisual equipment. From 1996 to 2005 exports in these key industries grew from $51 billion to $274 billion (UNCTAD, 2008, p. 6). Not surprisingly, China has (since 2005) become the world’s leading producer and exporter of value-added creative products.

Creative industries today are estimated to be growing globally at an average rate of 8.7% per year (UNCTAD, 2008, p. 24). U.S. creative industries (defined in terms of arts, media, and design), for example, are estimated to make up 8% of the national GDP,
outstripping auto production, aircraft production, agriculture, electronics, and computer technologies (Siwek, 2002). The annual growth rate of creative industries in OECD countries during the 1990s was twice that of the service industries overall and four times that of manufacturing overall (Howkins, 2001, p. xvi). World exports of visual arts, for example, more than doubled from $10.3 billion in 1996 to $22.1 billion in 2005. Between 2000 and 2005, for example, world trade in creative goods and services reached $424.4 billion in 2005, or 3.4% of the total world trade:

World exports of creative products were valued at $424.4 billion in 2005 as compared to $227.5 billion in 1996, according to preliminary UNCTAD figures. Creative services in particular enjoyed rapid export growth—8.8. per cent annually between 1996 and 2005. This positive trend occurred in all regions and groups of countries and is expected to continue into the next decade, assuming that the global demand for creative goods and services continues to rise. (UNCTAD, 2008, p. iv)

The major challenge for understanding the creative economy in terms of creative industries, however, lies in defining the depth and scope of these industries. More problematic than this, is their relatively marginal levels of employment. Taken as a whole, the percentage of employment in the creative industries is minuscule. In the United States, for example, creative industries accounted for just 2.5 per cent of total employment in 2003. Nederveen Pieterse (2010: 413) puts it this way,

If we interpret the cultural economy as a sector (including e.g., Hollywood, television, the arts, design, fashion) it is vibrant and significant, but not nearly significant enough in job creation to make up for the millions of jobs lost in manufacturing and through outsourcing…The cultural economy, though surely significant, is simply not large and substantial enough to employ enough American workers; just as software, high-tech and back office services in India will never employ enough of India’s workforce.

Creativity as Axial Principle
The second modality for understanding CE is much broader and more diffuse. It views creativity as vital to the economy in general and fundamental to an innovation-driven
global economy in particular. Following this line of reasoning, Howkins (2001) and Florida (2002) make creativity the axial principle of postindustrial capitalism. Underlying this version of the creative economy is an argument that creativity is now the key driver of global innovation (Christensen, 1997). This does not mean that creativity is itself an economic activity but that creativity becomes an economic activity “when it produces an idea with economic implications or a tradable product” (Howkins, 2001, p. x). Florida (2002), in particular, has argued that a new creative class made up of intellectuals, artists, and designers is an ascendant force today that is reshaping advanced capitalist countries. Building out from a “Creative Class” of scientists, engineers, architects, designers, musicians, artists, educators, and entertainers, Florida suggests that the creative economy constitutes 30% of the US workforce (with a “supercreative” core representing only 12% and a larger contingent of creative professionals in business, finance, health, law, accounting, and related professions representing 18%). He elaborates,

In 1900, creative workers made up only about 10 percent of the U.S. workforce. By 1980, that figure had risen to nearly 20 percent. Today, almost 40 million workers- some 30 percent of the workforce- are employed in the creative sector…. When we divide the economy into three sectors- the creative, manufacturing and service sectors- and add up all the wages and salaries paid, the creative sector accounts for nearly half of all wage and salary income in the United States. That’s nearly $2 trillion, almost as much as manufacturing and services combined. (Florida, 2007, pp. 29–30)

In contrast to Friedman’s (2005) notion of a “flat world”, Florida (2007: xviii) argues that wealth and power is becoming increasingly concentrated within the world’s richest cities (Sassen, 1991). While the share of the world’s population living in urban areas was just 3% in 1800, and 30% in 1950, it is 50% today (and as high as 75% in advanced capitalist countries). Five mega-cities have more than 20 million inhabitants, and another twenty-four cities have 10 million inhabitants. Accordingly, the world’s 40 largest mega-regions are now home to some 18 percent of the world’s population and produce two-thirds of global economic output (including nearly 9 in 10 new patented innovations).
While flat world theories (Friedman 2005) accurately register rising influence of emerging countries like India and China, they overlook the growing divide between the super-educated and the vast majority who lack access to education. Beyond the mobile “creative class,” whose members are free to migrate between the world’s economic peaks live the vast majority who are left to toil in the world’s valleys (Florida, 2005b). In fact it is not that the world has become “flatter,” but that the world’s economic peaks have become slightly more dispersed.

Whether measured in terms of financial power or commercial innovation, only a very small number of cities in the world today dominate the global economic landscape. Even as the world’s cities absorb ever-larger numbers of the global population, only a handful of cities command their share of wealth and power. Staggering economic peaks like New York, Paris, London, and Tokyo form the major control nodes of the global economy (Porter, 1990; Sassen, 1991). If the world economy were measured for commercial innovation, wealth would in fact be even more concentrated. New York’s economy alone is equal in size to that of Russia or Brazil. “Together New York, Los Angeles, Chicago, and Boston have a bigger economy than all of China. If US metropolitan areas were countries, they’d make up forty-seven of the biggest 100 economies in the world” (Florida, 2007, p. xviii).

Alongside discourse on a knowledge economy, Florida and others point to the increasing importance of creativity and a creative economy. In their view we seem to be entering a new world now, a world in which the major raw materials are no longer coal and steel produced by machines, but creativity and innovation produced by the human imagination. It is certainly true that all human beings are creative—this is a basic capacity of the human species, grounded in its ability to evolve and adapt. One increasingly important question that advanced economies must now seriously consider is “what next?” What remains after we have mechanized agriculture, industry, and messaging technologies (Lèvy, 1997)? If Florida and other advocates of the creative economy are right, then creativity is now fundamental to wealth and prosperity and cultural innovation is critical
to its flourishing. Yet it is precisely creativity that is least valued by contemporary institutions.

The vast majority of hierarchical organizations today deliberately submerge creativity beneath bureaucratic layers of command-and-control. This is equally true of contemporary systems of education. While it was once true that school systems effectively distributed the necessary skills for an age of industry (numeracy, literacy, symbol manipulation), it is equally true that these same institutions are not equipped to support the skills and capacities for an age of innovation. Much as Franklin Roosevelt used the New Deal to reform the economic and banking systems in order to construct the infrastructure necessary to emerge from the Depression, so today must we develop the policy framework and infrastructural renewal to reform education for an age of innovation. “Like earlier efforts to build canals, railroads, highways, and other physical infrastructure to power industrial growth, the United States and countries around the world must invest in their creative infrastructure if they want to succeed and prosper in the future” (Florida, 2007, p. 249).

Education is critical to this creative infrastructure. Rather than understanding learning in terms of fixed objects that are transferred from one generation to the next, we need to begin to design educational systems that support knowledge and learning in terms of continuous cultural innovation. Education systems designed for industrial societies do not effectively harness the liquidity of creative innovation because they are too centralized. Transferring a fixed body of knowledge and practices from experts to amateurs is contradictory to an economy increasingly dependent on continuous flows of design and innovation. Allowing students to combine and blend cultural flows, as a part of the larger continuum of cultural production, is now fundamental to reconfiguring learning and education.

**Paradigm Four: The Green Economy**

The fourth model of the knowledge economy that I examine in this study is the Green Economy (GE). Growing concern about climate change and the impact of carbon dioxide
emissions has made green innovation and a green economy a central feature of international debate. This includes advances in technological innovation, renewable energy generation (wind, solar, geothermal, and biomass) and energy conservation. At the policy level, the definition of a “green economy” remains in flux. According to the United Nations (UN), for example, the “green economy approach seeks, in principle, to unite under a single banner the entire suite of economic policies and modes of economic analyses of relevance to sustainable development” (UN DESA, 2010, p.15). In theory, this translates as improved human wellbeing and social equity, while at the same time significantly reducing environmental risks and ecological scarcities (UNEP, 2014).

Linked to the elimination of fossil fuels and a long-term shift from highly polluting industrial industries to low-carbon, low-waste industries, the Green Economy is in fact viewed by many as an oxymoron (Brand, 2012; Lander, 2011). This is because the massive resource-driven exploitation inherent in capitalist production contradicts the basic principles of ecological sustainability (Daly and Farley, 2010). Indeed, McMurtry (1999) describes the current phase of global economic development as the “cancer phase” of capitalism. In his view, the globalization of laissez faire capitalism is not merely analogous to cancer but is in fact a real and growing disease that threatens the capacity of the planet’s social and cellular immune systems.

**The Green Economy and Public Policy**

For advocates of green policy, reducing global warming and enhancing resource management are clear reasons to take the idea of the Green Economy seriously. The evidence from climate science, points to the need for a large-scale and coordinated response to climate change, including broad portfolios of active technologies and regulatory policies. In the U.S., the rising call for green innovation has stimulated interest in the potential of rejuvenating the economy through “green jobs”. Van Jones (2008), for example, has proposed a *Green New Deal* that seeks to transform the country’s economy around low and medium-skill “green collar” jobs. The limitations of past U.S. energy policy, however, including an acute dependence on fossil fuels (petroleum, coal and natural gas) suggests that the U.S. has a long way to go.
Most theorists point to the need for developing an electricity-driven smart grid as the backbone for a Green Economy. This is because the challenge underlying any strategy for renewable energy is the issue of storage and transmission. Changes to the U.S. electricity grid, for example, would mean introducing next generation digital technologies in the development of a national smart grid. Directly connecting suppliers (utilities) to customers, while at the same time transforming this into a bi-directional relationship, could completely transform the U.S. energy infrastructure. A two-way power flow from distributed renewables like solar and wind, for example, would mean that consumers could sell excess electricity back to the grid. Using smart grids, U.S. energy production could become augmented by clusters of locally distributed energy resources (DER). While DER systems are small-scale power-generation technologies (typically in the range of 3–10,000 kW), they can be combined to form dense clusters of networked energy. Since most forms of renewables (ocean tide, wind, solar) are inherently variable or intermittent, smart grids offer the capacity to balance sudden drops in electrical generation by adjusting storage or consumption itself.

The rush of stimulus spending during the 2008 economic crisis included significant investments in the Green Economy. Under the leadership of President Obama, the Administration’s stimulus bill dedicated $71 billion to clean energy funding, with an additional $20 billion for loan guarantees and tax incentives to support clean energy projects. This included a proposed investing in high-capacity transmission that spans the country, linking to local electric utilities and distantly located bulk power generation to a Unified National Smart Grid. Using advanced, high-voltage lines, the U.S. Unified Smart Grid is envisioned as efficiently moving electricity across vast geographic distances with minimal losses.

Rifkin (2011) is particularly critical of President Obama’s green policies, which he argues lack a vision for a networked energy era (2011, p. 34). While U.S. energy policy introduces broad investments in a number green energy projects, these pilot projects remain disconnected and isolated. Rather than taking advantage of distributed
infrastructure, the philosophy shaping U.S. green policies remains fixed to centralized energy transmission. More than a collection of point-to-point interconnections between regional systems, the Unified National Smart Grid is a multi-directional electrical transmission platform, enabling access points to function as virtual power generators or Grid energy storage facilities. Deploying a unified energy network on a national scale could mean that consumers also become producers, collaborating over an open energy grid (Von Hippel, 2005; Bauwens, 2009). This would mean an addition of new layers of advanced technology onto the U.S. smart grid, bridging adjacent markets in architectural design, smart home appliances, wireless networks, auto production, and traditional utilities.

Towards a Third Industrial Revolution

In his recent book, *The Third Industrial Revolution* (2011), Rifkin argues that the promise of the Green Economy is the rise of a new kind of development rooted in a rising “energy internet” or *intergrid* that he believes is emerging as a mega-platform for a post-carbon civilization. Where the twentieth century was powered by oil, and the nineteenth century powered by coal and steam, Rifkin argues that the twenty-first century will be powered by distributed renewables such as solar, wind, hydro, geothermal heat, biomass, and ocean tide. The key to the Green Economy, he believes, is the affordances of ICTs as an infrastructure for networked consumption and production.

Accordingly, smart grids will eventually enable green energy to replace a centralized carbon-based energy industry, allowing prosumers to generate their own power. This is linked to the convergence of the Internet with an embryonic Energy Internet and a Logistics Internet or Internet of Things (IoT). Much as the steam-powered printing press enabled the necessary communication infrastructure for managing the First Industrial Revolution, and the telephone enabled the massive centralization and communication infrastructure for the Second Industrial Revolution, so the Internet is providing the necessary network infrastructure for managing and coordinating the Third Industrial Revolution. As he explains, the “telephone, radio and television were centralized forms of communications designed to manage and market an economy organized around
centralized fossil fuel energies and the myriad business practices that flowed from that energy regime” (p. 20). By contrast, the “new, second-generation electricity communication… is distributed in nature and ideally suited to manage distributed forms of energy” (pp. 20-1). He writes:

In the 1990s and the first decade of the twenty-first century, the Information and Communication Technology (ICT) revolution was grafted onto the older, centralized Second Industrial Revolution. It was, from the start, an unnatural fit. While ICT enhanced productivity, streamlined practices and created some new business opportunities and jobs—which probably extended the useful life of an aging industrial model—it could never achieve its full distributed communications potential because of the inherent constraints that come with being attached to a centralized energy regime and commercial infrastructure. (p. 20)

Building on the P2P architecture of the Network Economy, Rifkin describes the coming Green Economy as essentially a democratic energy commons that is largely free to produce and consume. Supported by five major institutional pillars, he argues that the collaborative logic of this green energy regime has begun entirely reshaping the command-and-control superstructure of industrial society. These pillars include:

(1) A shift to renewable energy
Including solar, wind, hydro, geothermal, ocean waves, and biomass.

(2) The design of buildings as power plants.
The design and construction of buildings as independent power generators or “power plants” from the sun, wind, and waste to provide for their own power needs as well as surplus energy that can be shared.

(3) Deploying hydrogen and other storage technologies in every building and throughout the infrastructure to store intermittent energies.
The use of hydrogen as a universal medium that “stores” all forms of renewable energy to assure that a stable and reliable supply is available for power generation and
transmission.

(4) Using Internet technology to transform the power grid of every continent into an energy-sharing intergrid like the Internet. The development of a “smart grid” or “intergrid” as a mega-platform, enabling businesses and homeowners to produce their own energy and share surplus power (much as information is produced and shared other across the Internet).

(5) Transitioning the transport fleet to electric, plug in and fuel cell vehicles that can buy and sell electricity on a smart continental interactive power grid.

In support of these five pillars, Rifkin points to the need for government leadership in the area of green policies to provide the basic resources (capital, tax incentives, etc.) and ideological support to advance and coordinate industries across a wide range of sectors. Joining a wide swath of industries that include clean technologies, green design and construction, telecommunication, fuel cell and plug-in transport, nanotechnology, and supply chain logistics, is the growing potential of advancing technologies.

Smart Systems
Underlying discussions on technological innovation for the Green Economy is the application of the term “smart technologies” to describe a range of ICT driven services supporting smart cities, smart appliances, smart networks, smart devices, and smart government. As a recent OECD (2013) report explains, smart technologies refer to applications or services that are “able to learn from previous situations and to communicate the results of these situations to other devices and users” (p. 4). Commonly portrayed as the next stage in Internet technologies, smart systems include:

1) Machine-to-Machine (M2M) communication across mobile devices.
2) Large-scale data processing via “Cloud Computing” to process and display data.
3) Data analytics or “Big Data” to correlate and interpret data.
Networked communication is essential to smart systems. The expansion of Internet protocol networks across the world has made it increasingly easier for M2M communication, lessening the amount of power and time necessary for information to be communicated between devices and systems. Building on layers of fixed Internet protocol networks, “always on” broadband networks, and more recently wireless satellite and mobile networks, smart systems increasingly leverage massive amounts of data generated by billions of Internet and mobile devices and services around the world. The key feature of smart systems is a capacity to respond to feedback generated through data in order to change the action or behavior of a system or subsystem. Smart systems are emergent wholes made up of interdependent sub-systems of networked resources that together afford scaled “intelligence”:

Systems can be scaled up, from individual units that are smart, to combinations of devices that make a larger whole smart. A smart household might combine a smart energy metre, smart lighting, smart thermostats, alarm system with applications on mobile phones, interaction with televisions and so forth. A smart energy grid can consist of smart energy metres in people’s homes, smart loading stations for electric cars, smart distribution networks and many others. Smart transport needs smart automobiles, smart delivery vehicles and logistical systems, smart public transport and smart roads working together. The better interconnected these independent units and separate systems are, the “smarter” the larger set could be considered. (OECD, 2013: 9)

Estimates are that there will be between 20 and 50 billion devices connected to the Internet between 2020 and 2030 as Moore’s law continues to drive resource costs down and capabilities up (OECD, 2013: 10). Transmitting, storing, processing and analyzing all of this Big Data is beyond the capacities of typical software databases. This is not necessarily about of the size of datasets, however, but about feedback speeds in analyzing and applying the data to change a system’s behavior using hundreds of thousands of servers “tied together by a common network and software stack that treats the servers as one common pool of processing and storage” (OECD, 2013: 16).
Beyond Quantitative Growth

In Milani’s (2000) view, the Green Economy represents the emergence of a postindustrial society based around principles of design, regeneration and sustainability. He draws a distinction between the current economic focus on capitalist driven quantitative growth and a long-term shift towards dematerialization in the form of qualitative development (Daly and Farley, 2010). As he explains, the “substitution of human intelligence for materials, energy, and cog-labor in direct production” in the context of “dematerialization” will enable a new kind of qualitative development around human potential that could significantly reduce ecological destruction (p. 72). In his view, a waning industrial civilization shaped by a philosophy of neoliberal political economy has managed to suppress the organic rise of emergent human potential rooted in “people-production”.

Focusing this critique on the need for transforming economic development around education, community rebuilding, and environmental stewardship, Milani points to the need for linking creativity and cultural production (the Creative Economy) to green design. In contrast to the mechanical systems of a “paleotechnic era” (Lyle, 1994), he argues that an evolving economy and society is beginning to mirror the complex systems found in nature. In his view, this involves both designing new sociotechnical systems based on natural systems (biomimicry) and long-term investments in human ingenuity and technological innovation. Underlying this vision of a reconstituted society is an emphasis on policy driven planning that builds on embedded communities that mirror ecologies found in nature. “Complex systems”, he writes, whether “production systems or whole economies, literally must be allowed to evolve, like ecosystems” (p. 73).

Much as Bauwens (2009), Milani links the affordances of network technologies to a new era of democratization and stochastic systems that he argues depend on self-organization and coordination from below. He elaborates,

The organic character of postindustrial organization suggests a trend towards growing democracy. It implies that political consciousness and control must be
more integrated into everyday work life… These trends are enhanced by the
impact of electronic communications technology, which makes possible the
coordination of widely decentralized units. Authentic postindustrialism therefore
facilitates direct democracy… Network organization allows the creation of
“communities of communities”. The extension of our minds and nervous systems
through new communications technologies- which today is most often used to
reinforce centralized control- is actually more appropriately used to empower
communities and regions, allowing them to be integrated with nature’s bioregions.
(pp. 73-4)

Criticizing arguments that fetishize “information” as a new mode of economic
development (Castells, 2000), he argues that information technology should play a
subordinate role in the development of a qualitative economy that is specifically focused
on human social development (p. 154).

Conclusion

Despite various distinctions in the ways in which each archetypal model reads the nature
and purpose of knowledge and learning, it would not be an oversimplification to point out
that all four dimensions play close attention to the issue of human capital. For both KE
and GE, human capital elides with STEM skills and represents a kind of measure of labor
quality. For CE, human capital is more properly associated with creativity and ideas, and
linked to a growing discussion on entrepreneurship and intellectual property. NE,
however, differs markedly from the other three models, in viewing human capital with
suspicion and focusing more closely on the “general intellect” in the context of a rising
cultural commons. Although conventional measures of human capital are largely based
on educational attainment (i.e., the share of a population with postsecondary education),
the NE paradigm of human capital elides with a communities-of-practice model in which
knowledge and learning are tightly embedded in social practice. This kind of distinction,
for example, is particularly significant to theories on educational evaluation and
assessment.

While there are substantial differences between the Neoclassical Knowledge Economy,
the Network Economy, the Creative Economy and the Green Economy, there are many
corresponding features as well. Overlapping all four paradigms is a rich discussion on innovation as a foundation to cultural transformation. Indeed, what most closely ties all four models together is a shared intellectual hold on the social imaginary of postindustrial societies. Though differing in emphasis each of these accounts reflects an eschatological approach to history that aims at prefiguring the future evolution of human society (Barbrook, 2006). All four models share intellectual roots in a historical metanarrative that links the whole of society to the trajectory of a principal segment or “remnant”. As Barbrook (2006) notes, much of the rhetoric underscoring post-Fordist celebrations of knowledge workers has simply perpetuated Fordist assumptions that a ruling class is indispensable to leading society towards a future “utopia”. Oscillating between a “new ruling class” and a “new working class,” are various predictions about a coming revolutionary vanguard. These includes such notable examples as: Adam Smith’s “Philosophers of Industry” (1776), Karl Marx’s “Proletariat” (1848), Max Weber’s “Bureaucrats” (1922/1978), Frederick Taylor’s “Scientific Managers” (1911/1967), Joseph Schumpeter’s “Entrepreneurs” (1942/1976), Peter Drucker’s “Knowledge Workers” (1969), Daniel Bell’s “Knowledge Class” (1973), Alvin Toffler’s “Third Wave” (1980), Jean-Francois Lyotard’s “Postmodernists” (1984), and most recently Richard Florida’s (2002) “Creative Class”.

Beyond their many similarities, there are ambiguities and contradictions between these intellectual paradigms as well. Looking closely at the discourses on KE, for example, we see that each paradigm emphasizes a unique dimension of “postindustrialization” overlapping distinct forecasts on work and learning. This includes differing approaches to innovation, differing notions of the production and consumption of knowledge, and differing approaches to the political economy of labor. Indeed, what is perhaps most problematic about these discourses, is the lack of a substantial political critique. From the standpoint of critical theory, for example, few models of KE challenge social exploitation within capitalist economy. Although it may be true that a rising creative minority can indeed make their living as the vanguard of a knowledge economy, for example, the truth is that this is largely the result of the substantial support afforded to them by the mundane labor of everyone else (Barbrook, 2006).
CHAPTER FIVE:
Document Analysis

Reading U.S. Education Policy

In the previous chapters, I examined the economic underpinnings of U.S. education policy. Against an historic background of neoliberal public policies, I argued that recent debates about U.S. education are largely framed by economic discourses linked to the pursuit of human capital development in a changing global landscape. Indeed, the common view today is that rising demands placed on U.S. education are not simply rooted in a temporary economic downturn but in a permanent sea change in the structure of the global economy. In the chapter that follows, I examine public documents that frame contemporary educational reforms and offer a critical analysis of these documents in order to understand their genesis and development.

This documentary analysis is offered within the broader context of a discussion on the ways in which K-12 public education reform in the U.S. is interpreted and negotiated. This data is viewed as evidentiary support for both interpreting the scope of the neoliberal policy framework and for an argument about the need for rethinking educational reform. I provide this analysis in order to highlight the contingency of discourses that shape the politics of reform. My larger goal in applying qualitative research methods is to begin to develop a more nuanced scholarship on KE in the context of conflicting accounts of educational reform in a postindustrial society.

In this chapter, I examine three public documents:


Each of these documents introduces a set of prescriptions for reforming education that largely builds on a narrative of economic growth. In the context of broader discourses on globalization and a global knowledge economy, these documents focus on the need for enhancing U.S. education in line with broader macroeconomic policies.

Despite the fact that these policy documents explicitly declare the need to move U.S. policymaking beyond neoliberal strategy, education policy remains deeply entrenched in command-and-control management models. Indeed, policies applied to education rest on flawed assumptions about education in a global knowledge economy. Based around systems that position schooling as a kind of factory for labor, I argue that education policy is hopelessly misaligned with the needs of KE. Rather than mirroring industrial era factories, students would be better served if schools were redesigned to support the kinds of skills and capacities needed across postindustrial societies (Robinson, 2001; Florida, 2002; Pink, 2005; Araya and Peters, 2010; Araya, 2013).

**U.S. Education Policy in Context**

In examining public policies promoted by the Obama Administration, it becomes widely apparent that the rhetoric shaping contemporary U.S. education builds on a mounting concern about the future growth of the U.S. economy. And there is good reason for this concern. Alongside a steady decline in interest rates, and a belief that monetary policy can regulate the economy, GDP growth is now driven by consumption and government deficit (Marber, 2014). Indeed, notwithstanding the substantial political and economic power of the United States, its’ relative position in the world has been declining for some time. This deterioration has been most apparent in the trade data. Weak manufacturing (deindustrialization) has led to a massive trade deficit, import dependence, and a chronic trade and current account deficit (Nederveen Pieterse, 2012). U.S. balance of trade has become unsustainable making it the world’s largest debtor nation. More importantly, the
U.S. economy has become highly dependent on other countries (especially China) to consume its treasury bonds in order to finance its growing debt.

Now heavily dependent on consumer spending and increasingly reliant on foreign creditors, the United States is a global hegemon in decline. U.S. share of world merchandise exports has fallen from 17 percent in 1963 to less than 10 percent today, while its share of imports expanded from less than 9 percent to 13 percent. Indeed, U.S. reliance on foreign capital has been partially masked by a succession of economic bubbles—the dotcom bubble, the low interest bubble, the real estate bubble, and most recently the subprime mortgage crisis. In fact, it would not be inaccurate to say that the Obama Administration entered office on a mandate of neo-Keynesian government intervention to resolve these economic challenges.

In the face of the greatest economic and financial crisis since the Great Depression, the Obama Administration entered office with a wide latitude in applying reform policies. Promoting reform of neoliberalism, the first term of the Obama Administration has largely been subsumed with stabilization policy. In response to the highest unemployment rate in thirty years, two very expensive and unpopular wars in the Middle East (costing of dollars), and the failure and/or collapse of some of the largest financial institutions in the U.S. (including Bear Sterns, Lehman Brothers, and AIG), the Administration introduced five key pillars to support U.S. economic recovery. These include: (1) greater regulation of Wall street and the disproportionate influence of finance capitalism; (2) investments in education in order to prepare students for the 21st century; (3) promotion and investment in clean energy technologies (and a corresponding reduction in Middle Eastern oil); (4) reform of the health care system; (5) a reduction in the national deficit in the development of a sustainable U.S. economy.

Building on top of the Bush Administration’s $700 billion dollar banking bailout known as the Troubled Asset Relief Program (TARP), the Obama Administration, introduced an additional $787 billion fiscal stimulus package in the form of The American Recovery
and Reinvestment Act (ARRA). Aimed at rescuing the U.S. from a deepening global recession, and combined with an assortment of tax cuts, ARRA provided funding for a wide array of spending initiatives intended to provide economic stimulus. ARRA was distributed over several years and included increased federal spending for health care, infrastructure, and education (Table 3). ARRA also included highly articulated reforms to social policy. Of the $787 stimulus, close to $100 billion was designated for aid to public education (P-16), including $48.6 billion in a state fiscal stabilization fund, $39.75 billion available to local districts and higher education institutions, and $8.8 billion for facilities’ modernization and repair (Table 4).

### Table 3: Actual ARRA Spending Over the 2009-2011 (in billions)

<table>
<thead>
<tr>
<th>Department/Agency</th>
<th>Estimated 2009-2011</th>
<th>Actual 2009-2011</th>
<th>Difference: Actual minus Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>20.0</td>
<td>31.3</td>
<td>+ 11.3</td>
</tr>
<tr>
<td>Commerce</td>
<td>4.5</td>
<td>3.3</td>
<td>- 1.2</td>
</tr>
<tr>
<td>Defense- Military Programs</td>
<td>6.3</td>
<td>5.3</td>
<td>- 1.0</td>
</tr>
<tr>
<td>Heath and Human Services</td>
<td>116.4</td>
<td>107.4</td>
<td>- 9.0</td>
</tr>
<tr>
<td>Interior</td>
<td>2.4</td>
<td>2.6</td>
<td>+ 0.2</td>
</tr>
<tr>
<td>Justice</td>
<td>2.6</td>
<td>2.9</td>
<td>+ 0.3</td>
</tr>
<tr>
<td>Labor</td>
<td>43.7</td>
<td>66.7</td>
<td>+ 23</td>
</tr>
<tr>
<td>State</td>
<td>0.4</td>
<td>0.4</td>
<td>- 0.1</td>
</tr>
<tr>
<td>Treasury</td>
<td>91.9</td>
<td>91.1</td>
<td>- 0.8</td>
</tr>
<tr>
<td>Social Security Administration</td>
<td>14.2</td>
<td>13.8</td>
<td>- 0.4</td>
</tr>
<tr>
<td>Education</td>
<td>93.5</td>
<td>87.2</td>
<td>-6.3</td>
</tr>
</tbody>
</table>

20 Flying in the face of neoclassical economic theory, the scale of the financial and economic disaster facing the U.S. and other advanced capitalist countries justified mammoth stimulus spending. Notwithstanding this massive spending, both political parties have historically supported counter-cyclical stimulus policy.

21 This included federal tax cuts ($288 billion), expansion of unemployment benefits ($82.5 billion), social welfare and domestic spending including education ($90 billion), healthcare ($147.7 billion), and infrastructure ($80.9 billion), and investments in the energy sector ($61.3 billion), housing ($12.7 billion), scientific research ($8.9 billion), and other projects ($18.1 billion).
Table 3 (cont.)

<table>
<thead>
<tr>
<th>Program</th>
<th>Total</th>
<th>Obligated</th>
<th>Dispersed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>18.9</td>
<td>19.4</td>
<td>+ 0.5</td>
</tr>
<tr>
<td>Environmental Protection Agency</td>
<td>4.3</td>
<td>6.4</td>
<td>+ 2.1</td>
</tr>
<tr>
<td>Transportation</td>
<td>31.5</td>
<td>31.9</td>
<td>+ 0.5</td>
</tr>
<tr>
<td>General Services Administration</td>
<td>2.6</td>
<td>3.1</td>
<td>+ 0.5</td>
</tr>
<tr>
<td>Homeland Security</td>
<td>2.0</td>
<td>1.3</td>
<td>- 0.7</td>
</tr>
<tr>
<td>Housing and Urban Development</td>
<td>8.3</td>
<td>11.0</td>
<td>+ 2.7</td>
</tr>
<tr>
<td>All Other</td>
<td>10.2</td>
<td>9.0</td>
<td>- 1.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>473.5</td>
<td>494.0</td>
<td>+ 20.4</td>
</tr>
</tbody>
</table>

Source: U.S. Congressional Budget Office

Table 4: Education ARRA Funds Allocated, Obligated and Dispersed as of March 5, 2010 (in billions)

<table>
<thead>
<tr>
<th>Program</th>
<th>Total Allocated</th>
<th>Obligated</th>
<th>Dispersed</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Fiscal Stabilization Fund</td>
<td>48.6</td>
<td>38.6</td>
<td>22.0</td>
</tr>
<tr>
<td>• Education State Grants</td>
<td>39.7</td>
<td>29.7</td>
<td>17.8</td>
</tr>
<tr>
<td>• Government Services Grants</td>
<td>8.8</td>
<td>8.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Pell Grants</td>
<td>17.1</td>
<td>8.7</td>
<td>8.6</td>
</tr>
<tr>
<td>Special Education</td>
<td>12.2</td>
<td>12.2</td>
<td>2.7</td>
</tr>
<tr>
<td>• IDEA State Grants</td>
<td>11.3</td>
<td>11.3</td>
<td>2.5</td>
</tr>
<tr>
<td>• IDEA Infants and Family Grants</td>
<td>0.5</td>
<td>0.5</td>
<td>0.11</td>
</tr>
<tr>
<td>• IDEA Pre-School Grants</td>
<td>0.4</td>
<td>0.4</td>
<td>0.07</td>
</tr>
<tr>
<td>Title I Education for the Disadvantaged</td>
<td>10.0</td>
<td>9.9</td>
<td>2.3</td>
</tr>
<tr>
<td>Race to the Top and Investing in Education</td>
<td>5.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>School Improvement Grants</td>
<td>3.0</td>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>Rehabilitation Services and Disability Research</td>
<td>0.6</td>
<td>0.6</td>
<td>0.09</td>
</tr>
<tr>
<td>Educational Technology Grants</td>
<td>0.6</td>
<td>0.6</td>
<td>0.05</td>
</tr>
<tr>
<td>State Longitudinal Data Systems Grants</td>
<td>0.2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 4 (cont.)

<table>
<thead>
<tr>
<th>Program</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Study</td>
<td>0.2</td>
<td>0.2</td>
<td>0.19</td>
</tr>
<tr>
<td>Teacher Incentive Fund</td>
<td>0.2</td>
<td>0.05</td>
<td>0.007</td>
</tr>
<tr>
<td>Impact Aid</td>
<td>0.1</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Teacher Quality Enhancement</td>
<td>0.1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>McKinney Vento Homeless Education Grants</td>
<td>0.07</td>
<td>0.07</td>
<td>0.015</td>
</tr>
<tr>
<td>Student Aid Administration</td>
<td>0.060</td>
<td>0.044</td>
<td>0.019</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>98.2</strong></td>
<td><strong>71.3</strong></td>
<td><strong>36.2</strong></td>
</tr>
</tbody>
</table>

Source: Federal Budget Project, U.S. Department of Education

Document Analysis: Towards a U.S. National Innovation System

As I indicated at the beginning of this study, unpacking U.S. education policies requires an appreciation of the history of innovation strategy and the influence of economic theory in guiding educational reform. Indeed, over the past century U.S. innovation strategy has explicitly focused on macroeconomic policies using fiscal and monetary intervention in order to support private sector institutions (Mazzucato, 2011). Focusing less on specific technologies and more on the wider processes of innovation, U.S. industrial policy under President Obama builds on a working assumption that innovation is the key factor in determining the future success of the United States. Even a cursory analysis of contemporary U.S. public policy reveals a deep concern with transforming U.S. society and economy in the face of daunting challenges linked to globalization and the waning influence of advanced economies.

This downward pressure has resulted in educational reform measures that have been largely shaped by the need to improve the skills of the U.S. labor force. Much as previous administrations, the Obama Administration has aimed at enlarging the role of the federal government to raise the quality of public education in the hopes of boosting academic achievement levels and thus economic performance. This federalization has also included new accountability systems linking teacher evaluation and remuneration to standardized
testing, and a concerted effort to move the country towards a national curriculum by leveraging competitive grants for federal funding. This has also included a forceful attempt to liberalize public education through the expansion of charter schools.

In response to these reforms, the general consensus among educationalists has been largely negative. Critical scholars, for example, argue that reforms have not properly addressed systemic issues of equity in public education, with gaps between students from middle and working-class families continuing to grow (National Center for Education Statistics, 2011). According to Saltman (2010a),

The key point here is that standardization (as typified by standardized testing, the regressive linkage of school funding to test scores, value added assessment, etc.) is being deployed differently in working-class and poor public schools as opposed to in professional-class public schools. It is not only that pedagogical and curricular matters are being reformed differently, but that the professional-class schools continue to receive public investment while the schools of working class and poor students in both urban and rural areas are being transformed into a new kind of commodified lower tier through privatization. (p. 390)

Reforming U.S. Education

There have been several Presidential commissions examining educational reform in the United States over the past century. These include The Truman Report (1947), the Committee on Education Beyond the High School (1956), the Task Force on Education (1960), the National Commission on Excellence in Education (which produced A Nation at Risk) (1983), and the Commission on the Future of Higher Education (2006). Although the explicit focus of U.S. federal policy on education has long been excellence for all, the implicit focus has been the need for education to service economic growth. Following on from President Bush, the Obama Administration has used government-led investments in education to extend NCLB as part of a broader emphasis on nationalizing educational reform.

Since taking office, the Obama Administration has justified its federalization of K-12 education in terms of the need to develop competitive human capital:
For we know that economic progress and educational achievement have always gone hand in hand in America…The source of America's prosperity has never been merely how ably we accumulate wealth, but how well we educate our people. This has never been more true than it is today. In a 21st-century world where jobs can be shipped wherever there's an Internet connection…where your best job qualification is not what you do, but what you know -- education is no longer just a pathway to opportunity and success, it's a prerequisite for success. (Obama, 2009b, p. 5-6)

Advancing on an economic rationale, Secretary of Education Arne Duncan (2009) has suggested the wide variation in state standards is hurting the country, arguing instead for a set of “common, career-ready internationally benchmarked standards”. The fact is that a growing number of interest groups including policymakers, business leaders, and educators have become highly focused on the need for common standards to improve educational outcomes in the name of economic competitiveness. Coordinated by the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO), the Common Core State Standards Initiative (CCSSI) was first introduced in draft form in 2009 and finalized in 2010. Accordingly, CCSI (2010) defines college and career readiness as the ability "to succeed in entry-level, credit-bearing academic college courses and in workforce-training programs". Currently, the common core standards are only focused on English language arts and mathematics.

Rather than a specific curriculum, CCSI is viewed as a shared framework for interpreting common goals and expectations about K-12 schooling, leaving teachers to continue to construct lesson plans and tailor instruction. Opponents of these goals, however, argue that a federally driven education system will only undermine the inherent capacities for experimentation built into the country’s education system (Zhao, 2009; 2012b).

Mitigating both sides is the fact that the standards movement has been institutionalized at the state level rather than at the federal level. To allow for some customization, CCSI has a provision in the voluntary adoption guidelines that allows states to supplement up to 15 percent of the common core standards with state-level standards. Building on this framework, the Obama Administration has sought to increase the percentage of U.S.
college graduates (defined as either two or four-year degrees) from 39 percent to 60 percent of the population by 2020.

Despite the fact the Obama Administration has signaled the need to introduce policies that move U.S. public policy beyond neoliberalism (Peters, 2012), this has not translated into changes in national education policy. Indeed, social policies applied to U.S. education have simply reinforced neoliberal assumptions about schooling as a kind of factory for labor based around principles of conformity and compliance. Building on the policies of the Bush Administration, for example, President Obama’s education policies have focused on the expansion of charter schools and the use of performance-based compensation for teachers. At the center of the president’s K-12 education reform agenda is the “Race to the Top” (RTTT) grants competition. Indeed, using the stimulus funding as a lever for social reform, the Administration has implemented a substantial shift in social policy. As McDonnell & Weatherford (2011) elaborate, the criteria for RTTT grants have allowed the Administration to target its reform goals while at the same time maintaining considerable leverage over states applying for the funds:

In July 2009, when the U.S. Department of Education (USDOE) published draft guidelines for awarding the $4.35 billion in Race to the Top funds, the full import of what the administration hoped to accomplish with its use of the education stimulus became clear. State applications were to be judged on 19 criteria that included the extent to which they have been able to maintain K-12 funding at prerecession levels and the lifting of any caps on the expansion of charter schools. One absolute requirement was that applicant states could not have any laws barring the use of student achievement data in evaluating teachers and principals. 

(p. 311)

Stimulus funding has enabled the Obama Administration to craft a political agenda designed to motivate needy states to follow federally mandated standards. McDonnell & Weatherford (2011: p. 315), point out that this approach to educational reform has had three distinct strengths but also one significant weakness:

Strengths:
• A large discretionary funding source with little Congressional scrutiny over how it intended to use the funds.
• Avoidance of the kind of “agenda jamming” that had derailed Bill Clinton’s first-year initiatives
• Ability to frame the national discussion around education reform without being constrained by negotiations over the details of specific legislation.

**Weakness:**
• A lack of support “on the ground”.

Perhaps the major weakness with RTTT has been its “top-down” application. Although the economic stimulus has provided a pretext for significant investments in educational reform, the pace at which these reforms have been implemented may have in fact set in motion a whole new set of problems. By attaching conditions to receipt of stimulus funds, the Obama Administration has implemented significant national educational reform without mobilizing local support among the nation’s teachers. Lacking the indigenous support of teachers and their broader support communities, it is hard to imagine that current educational reforms will bear fruit. As McDonnell & Weatherford, (2011: 316) observe: As “with many past education reforms, the Obama Administration has emphasized the central role of teachers—how they are recruited, trained, evaluated, and compensated. In doing so, it faces a classic dilemma: the group the Administration has identified as a central part of the problem is the one on whom it must depend to solve that problem”. It remains to be seen whether President Obama’s educational reforms can be sustained over the long term.

(1) A Strategy for American Innovation: Securing Our Economic Growth and Prosperity

Building on NIS theory, *A Strategy for American Innovation* (SAI) represents the Obama Administration’s proposal for enhancing U.S. economic policy. Composed by the National Economic Council, the Council of Economic Advisers, and the Office of Science and Technology Policy, SAI emphasizes the role of government in steering the U.S. innovation system. In line with Mazzucato’s thinking on “State entrepreneurship” (2011) it argues that the “true choice in innovation policy” is not between government management and no government involvement (i.e. neoliberalism), but rather the “right role for government” (p. 10):

By championing policies that facilitate marketplace innovation, the federal government will continue to be an essential partner in the U.S. national innovation system. To that end, the Obama Administration will take appropriate public action by supporting an environment in which innovation is rewarded and best practices are diffused, investing in a technically capable workforce, supporting basic scientific discoveries, and promoting the development of the technology platforms from which future innovations will spring. Government direction can never be a substitute for the free market conditions that propel American innovation. But government must act to support those conditions and ensure that innovation, the engine of our prosperity, drives America further and faster towards higher quality jobs, healthier and longer lives, new opportunities and new industries, and the ever-expanding technological frontier. (p. 13)

SAI summarizes its argument for public investments this way:

In areas of well-defined national importance, public investments can help catalyze advances, leveraging key breakthroughs and U.S. leadership. The 21st century brings several critical areas – including energy, bio- and nanotechnology, space capabilities, health care, and education – where the demand for breakthroughs is clear. The Administration’s Strategy for American Innovation will harness public mechanisms to help meet our common goals, sparking commercial innovations and American ingenuity as we seek to meet the grand challenges of the next century and add impressive new chapters to the history of American progress. (p. 25)
Positioning the role of government in the US economy as an “innovation facilitator”, SAI makes the case for neo-Keynesian policy reforms beginning with wide-ranging investments in the “building blocks” of innovation. Advancing on NIS discourse, SAI defines innovation as “the process by which individuals and organizations generate new ideas and put them into practice” (p. 7). Accordingly, innovation strategy proceeds in contingent stages:

First, we must create an educational system that is internationally competitive and innovative in preparing our workforce for our increasingly knowledge-intensive economy. Next, we must invest in scientific research to restore America’s leadership in creating the scientific and technological breakthroughs that underpin private sector innovations. Finally, we must invest in a first-class infrastructure that moves people and ideas at 21st century speeds. These are the building blocks of an innovation strategy that will lead America to a more prosperous future. (p. 15)

Indeed, U.S. Innovation strategy is conceptualized as a pyramid of embedded layers supporting rising economic investment and growth (Figure 1). These layers includes:

(1) *Investments in the “building blocks of innovation”* (education, R&D, and infrastructure).

(2) *Promotion of competitive markets* through entrepreneurship, export promotion and regional cluster strategies.

(3) *Catalyzation of technology breakthroughs* in clean energy, healthcare technologies, education technology, and advanced manufacturing.
Investments in Innovation

The foundation layer of SAI includes basic investments that seed follow-on development. These include:

1. Reform of K-12 Education and workforce training (with a special emphasis on STEM fields).
2. Increased funding for basic scientific research.
3. Increased physical infrastructure investments (including proposals for high-speed rail and a National Infrastructure Bank).
4. Increased “virtual” infrastructure investments (including the Internet, a new smart grid, expanded wireless spectrum, and cyberspace security).
Taken together these investments are expected to support several government led initiatives including: (i) expanded commercial spectrum in support of wireless technology; (ii) patent reform to modernize and speed up the administration of patent applications; (iii) improvements in K-12 education through research institutions (ARPA-ED), competitive funding, public-private partnerships, and an increased number of STEM teachers; (iv) funding for clean energy research (ARPA-E), higher energy standards, and the renewal of clean energy tax credits; (v) support for early-stage entrepreneurship via new funding systems (Startup America), and improvements in the regulatory environment.

**Market Promotion**

The second layer of the SAI pyramid is a focus on market promotion to support innovation through government oversight. Markets are seen as platforms through which innovations can diffuse globally and scale across industries. Market promotion policies include:

1. Research and Experimentation Tax Credits to accelerate innovation ($100 billion over 10 years).
2. Various initiatives to ease entrepreneurship (patent reform, Startup America, the Affordable Care Act).
3. Bridging new and established entrepreneurs through “innovation hubs”.
4. Improving regulation and market access both domestically and globally via advocacy and policy.

**Catalyze Breakthroughs for National Priorities**

At the peak of the SAI policy pyramid, government is seen as a major driver of new experimental technologies coordinating public-private partnership (green technology, healthcare technology, educational technology, biotechnology and nanotechnology). This includes:

1. New clean energy standards and investments in clean energy research.
2. Research institutions in biotechnology, nanotechnology and advanced manufacturing.
3. Next generation applications for space (communication, navigation, commerce and security).
4. Healthcare technologies (health IT, data) to improve quality care.
5. Next generation educational technologies to personalize learning and advance lifelong learning and training.

Discussion: SAI and Education Policy
The most common criticism of U.S. economic planning is its inward focus (National Intelligence Council, 2012). Indeed, economic policy is strongly domestically oriented with international relations largely viewed in terms of market opportunities. In a multipolar world, however, this is shortsighted. With growing focus on physical infrastructure and energy in regions and states around the world, the U.S. will need to begin to examine opportunities for partnering with other countries in these areas (Bauer, 2012). Rather than a superpower going it alone, the U.S. is now increasingly finding itself embedded in a global system that requires it to collaborate with other countries across a range of issues. This includes an increased focus on domestic investments that enable tangible social improvement. For all of these reasons, the Obama Administration has made some efforts to redesign U.S. policy around a more pronounced NIS framework.

Indeed, SAI does a laudable job of conveying the challenges posed by KE, especially the need for creative problem-solving skills. Focusing on educational reform as building blocks of NIS, SAI outlines four overlapping policy proposals:

1. Improve America’s science, technology, engineering and math (STEM) education including preparation of an additional 100,000 STEM teachers (by the end of the decade) through public-private partnerships and organizations like Educate to Innovate and Change the Equation.
2. Reform elementary and secondary education by steering state and local K-12 educational reform through the use of competitive grants (*Race to the Top*) and federal educational policy reform (*Blueprint for Reform*).

3. Restore America to first in the world in college attainment by becoming first in the world in college degree attainment, through expansion of the *Pell Grant* program ($40 billion), the *Health Care and Education Reconciliation Act* (making all federal loans available directly to students rather than third-party administrators), the *American Opportunity Tax Credit* (worth $10,000 for four years of college), the *Trade Adjustment Act* (investing in community colleges), and the *Task Force on Skills for America’s Future* (bridging businesses and educational institutions).

4. Create a first-class system of early education by investing in early childhood development, reforming *Head Start* programs through competitive funding (the *Early Learning Challenge Fund*) through common standards and quality improvement.

While only a small percentage of students needed advanced skills in the industrial era, today a capacity to apply knowledge to solve problems is seen as a basic perquisite to accessing a global labor market (Dede, 2013). More than “skills” per se, there is an increasing need for students to be educated to apply knowledge in the practice of creative and entrepreneurial problem-solving (Zhao, 2012b). In fact, SAI underscores this point arguing that the historic strength of the U.S. economy has been its explicit focus on entrepreneurship. Despite this recognition, however, the principle of entrepreneurship itself is not reflected in the substance of educational reforms. The notion that the U.S. education system may need to reconsider the factory transmission model itself, for example, is entirely absent.
(2) A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act

Building on the adoption of “college and career-ready” standards, A Blueprint for Reform (BFR) (U.S. Department of Education, 2010a) represents the Obama Administration’s official plan to reform the Elementary and Secondary Education Act (ESEA), it is the primary federal legislation governing K-12 public education in the United States. Originally introduced as a federal statute in 1965 by President Johnson, ESEA explicitly forbids the establishment of a national curriculum, focusing instead on state-administered, federally funded programs for primary and secondary education. Taken as a whole, the BFR is framed around four areas:

• Improvement of teacher/principal effectiveness
• Providing tools and information to families that will help them evaluate their children’s schools
• Implementation of college-and-career-ready standards
• Providing intensive support and effective interventions that will help improve student learning and achievement in America’s lowest-performing schools

Linking education to economic competitiveness, the President explains:

Today, more than ever, a world-class education is a prerequisite for success. America was once the best educated nation in the world. A generation ago, we led all nations in college completion, but today, 10 countries have passed us. It is not that their students are smarter than ours. It is that these countries are being smarter about how to educate their students. And the countries that out-educate us today will out-compete us tomorrow. (p. 2)

Intentionally broad, the plan’s stated goal is to increase local control and provide the necessary federal support. This includes Title I programs (a provision of ESEA) which are the primary funding source for lower income children and students. Amended and reauthorized in 2002 under the Bush Administration as the No Child Left Behind Act,
Title I funding\textsuperscript{22} is given to schools where at least 35% of children come from low-income families or to schools where 35% of the student population is low-income (which includes more than 50% of all public schools).

BFR is partly introduced as a response to criticism of NCLB. Criticism of NCLB’s punitive approach to educational reform and rigid emphasis on standardized testing overshadows BFR. To this end, the policy document concludes:

Throughout this proposal, we have sought to redefine the federal role in education: shifting from a focus merely on compliance to allowing state and local innovation to flourish, rewarding success, and fostering supportive and collaborative relationships with states, districts, and nonprofit partners. There are several cross-cutting changes we are proposing in order to allow local innovations to lead the way and to support the development, identification, and scaling-up of strategies that are working. (p. 39)

Accordingly, new systems of evaluation are introduced to capture more in-depth assessments of student achievement. Specific revisions include funding for states to develop a broader range of assessments to evaluate advanced academic skills, including students’ abilities to conduct research, use technology, engage in scientific investigation, solve problems, and communicate effectively. Improvement measures also include expanded assessment for English language learners, minorities, and students with special needs. To its credit, BFR leaves room for varied intervention models, with the key idea being that the federal government doesn’t mandate a specific model. If a school does not improve sufficiently, however, the state can close the school or “restart” the school as a charter school.

Building on NCLB, BFR supports “standards-based education reform” based on the premise that high standards and measurable goals boost performance outcomes. This framework includes:

\textsuperscript{22} Title I was intended to close the skill gap in reading, writing and mathematics between low-income urban and rural students and higher-income suburban students.
1) Rigorous College and Career-Ready Standards
2) Rigorous and Fair Accountability and Support at Every Level
3) Measuring and Supporting Schools, Districts, and States
4) Building Capacity and Support at Every Level
5) Fostering Comparability and Equity

Federal grants are targeted at supporting standards and assessments developed at the state level (CCS) including formula grants to high-poverty districts). States have the option of working with their four-year public universities or working with other states to establish common standards (particularly in math and English). These reforms include developing the necessary data gathering systems to measure performance and “reward success”. Data must be made publicly available and include measurements such as graduation rates, college enrollment rates, and include disaggregated data based on race, gender, ethnicity, disability, etc. States and districts are encouraged to reward successful schools and reach performance targets. To ensure equity, districts will be expected to measure and balance resources between high poverty and low poverty schools. States receive funds to design programs using one of four turn-around models for low performing “Challenge schools”. These four models are developmental in approach:

1) Transformation model: Replace the principal, strengthen staffing, implement a research-based instructional program, provide extended learning time, and implement new governance and flexibility.

2) Turnaround model: Replace the principal and rehire no more than 50 percent of the school staff, implement a research-based instructional program, provide extended learning time, and implement new governance structure.

3) Restart model: Convert or close and reopen the school under the management of an effective charter operator, charter management organization, or education
management organization.

4) School closure model: Close the school and enroll students who attended it in other, higher-performing schools in the district.

2. Great Teachers and Great Leaders
With a particular focus on measuring teacher and principal “effectiveness”, BFR emphasizes statewide assessment indicators in conjunction with state-level data systems and district-level evaluation systems that:

(i) meaningfully differentiate teachers and principals by effectiveness across at least three performance levels; (ii) are consistent with their state’s definitions effective and highly effective teacher and principal; (iii) provide meaningful feedback to teachers and principals to improve their practice and inform professional development; and (iv) are developed in collaboration with teachers, principals, and other education stakeholders. (p. 15)

Building on published “report cards” and corresponding to reward systems used in the private sector, BFR emphasizes “differentiated compensation and career advancement opportunities” in order to incent “educators who are effective in increasing student academic achievement, who take on additional roles and responsibilities in their schools, and who teach in high-need schools, subjects, areas, and fields” (p. 16).

3. Meeting the Needs of English Learners and Other Diverse Learners
This includes grant support for the evaluation of programs serving special populations including English language learners, students with disabilities, Native American students, homeless students, the children of migrant workers, and neglected or delinquent students. This includes (p. 19):
• Improving programs for English Learners and encouraging innovative programs and practices to support English Learners’ success and build the knowledge base about what works.
• Maintaining and strengthening formula grant programs for Native American students, homeless students, migrant students, and neglected or delinquent students; as well as for districts that are in rural areas or that are affected by federal property and activities.
• Meeting the needs of students with disabilities throughout ESEA and through the Individuals with Disabilities Education Act.

4. A Complete Education
Competitive grants to states are provided in support of literacy and STEM subjects that build on state standards including subgrants to high-needs districts. As an amendment to NCLB, partial emphasis is placed on “arts, foreign languages, history and civics, financial literacy, environmental education, and other subjects” (p. 28). Priority is focused on states that develop common standards, use technology to address learning challenges, consider universal design for learning principles, and align coursework with colleges and universities (including Advanced Placement and International Baccalaureate programs). Additional grant funding is set aside for innovative application of educational technology and digital media (including innovation grants to nonprofits).

5. Successful, Safe and Healthy Students
Responding to concerns about the need for community engagement, BFR emphasizes an educational continuum (from birth through career) that supports “effective community services, strong family supports, and comprehensive education reforms… in high-need communities” (p.32). Priority is placed on states, school districts, and nonprofit organizations that develop programs for Challenge schools that may redesign and expand the school schedule, including supports for nonprofits and community-based organizations. To ensure “school safety”, grantees are required to “develop and implement a state- or district-wide school climate needs assessment to evaluate school
engagement, school safety (addressing drug, alcohol, and violence issues), and school environment, and publicly report this information” p.33.

6. Fostering Innovation and Excellence
Modeled after the Race to the Top program authorized by ARRA, BFR leverages competitive funding against state-directed comprehensive reforms in standards and assessment. States and school districts are required to develop and implement comprehensive plans to improve student outcomes as measured by annual performance targets. Building on ARRA’s i3 (Investing in Innovation) program, additional competitive grants are provided to support evidence-based practice linked to as an independent evaluation. Perhaps most controversially, BFR promotes “public school choice” by providing competitive grant funding to charter schools.

Interpreting U.S. Educational Policy: A Blueprint for Reform
Building on a growing global focus on standards-based reform, BFR serves as an instrument for “rationalizing” U.S. schooling. The overriding assumption of BFR is that the development of rigorous academic standards linked to clear and measurable assessment is the means to advance high quality curricular and pedagogical practices. Reinforcing this assumption is an economic rationale that directly links high quality education and student achievement to economic growth. Much as NCLB, BFR relies on standardized testing to measure improvement. Indeed, failure to improve academic performance can trigger faculty termination and/or transformation of public schools into semi-privatized charter schools.

The main goal of BFR is to promote academic consistency across states through a federalized accountability system. Although cosmetic changes in language, are introduced to NCLB– “Teacher Quality” becomes “Teacher Effectiveness” for example, but the underlying principles of NCLB remain the same. BFR directs states to implement high-quality statewide assessments that align with newly developed state standards including yearly testing in reading and math in grades 3 – 8. Indeed, where NCLB imposed no requirements on content or standards developed by states, BFR requires
states to develop and adopt state standards in English and mathematics. States may choose to retain their current standards or work together and collaboratively to develop new common standards that ideally mirror the National Governor's Association Common Core Standards. Only those states that have implemented assessment based on common state standards by 2015 will receive formula funds.

One of the key features of BFR is a palpable distrust for the professional capacities of public teachers in the U.S. This is seen, for example, in the growing interest in merit pay as a means to steer teacher performance. Kumashiro (2012: 9) notes that merit pay represents a “form of positive reinforcement”, with the underlying supposition that teachers can be persuaded to work harder through behavioral rewards. The truth is that many of the problems associated with contemporary U.S. education- including the achievement gap- are unfairly mapped onto teachers. As many critical scholars note, the acute tensions facing U.S. schools today are rooted in a complex history of social inequity. Recent expansion in educational access due to civil rights legislation for previously disenfranchised students has meant public education has become a platform for class-based social struggle (Spring, 2008; Kumashiro, 2012; Lipman, 2009).

Despite an historic legacy of discrimination based around racial segregation, radical funding inequity, and meager investments in quality education, students from working-class and poor families remain subject to rigid and punitive disciplinary regimes (Saltman, 2010a). In Garrison’s (2012) terms, the testing regime itself reflects a misguided form of class structure that fuses technocratic business systems to caste-based social structures. Under this system, “schools assume the task of standardizing human capital as a commodity suitable for ready exchange that fits docilely into the existing sociopolitical-economic order rather than democratic individuals charged with challenging and changing the status quo” (p. 371). Put simply, the history of inequity in the United States has created a structural legacy that now uses schools as scapegoats for class and race-based oppression.

Indeed, much of the focus on testing in the U.S. reflects the interests of private sector
reform groups that have directly challenged teacher unions, school administrators and local school boards so that decision-making is no longer primarily determined by school leaders and elected officials who are governing schools and making policy decision but rather, by mega-philanthropies and corporations (Kumashiro, 2012: 7). According to Kumashiro (2012: 7),

The megaphilanthropies, like the Gates and Broad foundations, are exerting unprecedented influence over school reform. Although philanthropic funding continues to constitute only a small percentage of school funding, its influence is disproportionately large as it engages a corporate-based strategy to leverage wealth, not unlike the venture capitalists (Saltman, 2010b; Scott, 2009). This is where the term “venture philanthropies” comes from. Venture capitalists are those who leverage their wealth to make more money, and similarly, venture philanthropies are leveraging their wealth to influence policy. Primarily, these philanthropies target urban areas with the intention of piloting certain types of reforms eventually to scale up nationwide, which is why we see so much Gates and Broad funding coming into cities like Chicago (Lipman, 2011). Corporations also exert increasing influence over school reform. One example is Pearson, which dominates not only the testing market but also the test-preparation market, and is profiting enormously from funding initiatives like Race to the Top that require substantial outsourcing. Consequently, it is among the most influential educational lobbyists right now.

Between 2005 and 2009, the Gates Foundation spent $78 million on advocacy and funded the groups that wrote, evaluated, and promoted the Common Core Standards, the centerpiece of President Obama’s educational policy reforms (Ravitch, 2011: 277). Indeed, after decades of school reforms designed around neoliberal social policies, numerous studies have shown very high percentages of students struggling academically or leaving the education system altogether (Barton, 2005; Friedlaender and Darling-Hammond, 2007). Citing a recent nine-year study Ravitch (2011: 282) observes:

In 2011, the National Research Council of the National Academies of Science, our nation’s most prestigious research organization, released a nine-year study called “Incentives and Test-based Accountability”. A seventeen-member panel of social scientists, including some of the foremost experts in the world assessed the value of tying test scores to incentives: that is, to carrots and sticks, rewards and
punishments. The panel concluded that test-based accountability led to score inflation, to gaming the system, and to behaviors that undermined the value of the scores. They also reviewed the evidence and found that test-based incentives have a decidedly meager track record in boosting student achievement... When students practice the test content day after day, they learn to take the test, but the scores may not truly indicate their skills or knowledge. We have adopted a national strategy designed to raise test scores without necessarily improving the quality of education.

In response to the goals of BFR, many scholars argue that testing is the wrong vehicle for improving academic performance. Scholars collaborating with the National Education Policy Center (NEPC), for example, found that policies underlying BFR lacked an independent research base (Mathis and Welner, 2010). Despite the fact that BFR specifically argues for the need to base policymaking on the strength of empirical research (p. 41), reviewers of the document and its summaries23 (U. S. Department of Education, 2010b) found them to be largely partisan documents. According to Mathis and Welner (2010: 5), for example, this includes a “general neglect of peer-reviewed research and an over-reliance on information gathered from special interest groups, think tanks, government documents, and media reports”. Put another way, BFR is more strategy document than research-based public policy.

The most damning criticism of this policy document, however, is that it simply lacks the evidentiary basis upon which to form an empirical critique. Vital omissions include a lack of specific detail around: 1) a justification for or explanation of the accountability system used to evaluate schools (the lynchpin of the proposal); 2) the intervention models used to address low-scoring schools; 3) the research evidence demonstrating the value of competitive grants and/or charter schools for leveraging quality improvement (versus further increasing financial inequity between high-performing and low-performing schools). As Mathis and Welner (2010: 6) smartly conclude:

23 Roughly paralleling the structure of A Blueprint for Reform, the six reports included: 1) College- and Career-Ready Students; 2) Great Teachers and Great Leaders; 3) Meeting the Needs of English Language Learners and Other Diverse Learners; 4) A Complete Education; 5) Successful, Safe and Healthy Schools; 6) Fostering Innovation and Excellence.
Research should play a role in the formulation of policy. But it must be used to enlighten our discussions and not as selective, post hoc justification for predetermined ideological positions. For many of the nation’s educational problems, such as those catalogued in the Blueprint, there is a well-developed, informative, scientifically valid and independently established body of research. For those areas where our knowledge base is not yet mature, the wisest approach would be to actively seek new knowledge through pilot programs before mandating unproven — solutions as national policies.

If our goal is a more educated citizenry, our policies must be based on our best knowledge and experience. Otherwise, we risk weakening our educational system as well as our civic, economic, and social institutions. Sadly, it appears that the Obama administration is poised to continue the political misuse of research…The federal government can contribute to improving our schools most effectively when policymakers in the Department of Education seek and embrace research-based solutions—even when the research contradicts the politics or prevailing ideologies of the day.

As these scholars point out, in addition to the very weak research basis supporting BFR, the major problem with President Obama’s educational reform plans is its sweeping ideological assumptions. Building on the testing regime at the core of NCLB and an aggressive focus on charter schools, President Obama has attempted to federalize U.S. education without the proper investment in public policy research. This is a significant problem because it speaks to a larger challenge in contemporary U.S. policymaking. Indeed, the cost to education as a consequence of neoliberal welfare policies has been particularly high. Against a backdrop of neoliberal readings of KE, schooling has become little more than a conformity-driven factory. But does this make sense in the context of an innovation-driven knowledge economy?

(3) Transforming American Education: Learning Powered by Technology

In the same year as Blueprint for Reform (2010), Secretary of Education Arne Duncan released the final version of the Administration's National Educational Technology Plan (U.S. Department of Education, 2010c), a five-year action plan authored by a Technical
Working Group (TWG) focused on educational technology. Presented to the U.S. Congress by the Department of Education, the National Educational Technology Plan (NETP) represents the thinking of many of the leading scholars and practitioners on educational reform in the United States. Less a plan for implementing educational technology and more a plan for redesigning the U.S. education system, NETP offers a broad array of suggestions for transforming education. At its core, “Transforming American Education: Learning Powered by Technology” (U.S. Department of Education, 2010c) encourages structural changes to classroom education through the use of digital technologies. As the opening to the Executive Summary reads,

> Education is the key to America’s economic growth and prosperity and to our ability to compete in the global economy. It is the path to good jobs and higher earning power for Americans. It is necessary for our democracy to work. It fosters the cross-border, crosscultural collaboration required to solve the most challenging problems of our time. (p. 7)

Seeking to leverage technology to “revolutionize” education, NETP is intended as a blueprint for next generation education. As the authors observe, “technology-based learning and assessment systems will be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels” (p. 7). Against the backdrop of cost and revenue concerns, the report outlines several goals for reforming education across five areas: (1) learning (2) assessment (3) teaching (4) infrastructure and (5) productivity.

**(i) Learning: Engage and Empower**

Emphasizing personalized learning, NETP suggests that the “limitless, borderless, and instantaneous” nature of digital media now challenges education to develop engaging multimedia rich learning environments that support self-directed learning and twenty-first century competencies. This includes the use of Web tools (blogs, wikis, social networks) and data and visualization tools to scaffold student experiences with “real-world” problems.

**(ii) Assessment: Measure What Matters**
The report highlights the need for new forms of formative and summative assessment that might both diagnose and monitor student learning, as well as provide feedback on the education system as a whole. Underlining the need to adopt Common Core Standards, the report suggests that data driven systems can improve learning outcomes and provide continuous feedback to students, educators, parents, and administrators.

(iii) Teaching: Prepare and Connect
NETP also calls for teacher capacity building in STEM competencies and team-based teaching (or connected teaching) through professional communities of practice. Educators are viewed as critical to reforming education provided they are properly trained, rewarded, and supported by ubiquitous access to resources, data and analytical tools. The systemic lack of technology literacy across the field of education (teachers, researchers, and policymakers) is seen as significant challenge.

(iv) Infrastructure: Access and Enable
Underlying all five goals of NETP is technology as an enabling (cyber) infrastructure for education. This includes both institutional infrastructure (people, processes, learning resources, policies and models for improvement) and technical infrastructure (broadband connectivity, networks, servers, software, and management systems). NETP suggests that technology is now at an inflection point in which cloud computing and OER could transform education from a system of “rigid information transfer” into an “always on” network connecting data, learning communities, and multimedia resources. Part of the challenge is creating interoperability standards for content and student-learning data to improve decision making at all levels of the system.

(v) Productivity: Redesign and Transform
Building on the need for infrastructure and taking its lead from the private sector, NETP advocates fundamental structural changes to education around data management and continuous improvement. This includes managing and monitoring financial performance data, integrating diverse data systems, and adopting common cost-accounting standards to benchmark and analyze costs over time. As the authors point out, K–12 education
spending per student has increased by more than 70 percent over the last 30 years without a commensurate improvement in outcomes. The plan suggests rethinking basic assumptions including restructuring schooling by competence (rather than age or “seat time”), introducing flexible scheduling (around student needs) particularly through online education, and utilizing “smart” systems.

**Discussion: Interpreting NETP**

Of the three policy documents examined in this study, NETP offers perhaps the most compelling vision for transforming U.S. education for KE. Building on an economic development rationale, NETP focuses on aligning the use of digital technologies in schools with the broader applications of technology in the workplace. Accordingly, education is now an urgent priority driven by the need for more highly educated workforce with particular STEM competencies and skills. Taken as a whole, NETP is highly comprehensive in its recommendations for potential changes to schooling. The main deficits of NETP, however, are its’ under appreciation of the growing need to make education highly personalized (relative to the Creative Economy) and networked (relative to the Network Economy). While the plan is effective at laying out an extensive framework (across learning, assessment, teaching, infrastructure and productivity) for technology-mediated education, its strengths mostly lie in pointing to the need for developing a new and advanced technological infrastructure supporting educational transformation (especially teaching and assessment). Perhaps more importantly, NETP points to the need for developing incentives for solving the “grand challenge problems” facing education.

In my view, the strength of NETP is a focus on the need to resolve “grand challenges” facing postindustrial societies. As NETP concludes, perhaps the ultimate grand challenge facing us today is education itself:

---

---

24 Highlighting the *Higher Education Opportunity Act* (P.L. 110-315), passed in August 2008 and the introduction of the National Center for Research in Advanced Information and Digital Technologies (or Digital Promise), the authors highlight the potential of “grand challenge problems” to incentivize communities of scientists and researchers to build solutions for education.
Today, we have examples of systems that can recommend learning resources a person might like, learning materials with embedded tutoring functions, software that can provide UDL supports for any technology-based learning materials, and learning management systems that move individuals through sets of learning materials and keep track of their progress and activity. What we do not have is an integrated system that can perform all these functions dynamically while optimizing engagement and learning for all learners. Such an integrated system is essential for implementing the individualized, differentiated, and personalized learning called for in this plan. (p. 78)

This point would be much stronger, however, if it were more directly linked to entrepreneurship education, a point I will return to in the conclusion of this study.

Critics of NETP argue that the plan does not go far enough. Horn & Mackay (2011), for example, suggest that the plan is simply too iterative and simply lacks a strategy for disruptive innovation. In response, the plan’s authors suggest that disruptive innovations are more likely to come from the “edge” than the “core” and suggest that formal education is in fact only one node in an emerging learning ecology (Atkins et al, 2011). Waks (2011) argues that NETP lacks the kind of radical ideas on transformation that underlie changes in industries outside of education. In his view, NETP continues the command-and-control model for micro-managing education, rather than capitalizing on the network affordances of technology. Put differently, while it seeks to replace the limitations of the “factory” model of schooling, NETP manages instead to construct what Waks describes as a “flexitronic” model of schooling:

The TAE [Transforming American Education] “revolution” has two cardinal features: (a) strengthening the dominance of SOC [standard subject matter, analyzed into goals, objectives, and competencies] in curriculum, teaching, assessment through a pervasive system of measurements and controls, and (b) diversifying learning environments and methods for conveying SOC and connecting teachers for collaboration and exchange in the delivery of SOC. This adds up to greater control over learning by the central, financially dependent state and local educational agencies, and stakeholder clients. (p. 5)
As he points out, the chief distinction to be made in evaluating NETP is between centralized and distributed control models. Underlying the design of NETP is a continuation of the basic industrialized schooling system in which the structure of the factory school remains unchanged.

**Conclusion: Rethinking U.S. Education Policy**

The central problem with contemporary education reform policies is that they are simply outmoded. Locked into the factory logics of the industrial age, the Obama administration has made little effort to analyze the broad technological transformation that is remaking U.S. society and economy. As Waks concludes, each feature of factory schooling has been fine-tuned to fit a much larger industrial social order. It is for this reason, he suggests, that any reform of U.S. education will require a systemic shift that builds upon a new paradigm of learning linked to a global knowledge economy.

The rise of competitive international benchmarking systems like PISA and TIMSS (Trends in International Mathematics and Science Study) reflect an expanding global competition between national economies based around a capacity for skilled labor and national systems of innovation. This globalization of competition is driving a convergence of policies and strategies that key educational reform to the assessment and ranking of educational performance (Rizvi and Lingard, 2010). A large and growing industry has evolved around the use of standardized testing to measure and assess learning. In the U.S., this testing regime is often justified on the grounds that standardized testing can assist in “closing the achievement gap” between middle-class and working-class students. This is despite the fact that research has clearly shown that this achievement gap is rooted in an extensive history of discrimination, segregation, and inequitable funding (Ladson-Billings, 2006; Kumashiro, 2012). Indeed, under neoliberal social policies, the achievement gap has widened substantially with some “school districts spending more than four times as much per student as neighboring districts” (Kumashiro, 2012, p. 7).

Notwithstanding the obvious importance of education as a means for national economic
development, there remain open questions about the long-term effectiveness of the reform strategies now applied in U.S. education policy. Critical educationalists, for example, argue that raising achievement scores of disadvantaged students in order to enroll more students in higher education will not solve the growing challenges facing the U.S. economy. As Garrison (2012) observes, the problem today is that the testing regime itself checks the very “development of genuine individuality by keying social success toward a relatively small array of attributes approved by the aristocratic classes and away from those attributes that might threaten existing power structures by releasing unique potential” (p. 375). Indeed, this research study argues that the education system itself needs to be fundamentally reimagined. Rather than incrementally improving basic academic skills, the question today is rooted in fundamentally rethinking the purpose of schools. In an era in which knowledge has become a commodity, questions about knowledge transmission or the educational delivery become less substantial.

In the next chapter, I point to the need to move beyond economic philosophies that anchor schooling to educating factory workers for a mass society. More specifically, I speculate on the potential of new forms of social and economic investment that move human development beyond neoliberal social policy. Using in-depth interviews as guides for framing the discussion on educational reform, I develop an interpretative account of the kinds of changes that I believe are needed in U.S. education. Based on these interviews, it is clear that systems of education are now facing an evolutionary phase shift that will move them beyond an industrial era.
CHAPTER SIX: Interviews and Findings

Implications for U.S. Educational Reform

In the previous chapter, I introduced a critical analysis of the policies that now frame U.S. educational reform. In Chapter Four, I approached the discussion of KE in critical and exploratory terms by looking at multiple accounts of KE. These exploratory accounts of KE are inextricably linked to the goal of building a case for reforming education in light of research data produced through qualitative inquiry. This dissertation study seeks to problematize the notion of “knowledge economy” in order to more fully appreciate the challenges inherent in formulating U.S. education policy. Consequently, the objectives of this study are rooted in an analysis of the contextual structuring of public policy, and the way that policy discourses relate to and affect education.

In this chapter I present interview research and findings with a particular interest in advancing a new policy framework for changing the course of education in the United States. Building on qualitative research, I argue that a key theme linking various paradigms of KE is the increasing importance of innovation. Beyond an era of industrial workers, students are now under pressure to develop competencies that enable them to compete in a global era driven by creativity and entrepreneurship (Zhao, 2012b). Despite this fact, there remains a general lack of thoughtful political strategies for transforming education today. Indeed, as Means (2011) suggests, contemporary educational policies in fact stifle creativity and innovation: “Invocations to unleash creativity and innovation in educational contexts appear to stand in tension with the realities of the reorganization of education along the lines of privatization, audits and testing, standardization, and the marginalization of the social sciences and the humanities- processes that place limits on knowledge production and the free and cooperative exchange of ideas” (pp. 224-5).

Notwithstanding the importance of “skills development” in the context of STEM disciplines, this study suggests that a much wider range of competencies is necessary to support postindustrial societies in the 21st century. As I conclude, a central challenge
facing OECD countries today is that the structures underlying the production, preservation, and transmission of knowledge are changing (McNeely and Wolverton, 2008). In the contemporary milieu, for example, technology has begun shaping new institutional potentials and coalescing around entirely new network formations of a knowledge society. A central feature of digital technologies, for example, is their capacity to automate labor at all skill levels (Zuboff, 1988; Brynjolfsson and McAfee, 2014). As computerization enables deep structural changes in postindustrial societies, it simultaneously makes many forms of labor redundant. This has lead several scholars to suggest that automation is inevitable and that education is necessarily undergoing a vast restructuring (Brynjolfsson and McAfee, 2014). As technologies “like robotics, numerically controlled machines, computerized inventory control, and automatic transcription” substitute for routine tasks, various forms of labor become increasingly automated and so to do forms of knowledge and learning (Brynjolfsson and McAfee, 2011: 41).

**Interview Data**

I now turn to a detailed examination of the implications for shaping contemporary education policy in light of all four models of KE. This analysis is supplemented by research data from interviews conducted with researchers and policymakers whose work overlaps learning and KE. These scholars include:

1) Richard Florida, Director of the Martin Prosperity Institute at the University of Toronto, and leading proponent on the Creative Economy.

2) Michel Bauwens, founder of the Foundation for Peer-to-Peer Alternatives, and noted expert on the Network Economy.

3) Sam Pitroda, former Chairman of India’s National Knowledge Commission (2005–2009), Advisor to the Prime Minister of India, and founder and first chairman of India’s Telecom Commission.
4) Cathy Davidson, the John Hope Franklin Humanities Institute Professor of Interdisciplinary Studies at Duke University, a member of the National Council on the Humanities, and noted expert on digital media and learning.

5) Donald Brinkman, Program Manager at Microsoft Research in digital humanities, digital heritage, and games for learning, and former Program Manager with the Education Products Group.

6) Tony Wagner, Innovation Education Fellow at the Technology & Entrepreneurship Center at Harvard University and the founder and co-director of the Change Leadership Group at the Harvard Graduate School of Education

7) Tony Seba, Lecturer in entrepreneurship and clean energy at Stanford University and founder of several technology companies in Silicon Valley. He is Global Cleantech Advisor at Global Technology and Innovation Partners, and a member of the advisory board of the Stanford Society for Entrepreneurship in Latin America.

What becomes obvious from these interviews is that the discourses on KE have introduced significant pressure to reform education. The rise of new economic players across industries, and shifts in the kinds of competitive jobs and skills needed in advanced economies has focused considerable attention on education policies in OECD countries (Lundvall and Johnson, 1994). Despite this growing pressure, however, no formal model of postindustrial education has emerged to begin to transform education. Indeed, there remain open questions about the long-term effectiveness of the reform strategies now employed in U.S. education policy. More to the point, the findings from this research indicate that educational reform must move beyond incremental improvements in transmitting basic academic skills, and begin to more closely link schooling to practices of creativity and entrepreneurship.

Rather than framing education in terms of the needs of mass industrial society (i.e., education as a public good or as a means to social reproduction), educational reform
policies today are largely seen as driving towards the needs of a global knowledge economy. Part of the problem, however, is that there is no consensus on what redesigning education for the knowledge economy amounts to. Indeed, new developments in overlapping and expanding literature within economics, sociology and management studies, suggest that definitions of KE continue to proliferate. As this study has attempted to demonstrate, one of the underlying problems facing educational reform today is that there is not one vision of KE upon which to redesign education, there are in fact many. Looking at the four archetypal models of KE in the context of education, for example, we find several distinctive frameworks on educational reform.

Table 5: Four Models of the Knowledge Economy

<table>
<thead>
<tr>
<th></th>
<th>PARADIGM 1</th>
<th>PARADIGM 2</th>
<th>PARADIGM 3</th>
<th>PARADIGM 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Focus</strong></td>
<td>Human Capital</td>
<td>Networked Commons</td>
<td>Intellectual Capital</td>
<td>Natural Commons</td>
</tr>
<tr>
<td><strong>Key Actor</strong></td>
<td>Knowledge Worker</td>
<td>Peer Producer (Produser)</td>
<td>Creative Class</td>
<td>Green Jobs</td>
</tr>
<tr>
<td><strong>Learning/Training Focus</strong></td>
<td>STEM Skills</td>
<td>Collaboration, the Commons</td>
<td>Creativity and Innovation</td>
<td>Green Technologies</td>
</tr>
</tbody>
</table>
The Knowledge Economy: Education as Human Capital Development

Most advocates of KE policies supporting educational reform point out that the U.S. education system was shaped for an era in which global trade in goods and services was much less fluid. KE policies view STEM competencies as fundamental to postindustrial society as these skills are seen as vital to stimulating continuous innovation. Underlying educational reforms is the notion that human capital is the key to driving innovation and that economic growth is rooted in the a skilled laborforce. Sam Pitroda, for example, describes human capital development as critical to the future success of NIEs like India. As a key advisor to the Prime Minister of India and Chairman of India’s National Innovation Council, Pitroda argues that schools should leverage innovation in the education system itself.

Pitroda:

[Policymakers] believe that we need to focus on really improving [the] quality of people. See when I look at the global scenario today I find that we have spent billions and billions in improving quality of products but we have not spent time and money to create people… So we are not really focused on creating people… [A]t the end of the day we believe you need young people to focus on discipline, analytical ability, creativity, respect for the other viewpoint, ethics, globalization and multidisciplinary approach to everything.

As the former Chairman of India’s National Knowledge Commission, he points to the daunting challenges facing India’s development and the country’s critical need for skilled labor.

Pitroda:

We need to create 20 million new jobs year after year, how do we do that without focusing on knowledge? So we need to improve education, knowledge institutions and… we need development. Everything is happening in India but perhaps not happening fast enough. We’re not building roads fast enough; we’re not improving power requirements fast enough. So for all of these we really need knowledge to drive these initiatives. So [the] Knowledge Commission has eight members, we meet once every couple of months for two or three days and we look at essentially five aspects of knowledge. Access to knowledge, knowledge
concepts, knowledge creation, knowledge applications and knowledge production….Then we look at all knowledge concepts which relate to education, school education, work education, distance learning, open education, university education, teacher training. We also look at things like how do we get more of our kids to go into math and science. How do we get more kids to go through Ph.D. programs? Then we look at creation of knowledge, who creates knowledge, how knowledge is created. Essentially we focus on innovations, entrepreneurship, patents, copyright, trademarks, and all that. Then we look at application of knowledge in agriculture, health, small and medium scale industries, and traditional knowledge. We have large amount of traditional knowledge that we need to digitize, computerize, organize, sort it out whether it has to do with music, art, herbal medicines, yoga, you know, we just finished documenting a million manuscripts into digital format. These are manuscripts written 1500 years ago on banana leaves for example. You can get all of these on the website today. Then finally we look at e-governance to focus on the role of knowledge in improving governments, at federal level, at state level and at district level. So some total we look at about thirty different subjects in knowledge. We decided to set up a knowledge commission in and not a commission on education, not a commission on IT, nor on science and technology. Rather than vertical slice we decided to look at the horizontal slice.

In the U.S., concern about human capital is more directly focused on rising inequality. Tony Seba, a noted Silicon Valley entrepreneur and university educator, argues that unequal access to quality education is the central problem facing the United States.

Seba:

Education should be a lifetime pursuit now. The half-life of knowledge or the half-life of skills is getting shorter and shorter…[and] I think inequality of access to education is the biggest challenge facing the U.S. today. It’s not a question of people or technology or money, its inequality of access to education. You know, the top institutions are lavishly financed and well managed, but pretty much the rest are left to their own devices… and they just can’t compete. Most education at the high school and middle school level is local. And local funding and local management just cannot compete with the quality of the top 1% or so. And local education means that education is overly politicized. You have politicians and lobbyists setting not just educational goals but actually writing the content in textbooks and classrooms… This is not just dangerous; this is ignorant. This preserves ignorance not education.
Building on the discourse of KE, U.S. educational reform is now largely colored by explicit concern related to relatively low levels of academic achievement in many public schools. The policy approach taken by the Obama Administration has been a strong focus on “nationalizing” the U.S. education system in order to standardize access to quality schooling. Seba echoes this view, arguing that a more coherent national education system is critical to minimizing inequality.

Seba:

We definitely need a more national educational system… If you look at the Department of Education, it is the smallest Cabinet-level department in the federal government. It is less than 10% of the budget of the federal government. It was also just created one generation ago, in ’79. It didn’t exist before. What that tells you is that education has not been a national priority in the U.S. Historically… a national educational policy may not have made sense [in such a big country], but in this day and age… the local educational system doesn’t make sense anymore. We need a lot more national government in education not less…. I don’t think education today has anywhere close to the priority it should. And you know, if the budget is an indicator of priority, we see the military as being 10 times more important… The truth is that the military is important but what has made this country great is innovation and technology and its economic might. And this is mainly going to come from education… so we have to make education at the federal level a higher priority. No doubt about that.

According to Harvard professor Tony Wagner, however, this approach may be necessary but not sufficient. In his view, the problems with education today are manifold.

Wagner:

Framing the problem, I think most people believe that the only real problem we have in education is raising the achievement of our disadvantaged students and getting more kids to college. My view is that if we merely aspire to that goal, we will leave all of our kids behind. That we need to fundamentally re-envision and rethink education for the 21st century, just as we had to rethink the one room school house for the industrial era.

From Wagner’s perspective, the educational reform movement in the U.S. lacks a sufficient understanding of the problem that a knowledge-based economy poses. Rather
than focusing on transmitting basic academic skills and competencies, he argues that educational reform needs to be more closely geared towards the creative application of knowledge.

Wagner:

From my point of view, the fundamental reality is that we don’t have an economy that can employ kids who graduate with the kinds of skills that our kids graduate with. Which is to say, skills that are kind of low-level intellectual and academic skills. We don’t have an economy that can employ those people anymore. We don’t have you know, blue-collar wage work. We don’t have manufacturing. Post World War II, we were the largest manufacturing economy in the world. Today, it employs, what-- not even ten million people. Right now today- what most people don’t realize- they say ah, the unemployment rate is going down, isn’t that good news? Well, you dig a little deeper and you realize it means nothing. Because in point of fact, we have a smaller percentage of Americans working today in the labor force than at any time since 1978, when women first started entering the labor force in large numbers. 63% of Americans are either employed or looking for work. Then you subtract out the one’s looking for work, and you’re barely over half of the country has a job. Then everybody says, well you send more kids to college and it’s going to solve the problem. Well, you look at the combined under and unemployed rate of very recent college graduates and its disastrous. Depending on whose numbers you believe, the underemployment rate is well over 40% with an additional 10% or more who are unemployed. By underemployment, I mean kids who have a job that don’t require a BA, and don’t pay BA degree wages. You know, we’re worried about government debt in this country. The debt we really should be worried about is college graduate debt, which averages over 26,000 dollars per kid and can’t be forgiven with bankruptcy.

The Knowledge Economy: Implications for Educational Reform

Indeed, Wagner’s perspective is echoed by most of the interviewees in this study. The growing concern outlined by these experts on KE is that the U.S. education system lacks the capacity to educate students for the kinds of skills and competencies needed in the 21st century. Cathy Davidson, professor at Duke University and a recently appointed member of President Obama’s National Council on the Humanities, notes that that there is vast dissatisfaction with the U.S. education system. As she elaborates, schooling itself
needs to be rethought today in response to the demands of a nascent revolution in digital technologies.

Davidson:

I think we need a paradigm shift [in education] and once we have a paradigm shift... everybody is ready. I don’t know teachers who like the current system. I don’t know students who like the current system. I don’t know administrators who like the current system. You know, I think people are really aware that the current system was developed out of a whole series of industrial age assumptions that no longer are pertinent and if we’re creating, if the purpose of the institution is to support people’s success in a certain kind of cultural environment—now that that has changed we need for institutions [to support] different institutional configurations. It’s basically [that] what we know as school has existed for 120 years and that’s not very long. We’re fifteen years into the digital revolution... Fifteen years into the industrial revolution, we were just inventing the common schools, you know, Horace Mann in the 1840s inventing the common schools. So you know, it took a long time to invent the current system but you know, ah the same kind of evolution will happen for the digital age. It has to, it’s just not working.

While current educational policy reform focuses on tested academic achievement as the key output of schooling, the question many critics ask is whether educational “reform” will ever be sufficient to reshape education systems built for mass industrial society. Like Davidson, Wagner is critical of U.S. education particularly with regard to what he describes as incremental reform at the federal level. Linking U.S. educational reform policies to what he characterizes as a faulty assessment about economic change, he offers a critique of the assumptions underlying education policy today.

Wagner:

I think [President Obama’s educational policies] have been a disaster. I think first and foremost driving states to evaluate teachers on the basis of standardized multiple choice test scores, for which students themselves have no accountability— as I said, I think it will drive the best teachers out of the profession. I think it is a profoundly unprofessional way of assessing teacher effectiveness.

In his view, the current national reforms based on data collection on student performance, including the implementation of CCS and the design and deployment assessment
systems, fall far short of the sorts of innovation needed to transform U.S. education. Wagner elaborates:

I think that it's not a matter of getting incrementally better at what we already do. It's a matter of fundamentally rethinking, reimagining - first and foremost- what are the outcomes that matter most, what should students know and be able to do, in an era where knowledge has become a commodity, and where the world doesn’t care how much you know. What the world cares about is what you can do with what you know. And secondly, how do we motivate today’s students to want to achieve levels of excellence. And then thirdly, how do we deal with the elephant in the room that nobody wants to talk about, which is the childhood poverty rate, which is the real story behind the achievement gap.

Wagner is right to point out that formal education has historically been geared to serve the needs of a highly stratified and predictable workforce. Beyond age-graded classes of fixed size and pacing, however, schooling is now tasked with being able to support new competencies that drive postindustrial societies. Indeed, the results of this study indicate that the current education system is in fact holding back this transformation. The point here is that retooling schooling for KE is more complicated than simply reinforcing STEM disciplines through an enlarged testing regime. As Wagner observes, it means reexamining the structure and provision of the education system as a whole.

Wagner: The world doesn’t care how much you know, that's a commodity—you can look it up on the Internet. What the world cares about is what you can do with what you know. Which is a completely different and brand new education problem. We created our education systems in an era of knowledge scarcity. If you wanted to know something you had to go to the library. And if you wanted to know something that you had to sort of recall frequently you had to memorize it. Well, neither are true any longer. We have now a knowledge abundance system, not a knowledge scarcity system. That changes everything. It changes the purpose of education. You know, it used to be that you had to go to a teacher because we teachers were the only ones in possession of those things called clay tablets, or then the papyrus reeds, or then those things called books- very expensive. And so you had to go through us to acquire the knowledge that we were in possession of. Well now knowledge is democratized, everybody has it. You don’t need a teacher to get it. So then what’s a teacher for? What’s school for? These are brand new questions. And nobody is even asking them, let alone trying to answer them.
Indeed, for most of the interviewees in this study, the overarching view is that the kinds of educational reforms required for KE are not being properly addressed in U.S. education policy because “assembly-line” schooling does not prepare students for a postindustrial society.

Wagner:

Just looking at it from the point of view of jobs, just being very pragmatic about it. Structured routine jobs are all but gone out of our economy. The only ones that are left are local service jobs that pay minimum wage- service and retail. Manufacturing, white collar structured jobs are gone. *Even* jobs that have been considered comparatively *unstructured* - like law or accounting- are disappearing. And some kinds of medical practices are disappearing- like radiology. So what does that leave to employ people? Well, it leaves a large area of innovation and entrepreneurship. But that then demands that we prepare young people very very differently. *You can’t prepare kids for an innovation economy on an assembly line*. And that's the core contradiction. We have factory model, assembly line, batch-processing schools that are holdovers from the industrial economy. But we don’t have an industrial economy.

Despite the current influence of neoliberal thinking in educational reform, many of the experts interviewed in this study suggested that this corporatization of schooling was a large part of the problem. Michel Bauwens, founder of the Peer-to-Peer Foundation, was perhaps the most pointed in his criticism.

Bauwens:

I’m not sure all the following are connected to neoliberalism stricto sensu, but here are the main problems in education … 1) exaggerated standardization and testing in the primary grade, and hence a loss of focus on the whole individual, on critical thinking and on citizenship awareness; 2) commodification of education, which is increasingly seen as just obtaining skills for the market, and thus also, less and less attention to humanities and arts; 3) the problem of life-long debt dependency of students and how that constrains their choices of studies; 4) the increased control on teachers, heavier administrative burdens and less freedom to teach how they see fit.
This view is echoed by Wagner as well. Speaking to the issue of charter schools, for example, Wagner criticizes what he describes as the “business theory of change” in educational reform.

I think [it is a mistake] for the Obama administration to believe that charter schools are going to be a panacea for education. Essentially its the business theory of change: The business theory of change is that the problem with education is the lack of competition so you create competition with charter schools and things will get better-- number one. And number two- that what is really thwarting, um, improvement of education is teacher unions and so if you get rid of teacher unions that will be good too. And I see the Obama Administration as kind of furthering both goals. Neither one of which is there any evidence what so ever will make a difference in terms of the outcomes that matter most. Certainly--I’m actually—I helped start one of the first charter schools in Boston, and I believe that some of the best schools in this country happen to in fact be charter schools, but the research evidence say overwhelmingly [that] there are as many bad charter schools as there are good and most of them are no better, no different.

Beyond neoliberal accounts of KE, there are in fact many alternative policy models for framing education. Alongside a transformation in the economy, there is a need for a corresponding transformation in the social and economic philosophies that now guide education. Indeed, despite the fact that U.S. educational policies fall short of many of the new social policies discussed in the context of Social Investment Theory (a point I will return to in the final chapter), there is nonetheless a strong recognition of the need for rethinking education policy today. Critics of the neoliberal readings of KE argue that the celebration of “knowledge workers” minimizes class stratification and ignores the systems of exploitation that undergird capitalist economy.

The Network Economy: Education and Peer Production

Critiquing the influence of neoliberalism on education, Bauwens argues that current educational reform policies will only serve to expand social inequality.

Bauwens:

I see two main different interlocking crises... The first issue has its roots in the educational model in industrial capitalism, i.e. the centralized organization, the formatting of processes making education work like a factory, etc. The second
issue derive from the pathological mode of neoliberal cognitive capitalism: the underfunding and destruction of equality-producing public education in favor of inequality-producing private education; the destruction of any form of deep education that creates a full and rounded human being, and its replacement by purely functional ‘business’ and ‘industrial’ education.

For Bauwens, neoliberal capitalism is a pathological system that is predicated on false assumptions about human development. Indeed, he takes issue with the very idea of KE:

I actually reject the concept of the knowledge economy. Knowledge is not a scarce good, and should not artificially be made or kept scarce through legal repression or technological sabotage. So knowledge is by definition outside the economy of supply and demand but is the general context through which humanity operates, Knowledge, culture and science are part of the sphere of human abundance that the economy can profit from, and in turn can enable. The economy is the sphere of the circulation of scarce and rival goods, which exist to allow human culture and knowledge to thrive. So all humans should be educated for knowledge and culture as global citizens, and helped to create the economic value, which allows them to live and thrive and produce and exchange culture in their civic lives.

Unlike conventional definition of KE, human capital does not subsist in the individual alone. Rather, in the NE model, socially mediated networks are often described as a fundamentally new logic and/or a new stage in history (Castells, 2000). For theorists on KE as “cognitive capitalism”, for example, NE elides with notions of networked innovation as converging around language and ideas in the generation and circulation of values and artifacts. Here the object of production increasingly becomes subjectivity itself: “As biopolitical production becomes a dominant force of production, surplus value increasingly depends on the exploitation and expropriation of the creative and communicative circuits of culture- or what can be said to form the ‘common’ ” (Means, 2011, p. 216). As Hardt and Negri (2009) note, this does not mean “that the production of material goods, such as automobiles and steel is disappearing or even declining in quantity, but rather that their value is increasingly dependent on and subordinated to immaterial factors and goods” (p.215).
For Bauwens, the NE paradigm represents a new frontier in social production. Pointing to the importance of shared collaboration in the development of “use value” over “exchange value” he outlines an alternative model of KE. The key point is that capitalism abhors the “common” even as its future depends upon it (Hardt and Negri, 2009). Accordingly, peer production is now becoming a primary source of value in so much as production is increasingly growing autonomous from the demands of capital.

Bauwens:

Our basic hypothesis is that peer-to-peer networks engender a new type of sociality that is fundamentally transforming our societies. In particular, we focus on the self-aggregation of people around the common creation of value, based on shareable IP, which we call peer production, and its associated modes of governance and property. We monitor both the bottom-up institutionalizations of such processes, but also the adaptation of the existing institutions to such challenges. We consider three paradigms to be the key: the openness, focusing on open and free contributions; participatory processes or ‘deep democracy’; and the commons or sharing paradigms, which concerns the results.

Bauwens is unambiguous about the democratic potential of peer production:

In the context of the emerging system of peer production, citizens should be enabled to participate in a contributory economy, that rests on contributed knowledge. This means: 1) discovering your passion 2) learning skills to co-create 3) finding ways to contribute to the general welfare. So the key is to find the intersection between passion, skills, and what is needed by concrete human communities.

Bauwens rejects the ideal of “human capital” and predicated notions of exchanging labor for capital, arguing instead for the need for “use value”.

Bauwens:

We need to put use value at the core of our society and economy again, and consider exchange value as a mere means to an end. As we move away from the commodification and instrumentalization of the human, we can start seeing ourselves integratively, as a set of ‘capitals’ that can be developed over time through self-work, and co-production, including relational capital, knowledge capital, social capital, etc.
In the NE paradigm, learning is increasingly viewed as interdependent with mass participation (Davidson and Goldberg, 2010). Building on discourses that view ICTs as bridging a global society, knowledge and learning within the NE paradigm strongly overlaps discussions on collaboration. In Cormier’s (2010) terms, for example, the *community is the curriculum*. Less driven by knowledge transmission and more closely joined to communities-of-practice, learning is understood in terms of “rhizomatic” networks. Indeed, for Bauwens, education is now deeply interconnected with collaboration and the co-creation of value in a P2P driven era.

**Bauwens:**

The traditional education of industrial society was about creating packaged goods. Clearly defined skills and knowledge so that the products of education would fit in the economy. But a knowledge society needs much more creative, transdisciplinary individuals who can creatively co-construct and problem solve in productive communities that are much more fluid than before. More importantly, the modern generations crave above all to have meaningful occupations, and since the current system insufficiently responds to this, many are creating their own occupations, through new forms of ethical and social entrepreneurship, that create value but also social good. Their learning process to achieve this is now mostly by stealth, through the interstices of the educational system and through the access to networked communities where a lot of self and peer learning takes place. These kind of parallel education needs to become a much bigger part of the new educational mainstream. I would suggest that in the new educational systems, co-creation in productive communities is part of the educational practice.

Speaking to the need to rethink education in the 21st century, he suggests that the challenge today is to transmit the new tools and practices that make accessing networks equally available to all.

**Bauwens:**

The immediate effect of networked learning is that it favors those who have learned autonomy, but still leaves broad layers of the student and non-student population behind. Thus, while it enables many, it also in the short term creates new inequalities between those that have the means and skills to use networks, and those that have difficulties with this. Thus part of educational reform must also be the sharing of means and skills to create equality of access, and the cognitive and social skills needed for this type of participation.
Not all of the experts interviewed were entirely predisposed to positive characterizations of the NE paradigm. In Donald Brinkman’s view, for example, it is a mistake to interpret contemporary innovations in technology as somehow detached from the realities and contexts in which they are embedded.

Although it may be true that network-mediated learning leverages agency and autonomy in the context of “situated” networks of artifacts, technologies, and people (Lave, 1998; Lave & Wenger, 1991; Brown et al, 1989; Varela, 1991). It also true that this largely depends on socially mediated access to these networks (Vygotsky, 1978). As Selwyn (2009: 92) reminds us, learning is now strongly connected to an individual’s capacity to access specialized information sources (personalized learning). Selwyn is especially critical of “unwarranted valorization of the individual ‘rational’ learner operating within an efficient technological network” (p. 94). Brinkman, a Program Manager at Microsoft Research, is also critical of the exaggerated expectations of networked collaboration. He points out that peer production remains highly dependent on hierarchical organization, citing the democratic decline of touchstone projects like Wikipedia. At the same time, he is enthusiastic about the growing influence of network-mediated practices on education, particularly Open Educational Resources and Open Access scholarship.

Brinkman:

There’s great examples like the open annotation consortium and object reuse and embedding OER. OER and OAC (Open Access Coalition) are some really I think excellent movements that are really trying to allow objects to have unique identities that can be expressed no matter where you’re surfacing your query and allow yourself to not only retrieve those objects but also connect them to other objects and create annotations around them. So this is the line I have of more inner connected knowledge experience where when you look at a piece of data you can see not only data that is related to it but you can also see what other users have done and think of it in a social way and try to understand what other academics are doing with that data and start to pull connections just based on – – I think the ability to discover new patterns and come up with new insights by seeing widely disparate data is really important… if we can create a common corpora or the ability to link corpora together then we create the ability for people to compare these datasets and see where these things would exist there. But you
know, I’m focusing on only one aspect, I mean it’s such a big question for the ability to read information and to see the connections between information as just a method of exploring in a much more free flowing manner…

Perhaps the strongest critique of the influence of technology today its influence in restructuring how work is now done (Autor et al., 2003; Dyer-Witheford, 2000). For contemporary theories on digitally mediated labor, ICTs now form an underlying infrastructure translating knowledge work into routine practices. Notwithstanding the fact that new tools engender changes in the way people interact, communicate, and collaborate (Siemens, 2004), the growing standardization of knowledge and skills suggests that “knowledge work” elides with a long-term process of de-skilling. Brown et al. (2010), for example, argue that software is in fact standardizing and codifying knowledge work so that it might be outsourced to where ever labor is cheapest. Accordingly, this “digital Taylorism” is accelerating income polarization and rising inequality.

**The Network Economy: Implications for Educational Reform**

Perhaps the most significant sign of NE’s promise of transformation today is that it is becoming part of the discourse on institutional reform (Iiyoshi & Kumar, 2010) (OECD, 2007c). Together, OS Projects like Wikipedia and Linux, and social platforms like Facebook and Twitter, are used to demonstrate the rising importance of networked connectivity across institutions and practices (Granovetter, 1973). Networked collaboration, it is argued, is highly conducive to learning and innovation because production itself is grounded in self-organizing systems of collective intelligence (Ito et al., 2008; Lévy, 1997).

Building on the NE paradigm, learning and education should increasingly be seen as interdependent with what Cormier (2010) calls the “rhizomatic model” of learning. Where the traditional method of expert instruction requires significant time and resources, collaborative knowledge construction in the form of wikis, blogs, and online communities is as key to restructuring the way people build and use knowledge (Brown et al., 1989; Brown and Adler, 2008). These social learning practices support “a more
discursive rhizomatic approach to knowledge discovery”, based on both the exploration of an established knowledge canon and the negotiation of what in fact qualifies as knowledge itself (Cormier, 2010: p. 515). Accordingly, curriculum is less driven by transmission (predefined inputs by experts), and more defined by and through those mutually engaged in the learning process. As Cormier suggests, the community acts as the curriculum, “spontaneously shaping, constructing, and reconstructing itself and the subject of its learning in the same way that the rhizome responds to changing environmental conditions” (Cormier, 2008):

Community as curriculum is not meant as a simple alternative to the package version of learning. It is, rather, meant to point to the learning that takes place on top of that model and to point to the strategies for continuing learning throughout a career. There is a base amount of knowledge that is required to be able to enter a community, and there are methods for acquiring the specific kinds of literacy needed to learn within a specific community. A learner acquires basic forms of literacy and associates with different peer groups. Networks begin to form and, occasionally, communities develop. Knowledge is created and sometimes discarded as the community interacts. Knowledge does not develop and spread from and through concentric circles. There are no “plastics” to be learned and no canon to consult to ensure that a new skill has been acquired. Knowledge is a rhizome, a snapshot of interconnected ties in constant flux that is evaluated by its success in context. (Cormier, 2010: 516-7)

In this networked environment, education is perhaps best framed as community participation.

The Creative Economy: Education and Creative Practice

For advocates of the Creative Economy, creativity is viewed as the key to unlocking postindustrial societies. Scholars and theorists like Daniel Pink (2005), Richard Florida (2002), Ken Robinson (2001) and John Maeda (2006), have each emphasized the need for enhancing creativity in education, particularly in relation to related notions of talent formation and self-expression. Indeed, much of the thinking on CE borrows from constructivist notions of education rooted in the work of John Dewey (1975), Maria Montessori (1964), Jean Piaget (1954), and Lawrence Kohlberg (1969). Robinson and Maeda, for example, are strong advocates of the need to reshape education policy to more
fully incorporate creativity through the arts and humanities. Building on the philosophical thinking of Jean-Jacques Rousseau\(^{25}\) and Romantic notions of progressive education, CE is supported by a unique focus on education as “self-actualization”.

Indeed, according to Richard Florida, Director of the Martin Prosperity Institute at the University of Toronto, this understanding of KE suggests something more than simply education as human capital development. Beyond HCT, Florida describes this notion of creativity as a level above human capital.

**Florida:**

[T]his is somewhat different I think then, human capital. Specifically, I mean, human capital seems to be skills that are already known in a sense that you do this and this is the reward that will come to you and this the impact it will have on society. But a lot of what this sort of creative class brings to the table is something that we don't know necessarily ahead of time, so they're creating job skills along with the work they do in it. As much as they need formal education in there, human capital is clearly required. It's something beyond that. It's a level up from that as well.

One obvious question that emerges from these interviews is whether CE represents a fundamental break with the industrial economy. Most interviewees agreed that despite the fact that creativity is often stymied by managerial systems built for the industrial economy, it nonetheless remains critical to the future of postindustrial societies (Howkins, 2001; Zhao, 2012b). According to Florida, CE is something closer to a new stage of capitalist economy than a break with capitalism per se.

**Florida:**

I see [the creative economy] as an evolution from [the industrial economy]. So in my earliest work I was very much concerned with the debate over Fordism and what comes after Fordism, so called post-Fordism, that was influenced by a group of scholars called the regulation school (they’re called regulación in France and

---

\(^{25}\) His writing in *The Social Contract* (1762) and *Émile: or, On Education* (1762) form the philosophical underpinnings and intellectual tributaries for contemporary notions of developmental learning.
Europe) and then a group of social scientists in the United States, including many geographers. And the argument in that went... is that the, that Fordism, mass production, industrial Fordism, had reached its limits and that a new system was emerging to replace it. Many of those people were looking at the flexible industrial districts—- Italy or perhaps the Silicon Valley, as exemplars of that, people like Alan Scott, Michael Stuart Burke, AnnaLee Saxenian, people who I very, very much admire and have learned a lot from. In my work... [I] did detailed examinations of Silicon Valley and Route 128, we actually embarked on a project studying Japanese economic and production organization and then the Japanese transplant companies in the United States. And we concluded that in fact what looked like it was going to evolve away from Fordism and to post-Fordism was what Japanese companies were doing on the factory floor and in my work to date I saw that the inspiration for [theories] of the creative economy does not come necessarily from Apple or from Google, or for high tech Silicon Valley companies although I think they do some things very well. Certainly doesn’t come from trying to understand arts and culture or even diversity, as one of my critics put it... I don’t think that at all, in fact I argued that this method of organization, economic organization, social organization production that Toyota perfected where they saw the worker as the source of continuous improvement or kaizen and when I visited Toyota and they said you know, we’re going to win and the big three are going to lose and the big three are going to lose and the reason is it’s the way you manage, and this was nearly 25 years ago. You think the key to success is the CEO and the big shot R&D, you know, and the MBA’s. We know that the key to success lies in harnessing the talent, innovation, creativity and productivity of our shop floor workers. So in that sense of the creative economy I see as a, it’s a break with the industrial era in that in under classic canonical Fordist industrial organization, workers were seen as cogs in the machine (as backs, as brains, as brawn), but I think the spirit and inspiration for the creative economy actually comes from advances made in manufacturing and when I look at this I actually think what Toyota does with manufacturing is very in tune with the evolution of a creative economy and what Apple and Google and IDEO do in design is very much in synch with the new creative economy and we’ve yet to build a full blown creative economy, in fact I think the prices reflect the emergence of the creative economy and then the bubble that surrounded it and now the moment of economic reset or transformation will hopefully put it back together. So yes in a sense it’s quantity leading up to quality and that ultimately the creative economy will represent something new, but really is born from the belly of the old industrial order.

For Florida, the roots of this evolving cultural milieu lie outside the market or formal
institutions altogether. In his view, new emergent forms of creativity are interdependent with larger cultural systems that are associated with meta-changes in postindustrial society.

Florida:

And what people don’t understand is the rise of the movement for cultural openness or when I look at the 60’s, I look at the 60’s as a giant temper tantrum associated with the fact that creative and innovative people, that energy couldn’t be harnessed by the old industrial order and so we had James Dean and Elvis Presley and Jim Hendrix and it was a giant temper tantrum… the real legacy of the 60’s isn’t Woodstock it’s the rise of the new system of production organization and innovation in Silicon Valley which found ways to harness that kind of thing and I think even more so the new order really is born in the belly and I would argue that the most important company to understand the creative economy still is Toyota but now it’s something new and different. You know when I read Izzy Sharp’s biography, his autobiography, and he talked about the Four Seasons, he talked about studying companies like Toyota and McDonalds… So in some ways what Toyota achieved is kind of a legacy of common sense where it makes perfect sense to harness workers’ intelligence and intuitions and creative capability. In fact that much more productive than trying to, you know, sever the link between conception and execution which is what happened, or mental or manual labor which Fordism really tried to do. It makes sense to reunify them in the way Toyota did because it’s just more productive. So in that sense the creative economy recognizes that and what I’m arguing is that it actually goes further than Toyota or Silicon Valley that this is a wholesale refashioning and then finally just to say that I kind of looked at theories of knowledge-based capitalism, information capitalism, technology capitalism, I didn’t like them because I thought they were focusing on things that could be poured into people’s heads and I asked myself if physical labor was a common human characteristic? What might be its analogue? And when I read the psychological literature I said oh this thing called human creativity is pretty much shared, it’s in each and every human being, we all have creative capabilities, we express them in different ways. So for me it was a better way of explaining what other people talked about as information or technology, or knowledge driven capitalism with something more innate and basic behind it, more elemental and fundamental behind it.

The implications for creative work are significant to critical studies on education policy for a variety of reasons. Florida, in particular, advances this discussion by pointing to the
contradictions in “human capital” development. Beyond discussions on skills formation, for example, he points to issues of technology and new organizational systems as an infrastructure for leveraging subjectivity, self-actualization, and talent formation in the context of creative work. Citing Marx, he comments on the growing need to link labor with affect:

Florida:

Absolutely, so [through technological advancement] we’re just freeing up human labor, human talent to do all the things that we used to have to do and to do new and better things. Highest and best use we used to say in land use planning. So yeah I think the key to economic development is continue to free up human labor to do more and better things, the more interesting innovative, you know, risky rent-creating kinds of activities and so the places, and I don’t even think it’s countries, I think it’s specific locations for all the reasons Jane Jacobs said. Intersubjective, you know, I think these are all inter-subjective processes. I think Marx was absolutely right that we do not work alone, we work in an intersubjective way and in the creative economy we’re much, you know, we stand on the shoulders of giants if we’re intellectuals or academics, well this is a historical and intersubjective process of leveraging human creativity, and that takes place in cities or in places and locations and so the places that compound those capabilities win, and the other thing I think that’s very clear is that the real game here in terms of achieving economic advantage is a game about attracting talent. And I think the places that are able to attract the broadest array of talent from the - because the distribution of talent is highly skewed in any given field-- the places that are able to attract the biggest array of that from the biggest number of places get a huge inordinate economic advantage. So yeah, that’s why I think the advanced economies are able to compete on and that’s the only way they’re able to overcome the incredible cost advantages in the emerging economies.

Florida:

You know if I go back and read my Marx, I see that Marx was very concerned about the physical production and the physical labor of people and how that was alienated and I think he saw the physical production and the alienation as part of this intersubjective thing which made people similar. I actually think human creativity is what makes us more alike. Then when I go back and read my Marx I kind of look at the Grundrisse and say oh my God he already almost thought of that. So I think there’s this very basic thing in creativity that is democratizing and actually very human and that’s the way I’ve tried to make the argument and then we have to craft institutions. But you know, I think the nature of economic
growth is on our side. I actually think the logic of economic history, not in a Marxian way that’s going to push us to a kind of a socialism as he saw it in a teleology of history. I actually think that the logic of economic growth is pushing us towards a mode of production that requires more and further and greater and more expansive human participation. You know, economic development if we’re going to achieve it now requires greater human development, that’s kind of the logic I see, so in that sense I think history is on our side. The logic of development, economic growth is on our side, and I think sooner or later certain places will recognize that and act on it, or at least I hope, that’s my hope. If I start to look at it another way then I get much less hopeful, but that’s my hope for a better future and that’s the work I try to do.

Indeed, he reminds us of the scale of the changes associated with a postindustrial society and points to the need to think strategically in shaping institutions that support increased human potential and complex and extensive advances in the organization of industrial systems.

Florida:
So I think there’s a big shift going on and... what puzzles me is 100 years ago during the rise of industrial Fordism, people were willing to have these conversations which I would call strategic conversations about the future of the institutions of their society. Now what we’re doing is trying to bring back the housing, auto, industrial banking complex. No one is really having a big strategic conversation about what are the kinds of institutions required and infrastructure required to build human infrastructure to build this economy and society of the future. That really worries me. If no one will talk about it, it worries me that... how does it get built?

He also points to new challenges facing capitalism. Implicated in this need for new strategic models and institutions are rising problems related to property ownership, intellectual property, and the likely need to think more specifically about democratizing economic and social relations:

Florida:
And you know Jane Jacobs would have said you know, we’re still locked in this plantation system. You know, we have all these organizational and institution rigidities, these ways of thinking that are imposed on us— breaking with those. Breaking with those, it takes an enormous amount of effort. You know,
sometimes we call that the generation gap or the 1960’s and you know what happened was we ended up with these polarized categories... and so now we’re grappling, and I think these transformations are two or three generations long... but it's gonna take a long time to break with the institutions that we have, and and you know, I mean maybe the contradiction of creative capitalism at the end of the day is there's all this creative energy and intersubjective stuff going on, but at the end of the day there is private ownership and control of "intellectual property"... which means we have to kind of democratize, if you will, property relations, and and I think, you know, that you can all point to the Silicon Valley, you know, co-owned firm as an example of that, but, but you know, if it's true that we worked inter-subjectively and all stand on the shoulders of giants then we're going to have to democratize the system of of identifying and distributing intellectual property rights, and that’s a big, I mean these are big huge questions about the nature of property rights and the nature of capitalism, but we’re going to have to confront them sooner or later.

Florida suggests that there are very real questions about whether the education system as a whole is doing more harm than good. Perhaps, he observes, the future of education in a knowledge-based economy will move outside formal schooling altogether:

Florida:
You know, it may be that educational institutions are just— -- that creativity is different than education, we need some new kind of institution which is very different than what we have. So... I think that’s a first order problem and I just know the one, the stuff that we have there isn’t working. That what it appears to be is that many people, the people are not necessarily learning in school they’re learning despite school. I think no one is willing to really throw that out there and if I have to track my own intellectual development I would say— -- now it’s hard to reconstruct your life, but I would say almost entirely I learned despite school not because of school. I can think of very few things I learned in school. I can think of lots of things I learned from going to the library and reading. I can think of one or two teachers I had who were incredibly inspirational to me, but there’s not a lot, school seemed to distract me from learning and because of all the great socialization stuff we’re supposed to like about school it just completely distracted me from learning. So I don’t know... I think we need to really, really think long and hard about what that set of institutions would look like that’s good for young creative people.
The Creative Economy: Implications for Educational Reform

A critical feature of the discourse on CE is a focus on entrepreneurship. CE promotes a strong emphasis on IP in support of entrepreneurship because creativity is seen as driving sector-driven innovation. Building on Schumpeter (2008 [1942]), entrepreneurship is viewed as blending new combinations of currently existing inputs in the “gale of creative destruction” that continually replaces old industries and with new industries. Indeed, the general lack of “entrepreneurial” thinking around K-12 education itself, stands in stark contrast to much of the rhetoric on educational reform (Zhao, 2012b).

For Florida and other advocates of CE, new modes of education are critical to supporting a postindustrial society because creative ideas drive economic growth. In their view, contemporary education systems are now outmoded, however. Accordingly, “We can no longer succeed—or even tread water—with an education system handed down to us from the industrial age, since what we no longer need is assembly-line workers. We need one that instead reflects and reinforces the values, priorities, and requirements of the creative age. Education reform must, at its core, make schools into places where human creativity is cultivated and can flourish” (Florida, 2002). What seems obvious is that in order to build and propagate a system that develops students who are self-directed and intrinsically capable of acquiring new knowledge and skills, we must first recognize key problems within the education system itself. Means (2011) notes:

If capital is increasingly charged with extracting value from the common- that is from mass intellectuality and communicative and immaterial processes- it would seem logical that calls for creativity and innovation would present a substantive challenge to a narrow industrial model of schooling based on stratified, centralized and institutionally rationalized forms of school organization and curriculum. One would imagine that schooling for the creative economy would want to draw on, harness, and develop human capabilities while promoting greater autonomy and equity. The reality has been somewhat different. (p. 219)

If it is true that the Creative Economy demands fresh thinking about workforce capacities and creative institutions, then it might follow that the rhetoric of creativity would push for experimentation and a more expansive view of schooling. Sadly this has not been the
case. Beyond the era of schools as factories for industrial workers, we now face the challenge of developing schools as incubators of creativity and innovation. The truth is that any fundamental change in formal education will require a transformation of the industrial systems of schooling.

As Means (2011) observes, “In an economy where new sources of value and capitalist expansion have been heavily premised on privatization, intellectual property, and speculative finance, creativity becomes a key resource for the invention of new markets, products and patterns of work and institutional management” (p. 214). Leadbeater (2000, p. 110), for example, argues that contemporary education systems suffer from two lingering traditions— the monastery as knowledge repository and the factory as command production system— that have combined to severely hinder contemporary school systems. In contrast to these fixed hierarchical systems, we now require horizontal networks that allow “student-amateurs” to directly engage with one another in the practice of building and transforming ideas and practices. If competency in the use of resources within existing cultural systems is the goal of literacy in traditional systems of education, then cultural production and the reshaping of cultural systems must be the goal of education today. The growing economic challenge for advanced economies is to develop social and economic policies that support sustained cultural innovation. Venturelli (2005) puts it this way:

The challenge for every nation is not how to prescribe an environment of protection for a received body of art and tradition, but how to construct one of creative explosion and innovation in all areas of the arts and sciences... Nations that fail to meet this challenge will simply become passive consumers of ideas emanating from societies that are in fact creatively dynamic and able to commercially exploit the new creative forms” (p. 396).

26 Hesmondhalgh and Pratt also trace the manner in which the term culture has been expanded far beyond its original meaning. As the write, “Some have argued, on the basis of the flexibility of the term culture, that it is useless to talk of the cultural activities at all. Others have also implied this by arguing that all industries are cultural, because all industries are involved in the production of goods and services which become part of the web of meaning we know as culture (Hesmondhalgh & Pratt 2005, p. 6)."
In contrast to the fixed hierarchical systems of the Industrial Age, we now require horizontal networks that allow “student-amateurs” to directly engage with one another in the practice of building and transforming ideas and practices. This interpretation does not mean that established cultural practices are irrelevant to KE. In fact, established cultural forms are the foundations upon which new cultural forms are developed. Rather, it is to question the idea that education is merely a question of social reproduction.

The Green Economy: Education and Green Innovation

In addition to the Creative Economy and the Network Economy, there is widespread political and economic interest in “clean technologies” and the Green Economy. Directly overlapping discussions on a knowledge-based innovation, GE is particularly focused on long-term economic transformation. At the policy level, the definition of a “green economy” remains in flux, but it is directly linked to the elimination of fossil fuels and a long-term shift from highly polluting industrial industries to low-carbon, low-waste energy production, especially renewable energy generation (wind, solar, geothermal, and biomass) and energy conservation.

The broad consensus around climate change has led many analysts to champion technology as foundational to GE. Reducing global warming and enhancing resource management are strong reasons to take the idea of a green economy seriously. It has become increasingly clear, for example, that we are moving beyond the closed loop of industrial civilization. Indeed, many countries today are aggressively pursuing green innovation strategies because of the potential social and economic benefits associated with harnessing clean energy.

The global economic potential of clean technologies has driven an international competition around clean energy that many view as key to power and wealth in the 21st century. Tony Seba, a noted expert on clean technologies and a technology entrepreneur in Silicon Valley, suggests that GE represents a major historical disruption in energy production and consumption.
Seba:

I’ve been developing or helping to develop solar power plants and wind power plants and I also teach on these subjects… I think that over the next 10 or 15 years we will go through the most massive disruption in our society since the first industrial revolution. I think the changes that are coming are just massive [because] there are a handful of technologies right now that are improving exponentially and will disrupt both transportation and energy as we know it…

The recent rush of stimulus spending around the world includes significant investments in GE. Green innovation and the development of green technologies are seen by many policymakers as critical to the future prosperity of advanced economies. This is clearly the view of the Obama Administration as well. The Administration’s stimulus bill has dedicated $71 billion to clean energy funding, with an additional $20 billion for loan guarantees and tax incentives to support clean energy projects. The Administration has proposed investing in a *Unified National Smart Grid* linking all of the nation’s local electrical networks that have been upgraded to smart grids. High-capacity transmission would span the country providing linkages to local electric utilities and distantly located bulk power generation facilities. Seba is critical of the U.S. energy policies, however.

Seba:

I’m fairly disappointed [with President Obama’s energy policies]. I don’t think he has an energy policy actually. He goes on the record, you know, proudly saying we are generating more oil than we ever have, and we are generating more natural gas than we ever have, and you know he tripled the budget for nuclear energy, and so on and so forth. So I would not say that he has emphasized clean energy *at all*. The main policy mechanism that has pushed at least solar energy on the national level is the investment tax credit and that was actually a Bush [era] policy… And so I don’t see Obama as a clean energy guy at all. He hasn’t pushed back on clean energy like the Bush Administration or the Reagan Administration. But he hasn’t moved us forward either. You know, half of all the solar in the United States is in California. That is because of state policies. That is because both Governor Brown and Governor Schwarzenegger pushed for the Renewable Portfolio Standards and that's because we voted for climate change law at a state level… That gives you an indication of where the leadership for clean energy is coming from. It’s clearly not coming from Washington.

As Seba points out, technology may be essential to green innovation but strategic public policy is critical. Evidence from climate science points to the need for a large-scale
coordinated response to climate change, including a broad portfolio of active
technologies and regulatory management. The limitations of past U.S. policy, however
(particularly when compared to countries at the leading edge of green innovation) suggest
that the U.S. has a long way to go. Consider the data: 85 percent of America’s energy
comes from fossil fuels (petroleum, coal and natural gas). While America produces 10
percent of the world’s oil, it consumes one quarter of the world’s total supply. 70 percent
of that oil is imported from abroad (with estimates of $475 billion on imported oil in
2008 alone). The bottom line is that America’s high-tech society is built on top of a fossil
fuel economy of oil, coal, and natural gas. With finite supplies of carbon energy and
global warming concerns, this situation will have to change dramatically.

While environmental policy in the U.S. has mainly focused on educating (and sometimes
miseducating) the private sector about its environmental impact, what the U.S. has lacked
most is a robust public policy for coordinating a coherent green strategy. The strength of
countries at the leading edge of green innovation, for example, is anchored in their
capacity to leverage government oversight in the rapid coordination of public-private
partnerships. Lacking a coordinated and vigorous energy policy, the U.S. has not been as
effective as other countries.

Seba:

Germany has pushed solar and wind legislation since 2000. Germany by itself has
been a third of all the installed solar in the world. And you know, because of the
learning curve that has meant that the cost of solar has gone down really
substantially since then. Also because China has invested massively in solar.
Basically costs have gone down dramatically just over the last three years. The
costs have gone down by more than 80%. But it’s been driven mostly Germany
and China, not by the US. Having said that, solar is now at the point that it is
cheaper than grid energy in hundreds of markets around the world without
subsidies. So yeah, we are on the cusp of a major disruption of energy worldwide.

Growing concern about climate change and the impact of carbon dioxide emissions has
made GE a predominant focus in discussions on educational reform. Seba argues that this
discussion needs to also consider substantial changes in the structure and practice on
education itself. Echoing the arguments of other interviewees, he suggests that education systems need to be redesigned to enable postindustrial competencies:

Seba:

Most of our early education is still delivered in an agricultural or industrial way. Today we need to educate creative thinkers and we need to do that from the time they are kids. It's not about wrote learning, it's not about learning stuff; it's about creative thinking. And especially in the “knowledge economy” an educated person starts from the time a person is 1-2-3 years old. Not from the time they get into college. An educated person needs to know how to consume and generate knowledge… [including] how to generate and consume knowledge about knowledge… [And] with machine learning, AI, robotics, and so on, we also need to teach kids to use the tools to generate and consume knowledge.

The Green Economy: Implications for Educational Reform

Much as Milani, Rifkin (2011) makes a compelling case for education playing a critical role in empowering new generations of students and citizens for the Green Economy. He outlines several critiques of contemporary mass education and makes specific suggestions on changes to the methodological and pedagogical assumptions underlying contemporary schooling. In addition to training the workforce for the Green Economy, he explains, we need to develop curriculum around “advanced information, nano- and biotechnologies, Earth sciences, ecology, and systems theory as well as vocational skills, including manufacturing and marketing renewable energy technologies, transforming buildings into mini power plants, installing hydrogen and other storage technologies, laying out intelligent utility networks… and the like” (p. 231). Cozzens (2011: 405) notes:

Another national priority area is energy – an excellent choice by any standards. The terminology is strong: ‘Unleash a clean energy revolution’. Reflecting the overall goals of the innovation strategy, the objective is to create ‘new jobs in cutting edge industries while tackling the threat posed by climate change’. Stimulus funding is creating immediate jobs in weather and conservation, and over the longer term the plan calls for innovation in clean energy technologies, but the plan is silent on the fact that many of the clean energy technologies being installed today are products of European economies, which have been developing them for decades. There is no acknowledgement of the need to catch up in this
area or even to get into the alternative energy technology market. Without a solid strategy, the investment goal is a recipe for deepening the balance of payments deficit further.

Just as schools are being redesigned around ICTs, Rifkin argues that schools also need to be physically and conceptually redesigned around renewable energy generation and the Green Economy. In addition to professional and vocational skills, this means moving students beyond a utilitarian view of nature and towards their roles as stewards of a common biosphere. As he observes, the “notion that the primary mission of education is to turn out productive workers is grounded on a particular notion of human nature that was spawned in the Enlightenment at the very beginning of the industrial era” (p. 233). He goes onto explain that the primary mission of education in the Green Economy should be “to prepare students to think and act as part of a shared biosphere”:

Our ideas about education invariably flow from our perception of reality and our conception of nature—especially our assumptions about human nature and the meaning of the human journey… Our emerging sense of biosphere consciousness coincides with discoveries in evolutionary biology, neurocognitive science, and child development that reveal that people are biologically predisposed to be empathic—that our core nature is not rational, detached, acquisitive, aggressive, and narcissistic, as many Enlightenment philosophers suggested, but rather, affectionate, highly social, cooperative, and interdependent… New teaching models designed to transform education from a competitive contest to a collaborative and empathic learning experience are emerging as schools and colleges try and reach a generation that has grown up on the Internet and is used to interacting in open social networks where information is shared rather than horded. (p. 234-6)

Rifkin’s views echo those of Bauwens (2009) and Cormier (2010) in describing highly networked educational environments designed more closely to mirror complex social dynamics. Like Cormier, Rifkin describes this as lateral learning in which P2P communities collaborate together to solve problems through creativity and shared reasoning. Building on the notion of the “community as curriculum”, Rifkin adds the necessity for including the “biosphere as learning environment” (p. 248).
Conclusion: Rethinking Education Policy

Despite the need for fairly significant changes in education policy, the dominant paradigm of public education is still fundamentally rooted in the industrial revolution. Beyond managerial models that merely reinforce schooling as factories for social reproduction, we now require a new educational philosophy that leverages a digital era, especially the productive capacities of networks. Decentralized systems are proving to be more productive and agile than rigid, top-down bureaucracies. The key competencies today are not properly available in education systems today. Beyond basic numeracy and literacy, we now need to support competencies in collaboration, creativity, and innovation for an era of knowledge-based innovation.

Perhaps the one factor that now determines the rest, however, is the paradox of computerization. Zuboff (1998: 11), for example, suggests that technology’s potential for empowering a postindustrial society remains under-theorized. Indeed, Brynjolfsson and McAfee (2014) have produced a wealth of economic data demonstrating the correlation between rising unemployment and exponentially advancing technologies. In their estimation, technology is facilitating a deep structural change in post-industrializing societies. Defined as the amount of output per unit of input, productivity growth has risen significantly in the past two decades as a consequence of continuous advances in ICTs. Even as technology has boosted economic productivity, however, it has not ensured rising wages. In fact, median incomes have stagnated and even fallen over the past decade (Brynjolfsson and McAfee, 2011: 30). Part of the reason for this is sociopolitical. Despite the vast wealth created in recent decades, the majority of this wealth has been consumed by a very small elite. At the same time, exponential advances in computing and automation are now forcing OECD economies to move beyond industrial mechanization.

Keynes famously predicted the irrevocability of technological unemployment. In his 1930 essay “Economic Possibilities for our Grandchildren” he writes, “We are being afflicted with a new disease of which some readers may not yet have heard the name, but
of which they will hear a great deal in the years to come--namely, *technological unemployment*. This means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour”. Beyond human capital theory, there is now the looming challenge of labor automation. The introduction of industrial robotics in construction and assembly has both advanced productivity and enhanced quality control while significantly reducing the need for human labor. With exact precision, computers carry out highly ordered tasks more comprehensively than is capable by human beings (Zuboff 1988). The question today is whether technology will in fact facilitate newer and more innovative forms of labor or simply continue to subsume labor entirely. In the context of education, this has made older industrialized notions of formal education increasingly superfluous.

Where the Industrial Age introduced a level of machine-based innovation that revolutionized physical labor, the Information Age threatens to displace human labor entirely. A growing surplus of underemployed knowledge workers, for example, calls into question public policies that promote LLL in the context of a global knowledge economy (Longworth and Davies, 1996; OECD, 2007). Indeed as Rae (2010) notes, European social policies focusing on the EU as a “knowledge society” have been a disaster. Where Lundvall (2012) and other social investment scholars, highlight the importance of LLL and HCT for the learning economy, we must add the importance of education for meeting the challenge of technology as well.

In the final chapter of this study, I make conclusions regarding the strengths and weaknesses of contemporary U.S. educational reforms and offer suggestions for improving educational policies that build on notions of State-led investments in transforming education. Although it may be true that human capital development is a necessary to ensure economic competitiveness, it is also true human capital theory is insufficient for supporting educational reform in the 21st century. In addition to knowledge-based skill, for example, there are additional questions about creativity, peer production, and environmental sustainability that supersede the value of skills-driven reforms alone. It is certainly true that education has always been a complicated struggle
to manage competing sets of goals linked to a wide assortment of philosophical positions on human development (Crain 2000, Miller 1997, Gardner, 1983). However, it would seem that the challenges today are of a fundamentally different order. The key problem, I suggest, is that policy driven narratives on KE often assume a theoretical homogeneity when in reality KE is a highly multifaceted discourse overlapping various social forecasts that suggest the need for a range of educational reforms including greater openness (Peters, 2012), more fluid and responsive learning ecologies (Brown and Adler, 2008), and reinvigorated democratic practices (Benkler, 2006). In the final chapter of this dissertation I examine the contours of a new meta-paradigm for framing U.S. education policy that builds on multiple interpretations of KE.
CHAPTER SEVEN: Conclusion

No social order ever disappears before all the productive forces for which there is room in it have been developed; and new higher relations of production never appear before the material conditions of their existence have matured in the womb of the old society itself.

(Karl Marx, 1977 [1859])

Towards a New Metaparadigm for Education

I began this dissertation with an introduction to the research problem, focusing on divergence in the discourses on KE. Advancing on Peters (2010) work, I hypothesized that there are substantial differences between contradictory readings of KE that derive from unique interpretations of the future of advanced economies. Looking at four discrete discursive models of KE, this research has suggested the need for a new policy framework supporting U.S. educational reform. Overlapping distinct forecasts on work and learning, for example, each model of KE focuses on a unique argument for advancing the production and consumption of knowledge. Mapping the contours of the Neoclassical Knowledge Economy, the Creative Economy, the Network Economy, and the Green Economy, and looking specifically at the impact of these economic paradigms in shaping forecasts on the future of the United States, I have argued for the need to move beyond neoliberal social policies in order reconceive the role of education today. My purpose in framing these discourses as paradigms of KE has been to develop a deeper understanding of their features and logics towards the goal of developing a new metaparadigm of educational reform.

Against an historic background of neoliberal public policies, debates about U.S. education are now largely framed by a narrative of global economic competition within a changing geopolitical landscape. This downward pressure has resulted in educational reform measures that have been largely shaped by the need to improve the skills of the U.S. labor force. Indeed, domestic policy under President Obama has focused on STEM education as a key pillar in rebuilding the U.S. economy for the 21st century. Much as
previous administrations, President Obama has aimed at enlarging the role of the federal government to raise the quality of public education in the hopes of boosting economic performance. This federalization has also included new accountability systems linking teacher evaluation and remuneration to standardized testing in a concerted effort to move the country towards a national curriculum. This has also included a forceful attempt to marketize public education through the expansion of charter schools.

At the same time, critical scholars on education argue that contemporary education policies are too narrowly focused on accountability frameworks that excessively reduce schooling to worker training (Apple, 2006; McLaren, 2007). The overriding criticism is that educational reform does not focus on “educating” citizens but rather on merely training workers. In their view, education has been supplanted by systems of testing and compliance that combine a growing distrust of teachers with a national testing regime.

Any analysis of U.S. education policy requires an appreciation of the history of innovation strategy and the influence of economic theory in guiding educational reform. Even a cursory analysis of contemporary U.S. public policy reveals a deep concern with transforming U.S. society and economy in the face of daunting challenges linked to the waning influence of advanced economies. Indeed, the common view today is that rising demands placed on U.S. education are not simply rooted in a temporary economic downturn but in a permanent sea change in the structure of the global economy. Rather than a superpower going it alone, the U.S. is now increasingly finding itself embedded in a global system that requires it to invest in its human resources. For this reason, the Obama Administration has made significant effort to redesign U.S. policy around a more pronounced NIS framework. This includes an increased focus on domestic investments that enable tangible social improvement.

Beyond simple criticism of neoliberal education policies, the main purpose of this research has been to examine and critique U.S. education policy in light of emergent challenges facing the United States. Indeed, shifts in economic globalization linked to rapid technological innovation have introduced massive changes across the global
political and economic landscape. As post-industrializing economies in OECD countries enter what may be described as the Automation Age, the linkages between education and work may be becoming more tenuous. As MIT economists Brynjolfsson and McAfee (2014) demonstrate, automation has become a daunting challenge for industrialized economies.

With this in mind, this final chapter offers near-term and long-term suggestions on educational reform with the purpose of rethinking U.S. educational policy. I argue that educational policy should— at the very least— focus on more effective integration of technology into learning and pedagogy. Adapting education for an era of rapid technological innovation involves more than the mere transmission of sets of discrete vocational skills. Rather it involves rethinking education for innovation. At the same time, reframing U.S. education around capacities such as creativity (the Creative Economy), innovation (the Green Economy), and collaboration (the Network Economy) may not be sufficient for mitigating technological unemployment over the long-term. As Brynjolfsson and McAfee (2014) show, the combined power of digitization, exponential technological change, and recombinant innovation is in fact reconfiguring postindustrial societies and restructuring the logics of value creation. Indeed, technology is forcing postindustrial societies to reimagine their underlying relationship to work and to the State itself.

While it was once true that schools were effective vehicles for distributing the skills needed for an age of industry (numeracy, literacy, symbol manipulation), these same institutions are simply not designed to support the skills and capacities for an age of innovation (Araya & Peters, 2010; Scardamalia, 2002; Bereiter, 2002b). The truth is that educational systems today are undergoing an enormously disruptive transformation that is anchored to a revolution in digital technologies. Moving schooling beyond the logics of mass production and a world of iterative cultural change requires an enormous rethinking of educational reform. Much as the one-room schoolhouse of the 19th century gave way to a national education system in 20th century, so today the industrial era factory school is giving way to digitally-mediated learning systems anchored to a global public commons.
Education and Training for a Postindustrial Economy

This transformation in the material foundations of schooling and education overlaps a dramatic shift in the very meaning of “basic literacy”. While formal education continues to focus on “reading, writing, and arithmetic”, these basic skills, are no longer an advantage vis-à-vis advanced computerization and automation. Indeed, it may have once been true that international benchmarks like PISA and TIMMS were honest reflections of the literacy rates of a country or region. In the age of technological automation, however, these tests now offer less value. The truth is that digital technologies are now the basis for a new kind of literacy. Consider, for example, this aggregate forecast of STEM professions by the U.S. Bureau of Labor Statistics. What is obvious is that the use and application of computing and ICTs are becoming the base of professions in the 21st century.


Source: Data are calculated from the Bureau of Labor Statistics (BLS), Employment Projections 2010-2020

One of the main challenges facing educational reform today is that the speed of technological change is increasing. Indeed, the Great Recession of 2008 has made it
painfully obvious that the current education system is not equipped to underwrite dislocations in the labor market. Of the 3.4 million jobs that have been generated in the United States since the Great Recession, the majority are low paid jobs. As middle class jobs continue to be eliminated by technology, the obvious question is whether education can responsibly mitigate rising under-employment.

As critical scholars remind us, education systems today remain mired in the reproduction of class structure (Bowles and Gintis, 1976; Freire, 1970; Bourdieu, 1998; Apple, 2006; McLaren, 2007). Indeed, the strongest criticism of President Obama’s educational policies is that they are driven by political ideologies geared to serve the interests of a “transnational capitalist class” (Sklair, 2007) rather than the needs of students themselves. I largely agree with this critique and suggest that the lack of credible educational research supporting federal education policies has produced flawed policy proposals that remain largely rooted in the factory logics of nineteenth and twentieth-century Fordism.

The problem for U.S. educational reform under the Obama Administration is that a focus on mobilizing systems of measurement and discipline to manage learning risks poisoning the very creativity upon which the future prosperity of postindustrial societies is likely to depend. As Means (2011: 224-5) observes:

Invocations to unleash creativity and innovation in educational contexts appear to stand in tension with the realities of the reorganization of education along the lines of privatization, audits and testing, standardization, and the marginalization of the social sciences and the humanities- processes that place limits on knowledge production and the free and cooperative exchange of ideas.

Perhaps it is not surprising that this is the very same challenge facing capitalism itself. According to theories on endogenous growth, knowledge-based systems now grow in direct proportion to the capacities of human capital. As corporations attempt to exert control over the subjectivity of workers in order to extract value, they undermine the very capacities needed for creativity and innovation (Hardt and Negri, 2009).
Educational Reform for the Near-Term: Adapting to the Digital Revolution

Forecasts on labor growth over the near-term remain forbidding. Indeed, the pace of technological transformation across sectors of the global economy and the global labor market are making education and retraining far more daunting. Nevertheless, there is some optimism across many technology fields. There is reason to assume that new labor opportunities for skilled and semi-skilled labor will emerge as digital technologies begin to reshape urban development (Townsend, 2014: 30). With investment forecasts in excess of $40 trillion dollars over the next twenty-five years, smart cities may well represent the first new industry of the 21st century (Townsend, 2014; Campbell, 2012).

Notwithstanding the fact that labor opportunities are expanding fastest in emerging economies—especially the BRIC countries—new investments in smart technologies are increasingly impacting urbanization across advanced economies as well. According to Townsend (2014: 30), this amounts to $2 trillion in spending and investment in the U.S. alone.

Building on discussions of the Green Economy, smart cities are viewed as critical to theories on slowing and even reversing climate change. Considering the growing importance of cities, this is not a minor consideration. Cities constitute two percent of the earth’s surface, but account for a staggering seventy percent of greenhouse-gas emissions. With over half of the world’s population now living in cities, for example, and expectations of seventy percent of the world’s population moving to cities by 2050, smart cities are viewed as pivotal to deploying green technologies at scale and advancing sustainability policies. This includes a particular emphasis on sensors, data analytics, and data mining in conjunction with smart grids and locally generated renewable energy for efficient urban density (Rifkin, 2014).

The idealization of smart cities has become a robust policy discourse in recent years because of an economic focus on the role of human capital in global growth (Shapiro, 2006). Accordingly, innovation is driven by creative knowledge workers (Florida’s
“creative class”) who are increasingly located in spatially clustered regions of the globe (Porter, 1990). According to Campbell (2012: 9),

[It is not surprising that cities should be entering a global hunt for knowledge. It can be (and has been) argued that very raison d’être of cities is that they facilitate exchange of all kinds. More to the point, in a globalized economy where knowledge plays an increasing role, cities are the crucibles where linkages are made. In turn, linkages are the channels of learning, and learning is a key not only to good practice, but also to creating wealth and reducing poverty among the poorest.

Beyond technology (2008), Hollands argues for a vision of smart cities that bridges the discourse on the Creative Economy. Accordingly, smart cities are best viewed as “territories with a high capacity for learning and innovation, which is built in to the creativity of their population, their institutions of knowledge production, and their digital infrastructure for communication” (p. 306). The key to truly smart cities, he suggests, is the capacity of ICT networks to support social capital and sociocultural development. The real basis for smart cities, in other words, begins with people.

Part of the answer to reforming education for a postindustrial economy is simply effectively leveraging digital technologies for education in order to enable more interactive and personalized learning environments. Educating for an era of smart technologies, for example, suggests the need for new thinking on ICT proficiency and the use of advanced digital technologies across schools and universities. Much as the National Educational Technology Plan (U.S. Department of Education, 2010c) points out, this includes the use of gaming and simulations in the context of network-mediated environments. The value of gaming to education is that it provides a means for self-diagnostics and enhanced user control in the context of immersive learning environments. Beyond adapting education to technology, however, there is a larger and more daunting challenge around reframing the institutional and pedagogical structure of education. Most importantly, this means rethinking the transmission model of schooling (so deeply embedded in the design of industrial era schooling) and exploring the long-term scaling
capacities of learning and education as a feature of a commons-driven global economy (Bauwens, 2014; Cormier, 2010).

**Educational Reform for the Long-Term: Education and Social Transformation**

This research study suggests that education policy today is hopelessly misaligned with the needs of a technologically advanced knowledge economy. As Harvard scholar Christopher Dede (2013) notes, despite growing calls to transform education for the knowledge economy, “no clarity has emerged on the characteristics of a new model to replace industrial-era schooling or the mechanisms by which such a change would take place” (p. 2). Beyond industrial hierarchies based in cultural transmission, we now require national systems of learning and innovation capable of driving and sustaining creativity and collaboration. Indeed, the education system is now challenged to catalyze continuous cycles of innovation (Christensen et al, 2008; Robinson, 2001; M’Gonigle and Searle, 2006).

Part of this challenge is simply to move beyond a preoccupation with measuring basic skills and content in favor of education that directly leverages technology in the context of creativity (the Creative Economy), collaboration (the Network Economy), and sustainable innovation (the Green Economy). While human capital theory may offer value to educational reform in the short-term, it offers less value for rethinking systems of education for the long-term. Indeed, it is my view that the transformation of education is itself now largely a function of the transformation of the economic and social system in which education is rooted. Put differently, it is not merely formal education that must transform in an era of rapid technological evolution, but postindustrial societies as a whole.

The truth is that the rise of computational technologies reflects a radical break in the way our society is now organized and managed. In their book, *Reinventing Knowledge: From Alexandria to the Internet*, McNeely and Wolverton (2008) point to ongoing changes in the ontology of the “knowledge society”. As they explain, we are now “living through
one of the recurring periods in world history when far-reaching changes in economics, culture, and technology raise questions about the production, preservation and transmission of knowledge” (p. xii).

To put this in perspective, they explore the transformation of knowledge regimes in the context of institutions that have supported and constructed the “life of the mind” across Europe and elsewhere. As McNeely and Wolverton observe, each of these institutions has safeguarded knowledge in a particular era and served as an interface between scholars and the rest of society. These include: (1) the library, (2) the monastery, (3) the university, (4) the Republic of Letters, (5) the disciplines, and (6) the laboratory. “Libraries spread as agents of empire in ancient times, transplanting Greek culture through the Mediterranean world. Monasteries later formed amid the collapse of the Roman Empire… When the University coalesced in the twelfth century… it left the monastery in its wake, intact but irrelevant” (pp. 254-55).

According to McNeely and Wolverton, we now live in the age of laboratory science. As a mode of knowledge production, laboratories have transformed industrial societies, splitting the atom, landing human beings on the moon, decoding the structure of DNA, and advancing computing as a new means for producing and consuming innovation itself. Now in the era of the Internet and digital technologies, however, the laboratory is being reshaped by the democratization of knowledge and the rise of a distributed knowledge society. They suggest that a “homegrown countercultural humanism” is replacing the “discredited humanism of the Republic of Letters”, and speculate that the Internet’s networking capacity may well be the germ of entirely new networked institutions and practices that are slowly rising to replace the laboratory (pp. 268-70).

Given long-term trends towards enhanced computation and automation, for example, it is important to begin to rethink education’s role vis-à-vis an Age of Automation. Beyond the neoliberal market state and its narrow reading of education as human capital formation, we may need to begin to reconsider the social and educative value of schooling in a highly robotized society. Waks (2013), for example, points to the shift
from linear systems to complex systems as a heuristic tool for understanding where learning and education are now going (Siemens, 2004). The consequences of this phase transition are difficult to predict, but we do know that the batch-processing systems that have anchored mass schooling are now becoming outmoded.

Unlike the industrial logic of hierarchical structures, the pattern of interaction between the parts of a complex system determines its structure as a whole. As agents interact following local rules, their interaction enables self-organization. As agents and/or the local rules change, new emergent “phase transitions” can occur, moving the system as a whole into newer and more complex behavior (Barabási, 2002). As a new distributed substructure for learning and education, the Internet is now forcing the Factory school into such a phase transition.

The truth is that technology is not simply transforming the ways in which we produce and manage knowledge and learning. It is transforming how we produce altogether. If we accept forecasts suggesting rapid labor mechanization over the next two decades (Frey and Osborne, 2013), then we can safely assume that advanced industrialized economies are entering a new era in which labor markets and education are no longer tightly coupled. The central issue, it would seem, is that knowledge is becoming increasingly computational. Together software algorithms, computer-aided design, data analytics, and machine learning are beginning to revolutionize the institutions and social practices that anchor knowledge. As new methods for managing and producing knowledge displace old methods, so too must old institutions and social practices be displaced by new institutions and social practices.

Where conventional economic models largely maintain that new jobs will emerge and replace the jobs displaced by technology, there is growing concern that accelerating computing power is making this argument untenable. Indeed, technological innovation in the form of algorithms, industrial robotics, and artificial intelligence, is making all labor— including educated labor—less valuable. Historically, new jobs have followed in the wake of technological change. Just as factory labor displaced farm labor, so labor in the service
sector expanded in the face of globalization. Today, however, growing technological
unemployment linked to artificial intelligence and industrial robotics is undermining
conventional theories on labor churn. Even if new jobs and new products and services
emerge over the long term, in the short-term huge social dislocation will grow alongside
significant income gaps.

What is clear is that while the vertical integration and scaling of manufacturing and
services favored large corporate enterprises, today the collaborative architecture of the
Internet is enabling a highly scalable and complex coordination system that favors an
open networked commons. Perhaps more importantly, the substantial costs associated
with managing fossil fuels, now presents us with the need to transform our society around
sustainable innovation. Given the rapid evolution of digital technologies and their impact
on labor, it seems highly plausible that we are witnessing a long-term transition from a
capitalist market economy built around the trade of scarce goods to a global collaborative
commons rooted in horizontally scaling social networks. Responding to the scale of this
change is beyond the capacities of educational policy alone. Rather, it is a much broader
problem involving a transformation of the State itself.

**Beyond the Market State**

Critical scholarship crisscrossing the humanities and social sciences has long focused on
the need for extensive changes to neoliberal social policies (Jameson, 1984; Lyotard,
1984; Harvey, 2005; Cahil, 2011). As Jenson (2012: 61) points out that well “before the
financial meltdown of autumn 2008 revealed the fundamental limits of financial
deregulation”, many policy analysts had already recognized the deficiencies of
neoliberalism. In response to these deficiencies, social investment scholars emphasize the
importance of “productive” investments in economic growth to mitigate rising social and
economic instability (Giddens, 1998; Esping-Andersen et al., 2002). Where the twentieth
century was framed by the Keynesian welfare state (1940s-1970s), and the economic
crisis of the 1970s saw the rise of neoliberalism (1970s-1990s), social investment
scholars argue that Social Investment Theory represents the beginning of a new stage in
political economy (1990s-present) (Table 6).
### Table 6: Models of Political Economy

<table>
<thead>
<tr>
<th>Diagnosis on unemployment</th>
<th>Keynesian paradigm</th>
<th>Neoliberal paradigm</th>
<th>Social investment perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment and slow growth due to insufficient demand</td>
<td>Unemployment and inflation due to constrained supply because of labour market rigidities (excessively high labor costs, too much labor regulation, social benefits as work disincentives)</td>
<td>Unemployment linked to lack of adequate skills to fill today’s jobs and to create the jobs of tomorrow.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social policy and the economy</th>
<th>Positive economic role of social policy: Development of social insurances to prop up demand stimulate growth</th>
<th>Negative economic role of public social expenditure: the welfare state as a cost and as the cause of slow growth and inflation</th>
<th>Positive economic role of new forms of social policy: social policies that invest in human capital to increase employability and employment levels; to support labour market fluidity (flex-security); to prepare for the ‘knowledge-based’ economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social policy as precondition for economic growth and job creation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Key values and principles | - Social equality  
- Jobs for all (men)  
- Decommodification | - Individual responsibility  
- Any jobs  
- Activation | - Social inclusion  
- Quality jobs  
- Capabilities approach |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equality of opportunity’ ‘Prepare rather than repair’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Key norms for public action | - Big state  
- Central economic planning  
- Welfare state development- Policies to support demand | - Lean State  
- Deregulation  
- Dismantling of the welfare state | - Empowering state  
- Investment  
- Recasting of the welfare state |
|-------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
Table 6 (cont.)

<table>
<thead>
<tr>
<th>Key instruments</th>
<th>Policies to support demand</th>
<th>Policies to support demand</th>
<th>Policies to support demand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Development of social</td>
<td>Development of social</td>
<td>Human capital investment</td>
</tr>
<tr>
<td></td>
<td>insurance schemes for</td>
<td>insurance schemes for</td>
<td>policies to increase</td>
</tr>
<tr>
<td></td>
<td>income maintenance</td>
<td>income maintenance</td>
<td>competitiveness and job</td>
</tr>
<tr>
<td></td>
<td>Development of the public</td>
<td>Development of the public</td>
<td>creation</td>
</tr>
<tr>
<td></td>
<td>sector</td>
<td>sector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unemployment compensation</td>
<td>Unemployment compensation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monetarist economic</td>
<td>Monetarist economic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>policies to fight inflation</td>
<td>policies to fight inflation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deregulation of the</td>
<td>Deregulation of the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>labor market</td>
<td>labor market</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Privatization of social</td>
<td>Privatization of social</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and health services,</td>
<td>and health services,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>development of</td>
<td>development of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>capitalization to finance</td>
<td>capitalization to finance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pension schemes</td>
<td>pension schemes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Activation and workfare</td>
<td>Activation and workfare</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Much like theories on endogenous growth, social investment thinkers argue that public investments in healthcare and education can be compared to the productive investments in fixed capital supporting private sector expansion. Indeed, Social Investment Theory maintains a belief in the efficacy of the market system, but maintains a neo-Keynesian focus on steering economic and social outcomes (Morel et al., 2012b: 10). Where neoliberalism dismisses social policy as a cost and hindrance to economic growth, theories on social investment emphasize the need for the reform of welfare policy as a means to manage long-term socioeconomic planning. Much as theories on endogenous growth, the social investment perspective reaffirms the idea that long-run growth depends on long-term investments in policy and planning. Beyond the neoliberal policy dichotomy between economic policy and welfare policy, the social investment perspective suggests that social policy can play a key role in driving socioeconomic growth.

Contrary to neoliberal policies that curtail social spending on the grounds that public debt undermines growth, Social Investment Theory makes the argument that the lack of knowledge-based investments undermines long-term growth. Put differently, increasing
the supply of high quality labor through the provision of welfare state services (activation, childcare, eldercare, and employment services) is central to the social investment literature (e.g. European Commission, 2004). Rather than a return to the Keynesian redistribution policy framework of the 1970s (Chenery et al., 1974), however, education and social welfare are seen as key to stimulating long-run socioeconomic development (Pierson, 2007; Esping-Andersen, 1990; Nederveen Pieterse, 2012). This implies a renewed focus on social investments as a public good. Emphasizing human capital investment in a deregulated labor market, for example, the social investment perspective views education as an instrument for long-term social and economic development (De Deken, 2012: 8).

In many ways, the social investment perspective marks a kind of policy synthesis between the welfare focus of Keynesianism and the market focus of neoliberalism. Overlapping social policies found in Nordic welfare states, Social Investment Theory is distinguished from other types of welfare models by its emphasis on maximizing labor force participation. Like neoliberalism, social investment theory focuses on public policy aligned to supply-side economics, but unlike neoliberalism it also breaks with any ideological attachment to minimal government. Hemerijck (2011: 14) elaborates,

The logic of “social policy as a productive factor” contrasts with neo-classical economics in three crucial dimensions. In the first place, neo-classical economics, based on perfect information and market clearing, theoretically rules out the kind of social risks and market failures that the welfare state seeks to address. Secondly, because neo-classical economics focuses only on the (public) cost side of the welfare state, it is unable to appreciate its core macro- and micro-economic benefits. Thirdly, even where markets function well, collective action problems may obstruct the creation of public goods if participation in the policy cannot be guaranteed and defection is likely. Markets are destined to undersupply education, the benefits of which cannot be internalised. Extensive comparative empirical research has since the turn of the century revealed that there is no trade-off between macro-economic performance and the size of the welfare state. The presence of a large public sector does not necessarily damage competitiveness. On the contrary, there is a positive relationship between fertility and high levels of female participation in most Scandinavian countries...
Like Keynesianism, social investment emphasizes the role of the State in providing social provisions to maintain socioeconomic growth. In policy terms this translates as universal investments in LLL, healthcare, and early childhood care. But where Keynesianism focuses on counter-cyclical macroeconomic investments for the here and now, government-driven social investments are framed as public investments for the future (Morel et al, 2012; OECD, 2006). Much as the State mobilizes resources to promote R&D in support of technological innovation (Mazzucato, 2011), it is argued that the State should take deliberative steps to make scaled investments in advanced education and training to promote human “capacitation”. Unlike neoliberal readings of human capital theory, however, this is not merely to service the expansion of corporatized capitalism, but to enlarge a country’s endogenous capacity for social and economic development.

**Challenges to Social Investment Theory**

Despite the growing interest in Social Investment Theory, however, there are a number of legitimate criticisms that warrant careful consideration. Perhaps the main criticism is that there is no precise definition of the term “Social Investment”. Indeed, critics suggest that Social Investment Theory is merely a new phase of neoliberalism: While “spending in areas such as education, childcare and health is seen as a good… spending on passive welfare such as unemployment benefits is seen as bad” (Perkins, Nelms & Smyth, 2004: 8). Critical literature drawing on Foucault’s writing on *governmentality*, for example, point to the inherent “automization and responsibilization” maintained in social investment thinking. As Lister (2003) maintains, the consequence of the managerial state is that “education is reduced to a utilitarian achievement-oriented measurement culture of tests and exams, with little attention paid to the actual educational experience” (p. 434). Green (2007: 60) adds that “Programmes are operationalised through the application of various technologies of government including audit, benchmarking, public service agreements target-setting and performance reviews and measurement”. In this way, control is “based on the apparent ‘empowerment’ of subjects to regulate themselves” (Newman, 2001: 22).
Additionally, the growing literature on labor automation suggests that social investment thinking underestimates both the rising socioeconomic challenges posed by technological innovation and the very real problem of climate change. Given the rapidly unfolding environmental crisis and its acceleration under globalization, it is simply naive to assume that reforming capitalist political economy will be sufficient to avoid ecological catastrophe. Using the language of economics, social investment policy is imagined as having a multiplier effect: increased economic participation supports a positive cycle of increased contributions to the economy. This approach to reforming neoliberal public policy is noteworthy but is it substantial enough relative to the scale of problems we now face?

Bridging the economic and social dimensions of public policy, the social investment perspective aims to build policies to resolve structural challenges within postindustrial societies (i.e., aging populations, changes in family structure, new migration patterns, and increased cultural and ethnic diversity). From this perspective, Social Investment Theory argues for conjoining economic and social policy without reducing one to the other. But is this sufficient? Are the growing demands for social and political transformation linked to technological innovation and accelerating climate change resolved by simply encouraging more investments in education and social services?

**Towards the Partner State?**

As former neoconservative Francis Fukuyama (2012) maintains, there is an acute need for “serious intellectual debate” about the erosion of the middle-class across many OECD countries. For the past thirty years, the value of postwar welfare state has been progressively undermined by neoliberal ideology. Following the rise of neoliberalism in the UK under Thatcher and the US under Ronald Reagan, the public value of education and other social goods have been hollowed by market-driven austerity policies. Indeed, Fukuyama argues for a counter-revolutionary ideology to replace neoliberalism:

> Politically, the new ideology would need to reassert the supremacy of democratic politics over economics and legitimate anew government as an expression of the public interest. But the agenda it put forward to protect middle-class life could not
simply rely on the existing mechanisms of the welfare state. The ideology would need to somehow redesign the public sector, freeing it from its dependence on existing stakeholders and using new, technology-empowered approaches to delivering services. It would have to argue forthrightly for more redistribution and present a realistic route to ending interest groups’ domination of politics. (2012, p. 11)

Bauwens (2012), for example, argues that the kind of institutional restructuring needed at the level of State is best found in relation to a public administration of the commons. In his view, we are witnessing the slow death of the welfare state, but also the death of the neoliberal corporate state as well. Against the backdrop of deindustrialization and growing numbers of precarious knowledge workers, he points to the need for a “Partner State” that might oversee the fixed public capital needed for peer production and a collaborative commons. Notwithstanding the fact that the State remains class-biased, Bauwens argues that a rejuvenated democratic state needs to refocus on the common good in order to maintain its legitimacy.

Based on the ideas of Italian political scientist Cosma Orsi, the Partner State is designed to enable and support the creation of social value by its citizens, while at the same time protecting the common infrastructure underlying co-operation. Unlike the utilitarian notions of capital accumulation and individual self-interest that underlies the Market State, the Partner State is understood as a set of laws and practices that protect infrastructure for the commons through for-benefit institutions. Building on horizontally scaling networks, the peer production of common value remains the locus of a civil economy and civic institutions.

What about education? Rifkin argues that MOOCs will enable massive platforms for scaling near zero cost education as well. Much as other areas of the collaborative commons, the top-down features of formal schooling will be displaced by peer driven communities-of-practice. Where learning in the capitalist era was fixed to autonomous learning and training for the labor force, education will now be more closely aligned with critical thinking and social transformation (Drucker, 1994). Knowledge itself moves from
being a proprietary resource that is used to leverage competitive advantage to a shared public good embedded in an Internet driven collaborative commons.

This kind of “public commons” thinking is only bolstered by the rising challenges associated with the convergence of ubiquitous computing and a networked collaboration. Rifkin (2014) argues that Moore's law is both expanding competition and driving down the marginal cost of producing additional units to nearly zero, making products and services essentially free. The consequence of advanced computing, in other words, is a precipitous decline in the value of markets for managing goods and services. Put differently, postindustrial societies are being moved from markets to commons, or from “exchange value” to “use value”, resulting in an era of networked collaboration that is open and free.

What is now obvious is that the interconnected forces of technological innovation, digitization, and distributed collaboration are moving authority away from institutions of formal schooling, and beyond their roots in nineteenth-century industrialization. The central challenge facing education today is the need to move beyond factory schooling. The main question, however, is what kind of school can sustain self-organizing communities-of-practice that are rooted in free and open access to the global commons?

**Conclusion**

The central argument of this dissertation research is that contemporary U.S. educational reform policies are based upon contradictory readings of the “knowledge economy”, rooted in ambiguous forecasts on the evolution of postindustrial society. Conflating discourses on KE, educational reform is now married to contradictory assumptions about the nature and function of education in the 21st century. While policymakers in the United States tend to focus on globalization and rising competition from developing countries, the truth is that something even more fundamental is transforming the global economy.

Much as the Industrial Revolution transformed physical labor, the Information Revolution (Beniger, 1986) is transforming cognitive labor. Beyond neoclassical
economic theory, and short-term investments in human capacitation as a foundation to economic expansion, U.S. education policy must now begin to reexamine its basic assumptions. The exponential advance of digital technologies is changing the nature of market economies. The main policy response to this phase transition has been to focus on restructuring the education system to manage against labor redundancy. But rising unemployment across most segments of the labor force is making this strategy less tenable. Indeed, critics respond that the scale of this transformation outstrips the need for the cognitive capacities of human labor.

As Karl Marx (1977 [1859]) once wrote, “No social order ever disappears before all the productive forces for which there is room in it have been developed; and new higher relations of production never appear before the material conditions of their existence have matured in the womb of the old society itself”. Notwithstanding the fact that capitalism will remain the dominant paradigm of value creation for many decades to come, it remains the case that distributed systems are forcing a phase transition that is transforming a society anchored to centralized systems. What this means is that education policy must adapt to these changing conditions. What is obvious is that retrofitting “factory schools” with advanced technologies is not a solution. Rather, we must begin to reimagine education in the context of a global collaborative commons.
Bibliography


172


Dede, C. (2013). Opportunities and challenges for educational transformation via learning technologies. In J. Guthrie (Ed), *A bigger bang for education’s bucks: Schools America must have at costs America can afford*. Dallas, TX: George W. Bush Institute.


Economist (2013b, November 7). On your marks: States are starting to test teachers. Retrieved from


Fukuyama, F. (January, 2012). The future of history: Can liberal democracy survive the


middle class. Cambridge, MA: Harvard University Press.


Scott, J. (2009). The politics of venture philanthropy in charter school policy and


UNESCO (2010). *Education for all global monitoring report: Reaching the
marginalized. Paris: UNESCO.


## Appendix A

### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>ANAR</td>
<td>A Nation At Risk</td>
</tr>
<tr>
<td>ARPA-E</td>
<td>Advanced Research Projects Agency Energy</td>
</tr>
<tr>
<td>ARPA-ED</td>
<td>Advanced Research Projects Agency Education</td>
</tr>
<tr>
<td>ARRA</td>
<td>American Recovery and Reinvestment Act</td>
</tr>
<tr>
<td>BFR</td>
<td>Blueprint for Reform</td>
</tr>
<tr>
<td>BRIC</td>
<td>Brazil, Russia, India, China</td>
</tr>
<tr>
<td>CCS</td>
<td>Common Core State Standards</td>
</tr>
<tr>
<td>CCSI</td>
<td>Common Core State Standards Initiative</td>
</tr>
<tr>
<td>CCSO</td>
<td>Council of Chief State School Officers</td>
</tr>
<tr>
<td>CE</td>
<td>Creative Economy</td>
</tr>
<tr>
<td>COMPETES</td>
<td>Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science</td>
</tr>
<tr>
<td>DARPA</td>
<td>Defense Advanced Research Projects Agency</td>
</tr>
<tr>
<td>DER</td>
<td>Distributed Energy Resources</td>
</tr>
<tr>
<td>DOE</td>
<td>Department of Energy</td>
</tr>
<tr>
<td>ESEA</td>
<td>Elementary and Secondary Education Act</td>
</tr>
<tr>
<td>EGT</td>
<td>Endogenous Growth Theory</td>
</tr>
<tr>
<td>EFRC</td>
<td>Energy Frontier Research Centers</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>FOSS</td>
<td>Free and Open Source Software</td>
</tr>
<tr>
<td>GE</td>
<td>Green Economy</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning Satellite</td>
</tr>
<tr>
<td>HC</td>
<td>Human Capital</td>
</tr>
<tr>
<td>HCT</td>
<td>Human Capital Theory</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IGO</td>
<td>Intergovernmental Organization</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IP</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>JOLTS</td>
<td>Job Opening and Labor Turnover Survey</td>
</tr>
<tr>
<td>K-12</td>
<td>Kindergarten-Grade 12</td>
</tr>
<tr>
<td>KBC</td>
<td>Knowledge-based Capital</td>
</tr>
<tr>
<td>KE</td>
<td>Knowledge Economy</td>
</tr>
<tr>
<td>LLL</td>
<td>Lifelong Learning</td>
</tr>
<tr>
<td>M2M</td>
<td>Machine-to-Machine</td>
</tr>
<tr>
<td>NASA</td>
<td>National Aeronautical Space Agency</td>
</tr>
<tr>
<td>NCLB</td>
<td>No Child Left Behind</td>
</tr>
<tr>
<td>NEPC</td>
<td>National Education Policy Center</td>
</tr>
<tr>
<td>NE</td>
<td>Network Economy</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>NETP</td>
<td>National Educational Technology Plan</td>
</tr>
<tr>
<td>NGA</td>
<td>National Governors Association</td>
</tr>
<tr>
<td>NIEs</td>
<td>Newly Industrialized Economies</td>
</tr>
<tr>
<td>NIS</td>
<td>National Innovation System</td>
</tr>
<tr>
<td>NSF</td>
<td>National Science Foundation</td>
</tr>
<tr>
<td>OA</td>
<td>Open Access</td>
</tr>
<tr>
<td>OAC</td>
<td>Open Access Coalition</td>
</tr>
<tr>
<td>OCW</td>
<td>Open Courseware</td>
</tr>
<tr>
<td>ODL</td>
<td>Open and Distance Learning</td>
</tr>
<tr>
<td>OE</td>
<td>Open Education</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
</tr>
<tr>
<td>OER</td>
<td>Open Educational Resources</td>
</tr>
<tr>
<td>OS</td>
<td>Open Source</td>
</tr>
<tr>
<td>OSM</td>
<td>Open Source Movement</td>
</tr>
<tr>
<td>P2P</td>
<td>Peer to Peer</td>
</tr>
<tr>
<td>PISA</td>
<td>Program for International Student Assessment</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RTTT</td>
<td>Race to the Top</td>
</tr>
<tr>
<td>SBIR</td>
<td>Small Business Innovation Research Program</td>
</tr>
<tr>
<td>SBTC</td>
<td>Skill-biased Technological Change</td>
</tr>
<tr>
<td>STEM</td>
<td>Science, Technology, Engineering and Math</td>
</tr>
<tr>
<td>SAI</td>
<td>Strategy for American Innovation</td>
</tr>
<tr>
<td>TARP</td>
<td>Troubled Asset Relief Program</td>
</tr>
<tr>
<td>TIMSS</td>
<td>Trends in International Mathematics and Science Study</td>
</tr>
<tr>
<td>TWG</td>
<td>Technical Working Group</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>USDOE</td>
<td>U.S. Department of Education</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
</tr>
<tr>
<td>WIPO</td>
<td>World Intellectual Property Organization</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organization</td>
</tr>
</tbody>
</table>
# Appendix B

## Interview Protocol

<table>
<thead>
<tr>
<th>Questions</th>
<th>Central Theme</th>
<th>Prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How would you describe your research?</td>
<td>Interviewees professional Background.</td>
<td>Can you describe what your current role/position is?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What has prepared you to work in this position?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How long have you been working on issues related to higher education?</td>
</tr>
<tr>
<td>2. What do you think are the challenges facing U.S. K-12 education today?</td>
<td>The context of higher education.</td>
<td>Can you describe some of the current challenges and/or issues in U.S. education?</td>
</tr>
<tr>
<td>3. Are there specific areas in formal education that you would like to see changed?</td>
<td>Educational reform policy.</td>
<td>What would you like to see changed in U.S. higher education?</td>
</tr>
<tr>
<td>4. There’s a lot of discussion now about the need for educating for a global knowledge economy. What do you think of this? How would you define the “knowledge economy”?</td>
<td>The larger economic milieu.</td>
<td>What are views on educational reform in the context of economic change—particularly the “global knowledge economy”?</td>
</tr>
<tr>
<td>5. Education today is</td>
<td>Specific economic policies</td>
<td>What is your view of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>often described in terms of human capital development. What is your view of this concept?</td>
<td>shaping U.S. educational reform.</td>
<td>human capital development?</td>
</tr>
<tr>
<td>6. What impact (if any) do neoliberal social policies now have on formal education?</td>
<td>Impact of neoliberalism.</td>
<td>What impact (if any) do neoliberal social policies now have on formal education?</td>
</tr>
<tr>
<td>7. It is suggested that education in the twenty-first century should be less about transmission and more about student-centered lifelong learning. What do you think of this idea?</td>
<td>Transformations in U.S. educational reform.</td>
<td>It is suggested that education in the twenty-first century should be less about transmission and more about student-centered lifelong learning. What do you think of this idea?</td>
</tr>
<tr>
<td>8. Some theorists have suggested that education needs to move beyond an industrial paradigm. How should we conceptualize postindustrial education?</td>
<td>“Postindustrial” education</td>
<td>Does educational reform need to move beyond the industrial paradigm? How should we conceptualize postindustrial education?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| **10.** How could U.S. education be enhanced by technology? | Technology and education. | What role does technology play in U.S. education?  
How could technology enhance education?  
What is the value of technology to educational reform? |
| **11.** What is the role of networks and/or mass collaboration to education? | Peer production and education. | What is the role of networks and peer production in changing the way education is conceptualized?  
How does mass collaboration change education? |
| **12.** How might the U.S. education system provide greater equity? | Equity and education. | How could U.S. education be redesigned to ensure greater equity? |
| **13.** In an ideal world, what should we teach students in the 21st century? | Views on educational reform for the 21st century. | In an ideal world, what should we teach students in the 21st century? |