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Policy Networks in Mathematics
Educating for Corporations and Against People

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Abstract
This article introduces an extensive analysis of the messy, entangled web of the politics of math education and a novel method for policy analysis. I have identified a policy network surrounding math education for America that presents the following interrelated interests: a national math education that develops human capital (the characteristics of productive workers), debates over traditional and reform pedagogy, agreement on a content knowledge deficit of math teachers, and a math education that fuels an education services sector. This article primarily describes the first of these trends, the notion that math education for America produces in people those intangible qualities usable by businesses.

For the last half of the twentieth century, we witnessed an increase in the attempts to define and execute a national mathematics education for public schools in the United States. National math education, what I will also refer to as math education for America, means two things: a circumstance in which all students across the US are offered primarily the same instruction from among mathematical topics, and a process whose outcome is in the national interest. Efforts have swelled to a greater magnitude since 2000, culminating in 2010 with over 40 states adopting the same math education standards (the *Common Core State Standards for Mathematics*) in part because such action increased a state's chances to win federal monies for use in schools. Such an emerging national math education warrants significant attention from those interested in education policy and math education.

This article introduces (1) an extensive analysis of the messy, entangled web of the politics of math education and (2) a novel method for policy analysis. I have identified a policy network surrounding math education for America that presents the following interrelated interests: a national math education that develops human capital (the characteristics of productive workers), debates over traditional and reform pedagogy, agreement on a content knowledge deficit of math teachers, and a math education that fuels an education services sector. This article primarily describes the first of these trends, the notion that math education for America produces in people those intangible qualities usable by businesses. The remainder of these themes is discussed in Wolfmeyer (2014).

The Social Network of National Math Education

Anthropologist Janine Wedel's (2009) perspective on contemporary governance inspired my approach to analyzing national math education: "Emergent forms of governing, power, and influence ... play out not in formal organizations or among stable elites, but in social networks that operate within and among organizations at the nexus of private and official power" (p. 20). Accordingly, to construct a social network of national math education, I first comprised a list of individual actors who took part in authoring influential policy documents. I next researched these individuals, via publicly available information, for their affiliations to organizations and created diagrams to represent the social network of all actors, both individuals and organizations, at play in the policy domain. Finally, I assembled data on the activities and statements of these actors in the identification of strong themes present in the network. These themes are argued to be the dominant interests in math education for America.

My methodology begins with a particular perspective (Wedel's) that is inherently suspicious of contemporary policy-making. Given this upfront, I was expecting to find a "math education" that is "not for America," hence the title *Math education for America?* (Wolfmeyer 2014). However, I did not anticipate all the particular interests I came to find, such as the interest in stating that math teachers do not know math. Some readers will disagree with Wedel and my suspicion of policy-making. They might reject the creation of a social network for the study of policy, and instead focus on the policy documents themselves. Or, they might look at my list of network actors, research these themselves, and describe the trends that they see in the network. In other words, I do not claim that my reading of the network is anything other than my own. For this introduction, the following provides a brief example of the method without discussing the complexities of the project in total.

One of the documents I used to begin constructing the social network of national math education is the *College and Career Readiness Standards for Mathematics* (2009). This document provided the blueprint for the *Common Core State Standards for Mathematics* (2011) that over 40 states have adopted as their curricular framework for math education, thereby indicating the influence of the document. The list of authors of the *College and Career Readiness Standards* included a "development team" and a "feedback group." Delineation between the two groups is provided by the National Governors Association's press release which announced the two groups: "The role of this Feedback Group is to provide information backed by research to inform the standards development process by offering expert input on draft documents. Final decisions regarding the common core standards document will be made by the Standards Development Work Group. The Feedback Group will play an advisory role, not a decision-making role in the process" (National Governors Association, 2009). In other words, the development group is the primary author of these curricular goals. Since they determined the contents of the standards adopted by over 40 states, I argue this group as the most influential in the development of the new national math standards.

Of the 15 people on the Development Workgroup, several are employees in the educational testing industry, including ACT and College Board. One member, Phil Daro, works for America's Choice, a company that provides professional development for math teachers and was recently bought by Pearson, an educational corporation. Thus the interest in national math education by educational business has already been made clear. Furthermore, the initial founder of America's Choice suggests another business interest: the National Center On Education and the Economy (NCEE) is a research and policy institute that aims to shape public education towards the needs of business. Specifically, they seek an education that develops in students the intangible qualities required to be a productive worker. Such qualities and investment in them are typically referred to as development in human capital. In light of this, funding for NCEE comes from the likes of Apple, Kodak and Walmart. Another research and policy institute that is well represented in this national math education event is Achieve, Inc. Funding this institute are Gates, Boeing, Hewlett, GE, IBM, JP Morgan Chase, Intel, and Prudential, among others. Therefore, the drafting of the document indicates another interest in national math education, that of the corporations that find math education useful for developing the workers they need.

I offer this brief example to introduce how I looked at the organizations in the social network surrounding national math education. Ultimately, my construction of a representative social network surrounding national math education is more involved than what I describe here, but it does rest primarily on looking at the individuals involved in such national math education events and their links to other organizations. Once the network was constructed, I then read it for strong themes. The primary theme is discussed next and for the remainder of the article.

Human Capital: Math Education for America's Purpose

As I outlined with the brief example above, math education "in the national interest" actually is in the interest of corporations, mostly for its role in developing human capital and providing a scenario for educational businesses to make their profits. Of the two, math education for America exists primarily to develop those intangible qualities of productive workers. I will later detail the several network actors who hold the interest, those that represent the interest (mainly because they are funded by corporations that hold the interest), and the many academics who adopt the interest. I also include how the educational businesses adopt this purpose for math education to advance their own interest in providing services related to the development of human capital.

Adopting the development of human capital as the primary purpose of national math education is a phenomenon that corresponds to Wedel's understanding of the individuals in these social networks surrounding public policy. Terming them "flexians," she posits that actors adopt other interests to advance their own. The several academics in the network adopt the interest of human capital to advance their own interests.

The notion of human capital designates human beings as one form of capital, or those assets that can lead to an increase of assets. Capital has usually been understood to primarily describe money, land, and factory machines, but now often includes "the importance of people - their abilities, their knowledge, and their competences - to economic growth" (Keeley, 2007, p 29). Because people can be the repositories of intangible qualities that aid in the production of goods and services, investments should be made to improve such capital, much like an industry puts money into its factory machines.

Human capital theory suggests that particular investment in humans can lead to greater business returns (Becker, 1994). This perspective views people as a natural resource upon which you can add value. In examining the activities and statements of actors math education's policy network, I found significant support for developing human capital. Some actors in this network are the types of organizations that reap the returns from investment in human capital; others, in the spirit of Janine Wedel's "flexians," do not share this interest but do agree with this purpose for math education for a variety of reasons, such as advancing their particular pedagogical stance regarding teaching math.

I begin by revisiting contributions from the aforementioned prominent figure in the development of human capital theory, Gary Becker. Recently, he suggests that math education is somehow important in the development of human capital. From an addition to his 1994 re-print of *Human Capital*: Concerns about investment in human capital "are stimulated by tough economic competition from a renewed Europe, Japan, Korea, and other Asian countries, by sluggish rates of productivity in the United States during the past fifteen years, by a large drop in SAT scores, and by the dismal performance of American high school students on international tests in mathematics" (Becker, 1994, p 17). Economists often attend to the results of student performance on such comparative assessments, indicating their connecting of math education with economic performance. In this way, economists view math education as at least one aspect of human capital development.

There has been more attention to these international math assessments, with some attempts at determining to what extent performance on these tests correlates with economic growth. Particularly influential among these attempts is the work of Eric A. Hanushek and Ludger Woessman. Their analysis indicates that a nation's investment in cognitive skill development (as measured by the outcomes on international math tests) contributes more to a nation's economic growth than its support of free trade and property rights or regulations on the product and labor markets. (Hanushek & Woessman, 2010). They use a nation's GDP per capita to indicate economic well-being as opposed to other indications of a society's economic health, such as real wage earnings or measures of income distribution. This marks a significant difference from the earlier work of Becker, who measured the return on investments in human capital by the wage earnings of those that received education.

Hanushek and Woessman suggest that human capital theory, presently or perhaps always, is concerned primarily with the rate of return for businesses, not individuals. Using GDP per capita as a measure indicates only how successful a nation's economic output is, with no consideration regarding who receives this benefit. Quite the contrary, given the stratification of wealth in the US from the 1980's through today (Harvey, 1995, p 17), measuring GDP per capita clearly signifies an emphasis on corporate profits. Human capital theory, at least in its present form, considers state investment in human capital as an important contributor to corporate profit. This is consistent with my previous considerations of globalization's effects on US wages, impacting both the workers regarded as professionals and producers.

The review of human capital theory provides a framework for identifying those in the network who align with this theory. I have highlighted how human capital theory emerged from the era of neoclassical economics and thereby emphasizes the contradictory theme of a free market, i.e. non-government run, approach to education coupled with a state that forces educational outcomes to meet the needs of business. However, economic theorists who do not share the neoliberal view, such as Robert Reich, also embrace human capital theory. In all cases, the theory investigates how such state investment in education can lead to economic growth. As indicated by the work of Hanushek and Woessman, this perspective clearly prioritizes the interests of such growth over the interests of those that receive the education. Furthermore, US competition in the global economy reduces the wages of both production workers, the majority of labor in the US, and professionals. Lastly, human capital theorists pay attention to math education, indicating their belief in its role in the development of human capital. Using this review of human capital, I now present the various network actors who desire a state that educates for human capital, who represent those that do, and finally those who adopt this interest to advance their own.

The Policy Network's Commitments to Human Capital

Now that I have elaborated on what it means to educate for human capital, I focus on the connection between it and national math education. Upon initial inspection of the writings and activities of the network's actors, I found that several indicated commitment to a math education that serves the needs of human capital. The results of my inquiry are expressed in Figure 1; this sociogram indicates the network actors that align with human capital. The gray actors are those I found to indicate such commitments because they are either corporations that will benefit from a national math education that develops human capital or because they are other individuals or organizations who state this as the purpose for math education. For example, one organization that holds the human capital interest is "GS9," ExxonMobil. This organization requires human capital to increase profit margins. There are also those network actors that are not the corporations themselves that will benefit from human capital development, but instead they are organizations that represent these corporations. An example from this category is the research and policy institute "RP1," Achieve, Inc., which receives funding from several corporations and has corporate executives on its board. Third are those academics that express the human capital interest; an example is "ME6," Francis (Skip) Fennell. He is a math education researcher who is not a board executive of an organization that uses human capital, but did adopt such an interest because he stated that math education will help the US compete in a global economy. Later I argue more clearly how these and other actions represent an adoption of the human capital interest. Of the network's 147 actors, 86 are gray. For greater clarity, I have also repeated the tables of network actors, this time indicating those actors who express the human capital interest.

Tables 1 and 2 in the Appendix to this article list the various organizations and individuals in the sociogram.

Human Capital in National Math Education's Social Network

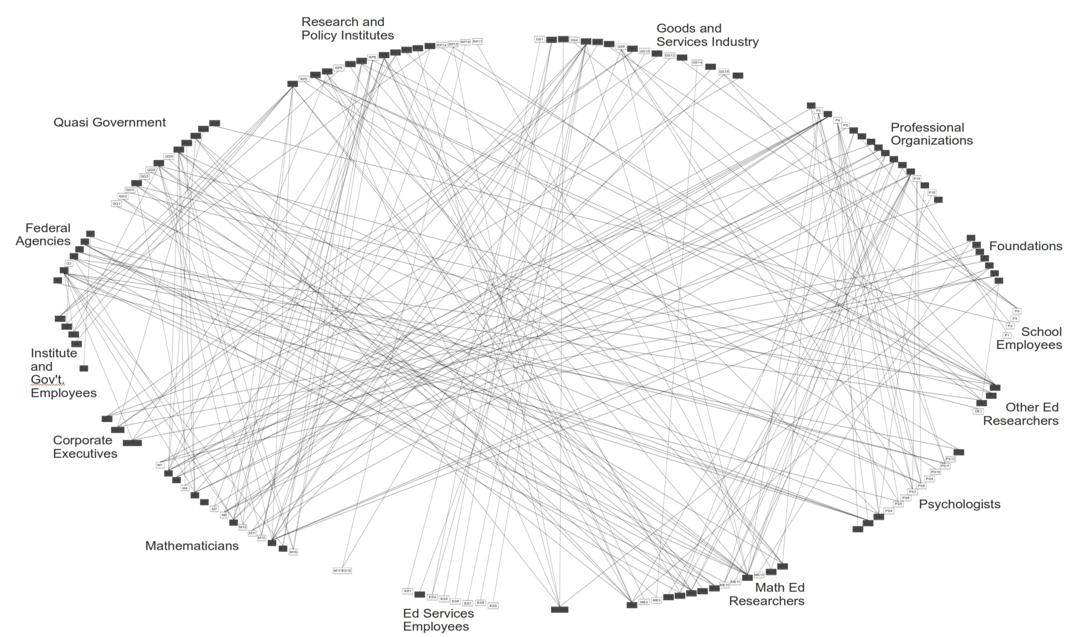

Figure 3-1

Network Actors Who Desire the Development of Human Capital

Several of the actors in the math education for America network require a workforce. They exist in the network because they desire the state to make investments that develop in humans particular intangible qualities. This opposes other explanations for their inclusion in the network, such as the claim of private philanthropy for the good of society. Rather, in light of the development of human capital theory, these corporations stand to gain by involving themselves in educational policy.

Broadly speaking, these network actors are businesses competing in a global economy. They include businesses in financial services, military services, information and communication technology, and energy. All of these sectors point to advancements in technology as a critical contributor to success, or profit increases.

Exxon, Guaranty Bank, the Noyce Foundation, Renaissance Technologies, RAND, and Sandia National Laboratory represent the types of actors surrounding a national math education who see it as a means to develop the human capital they require. The presence of Renaissance Technologies and Guaranty Bank signifies how math education can provide the human capital required by the financial services industry.

On the other hand, the Noyce Foundation represents math education for the human capital needed for information and communications technology. The Noyce Foundation was founded by the family of Robert Noyce, “co-founder of Intel and inventor of the integrated circuit which fueled the personal computer revolution and gave Silicon Valley its name” (Noyce Foundation, 2011). The Foundation funds projects that improve the teaching of science and math, which reflects Noyce's “concern about the shrinking pipeline of students interested and committed to science-related careers.” Information and communication technologies businesses provide both consumer technologies and services to other businesses, including those working in public education.

While the corporate motives for investing in math education remain nebulous, I have thus far indicated the types of corporations that desire such investment. These include businesses that work in the financial, information and communications technology, military and energy sectors. The next section presents the corporate shadows within the network, that is, those network actors that have significant influence from these types of businesses but are not these businesses themselves.

Network Actors Representing Corporate Interests

The network actors in this section do not directly benefit from investment in human capital, but instead represent the corporations that do require such development. Within math education’s policy network, there are organizations who have corporate board members or who are funded by businesses with the human capital interest.

For example, Achieve, Inc., the network research and policy institute that aided in developing the *Common Core State Standards* in math, also represents corporations desiring the development of human capital because this organization is funded by such corporations and has corporate executives on its board. Their funding over the years includes financial institutions such as Washington Mutual, Prudential, and Chase; information and communications technology corporations such as Microsoft, Hewlett Packard, Intel, and IBM; other engineering firms, including those that address the needs of the military like Boeing and Battelle, and others like Xerox and Kodak; and finally several insurance companies, such as Nationwide and State Farm. As with Conference Board and NCEE, Achieve accordingly indicates a commitment to the human capital interest. TERC, originally known as the Technical Education Research Centers, receives funding from, among other sources, Microsoft, IBM and Hewlett Packard. Again these indicate the Information and Communications Technology interest in math education. TERC was founded amidst concern over the Soviet launch of Sputnik, thus indicating TERC's historical connection to national math education for the military. Today, the activity of TERC comprises developing curricular materials and professional development for teachers.

As for examples of network individuals who represent the corporate interest, Edgar Robinson was vice president and treasurer of Exxon until 1998. Another individual in the network, Irma Arispe worked in the federal government's Office of Science Technology and Policy (OSTP). This auxiliary government agency “works with the private sector through the President's Council of Advisors on Science and Technology (PCAST) to ensure federal investments in science and technology contribute to economic prosperity, environmental quality and national security" (US Dept of Education, 2007). The 2006 PCAST included executives from Lockheed Martin and Dell Computer.

Thus far I have presented examples of network actors who desire investment in human capital or represent those that do. Looking at both the explicit and lurking commitments to human capital in this and the previous sections reveals that the following industrial sectors require human capital: information and communications technology, energy, financial services, military, and pharmaceuticals. Moving on, several network actors who lack the economic incentive to develop human capital also articulate that this is a purpose for math education.

The US "Competes in a Global Economy"

Many actors in the network that surrounds math education for America make the claim that math education, or knowledge and use of mathematics, will help the US compete in the global economy. These, and other similar expressions, reflect a belief that the US economy will remain strong if its citizens are the best trained for today's workforce needs. As suggested previously, while the US GDP may continue to climb, training for a competent workforce is in the interest of corporate profit rather than individual economic success. In fact, US participation in the global economy reduces the earning potential of its citizens. In other words, these actors who adopt the human capital interest are expressing alliance with the interest of the corporations who gain from human capital development.

I found that many network actors express a connection between math education and US economic viability. These statements come from network actors who do not desire investment in human capital for corporate profits themselves or from those that represent such interest. Because these actors adopt the interest, I am simultaneously using and affirming Janine Wedel's notion of "flexians," where actors in a policy social network adopt others' interests to advance their own.

Explicit statements connecting math education and the US economy come from both individuals and organizations in the network. An example of an individual is mathematician David Bressoud. He gave public testimony in support of increasing funding for the National Science Foundation's (NSF) programs in Science Technology Engineering and Mathematics (STEM) Education. From this speech:

> Much of America's competitive advantage in the world today is the result of its leadership in science and technology... Emerging powerhouses such as China and India are investing heavily in their universities and scientific institutes. As they also realize, promoting scientific and technological innovation requires more than funding laboratories and institutes. It requires educating the next generation of scientists and engineers who will populate those centers of excellence (Bressoud, 2011).

The competitive advantage pays reference to the global economy and the US concern of the strengthening of the Chinese and Indian economies.

An organization in the network surrounding national math education that connects math education to the US economy is MathCounts, a goods and services corporation that provides supplemental math education resources for gifted students, most often in the form of math competitions. In 2007, their chairman stated their associations with business and the connection between math education and the economy:

> As we continue a tradition started by our founding sponsors and corporate partners of ensuring that middle school students develop strong skills and
>
> enthusiasm for mathematics, we are encouraged by a shift in attitude towards math and its recognition as an essential component of our nation's future global standing (MathCounts, 2007).

US Students Compete in a Global Mathematics

Many network actors' compare US math education student performance to that of other countries. They too operate under the incorrect assumption that a strong math education for US students will result in greater US economic growth. Robert Linn, a psychologist in the network, has argued that these comparisons are embedded within the context of a math education for human capital, specifically one that allows the US to compete in the global economy. He writes:

> International comparisons have played a prominent role, sometimes explicitly and sometimes implicitly, in the debate about standards...Even when not mentioned, the international emphasis is evident from the context that stress economic competition and assumes that there is a close link between a nation's educational achievement and its economic competitiveness. (Linn & Baker, 1995, p. 405).

As I have indicated in this article, such economic competition between nations serves the interests of global economic health by reducing overall wages. The US motivation to invest in math education serves the interests of global human capital, rather than purely the US economy and not the interests of people living in the US. Therefore, such attention to international assessments should be associated with providing the human capital needed by the global economy.

Many network actors concern themselves with US student performance on two international assessments: the International Association for the Assessment of Educational Achievement's (IEA) Trends In Math and Science Study (TIMSS) and the Organization for Economic Cooperation and Development's (OECD) Programme International Student Assessment (PISA). Both IEA and OECD are actors in my representation of the social network surrounding national math education. Additionally, some network actors analyze other aspects of US math education, such as the mathematical knowledge of teachers, against that in other countries.

By Linn's argument, the fact that International Association for the Assessment of Educational Achievement (IEA) and Organization for Economic Cooperation and Development (OECD) produce these international assessments is enough to say the two organizations support human capital. However, examining the two organizations in this context also helps to elaborate on why such international comparison represents the theme of math education for human capital. Both organizations serve the interests of the contemporary economy, the OECD more explicit of the two in this regard. The OECD's mission includes promoting "policies that will improve the economic and social well-being of people around the world." While the OECD claims to "make life harder for ... crooked businessmen," it indicates a "shared commitment to market economies" (OECD 2011).

On the other hand, IEA connections to the economy are not as clear. IEA's situation in an emerging global economy begin with the fact that the World Bank and United Nations Development Programme funded TIMSS 2007 (IEA 2007). The World Bank's actions to "provide low-interest loans, interest-free credits and grants to developing countries for a wide array of purposes that include investments in education, health, public administration, infrastructure, financial and private sector development, agriculture, and environmental and natural resource management" (World Bank 2008) indicates a commitment to market economies, like OECD.

Furthermore, TIMSS has a long history that mirrors the emergence of the global economy. The test began with IEA's pilot study in 1959 that compared math achievement among students in the following twelve countries: Belgium, England, Finland, France, Germany (FRG), Israel, Poland, Scotland, Sweden, Switzerland, United States, and Yugoslavia. Since then, the number of participating countries has grown steadily; the latest Trends in International Mathematics and Science Study (2007) included 60 countries (IEA 2007). Clearly the IEA has expanded its influence and indicates a commitment among several countries to offering a similar math education to their youth. This commitment came to be as a result of the expanding global knowledge economy and each nation's quest to prepare its citizens to compete within it as described earlier.

The last international comparative project in math education that I highlight brings together many network actors. It highlights the differences in the math knowledge of teachers from among various countries. Math education researcher Liping Ma provided significant groundwork in this type of research, and the US Teacher Education Study in Mathematics (US-TEDS M) continues this work. On the advisory board of US-TEDS M are mathematicians Roger Howe, James Milgram and Hung-Hsi Wu; math education researchers Francis (Skip) Fennell, Jeremy Kilpatrick and William Schmidt; and other education researcher Tom Loveless. It is also supported by the IEA as well as funded by Boeing, GE, and Bill and Melinda Gates, thereby demonstrating further alliance with the human capital interest as I described earlier. Their work focuses on researching the variations in preparation of math teachers among nations.

This focus includes attention to comparing the math knowledge of such teachers, work that began with Ma's seminal *Knowing and Teaching Elementary School Mathematics*. In this book, she argues that elementary school teachers in China can explain the mathematics underlying division of fractions better than those in the US (Howe 1999). The US-TEDS M continues to measure such content knowledge, recently concludes "U.S. future elementary teachers' mathematics knowledge isn't distinctively high or low but certainly isn't at the level we as a nation would like" (TEDS-M 2010). In other words, Ma's initial hypothesis may still be true, but international comparisons do not support the claim that US math teachers have significantly less mathematical knowledge than their counterparts in other countries.

This section has outlined the variety of network actors who adopt educating for human capital because they compare US math education with that of other countries, a practice argued as an outgrowth over concern that the US was not competing well in the global economy. The magnitude of interest and work in this area indicates the extent to which there is a perception that math education contributes to economic growth. In the section following, I examine the particularly influential research that compares US math education to that of other countries.

The Testing Industry's College and Career Readiness

I have identified the development of human capital as the primary interest expressed in my representative social network surrounding national math education. However, an auxiliary business interest also exists in the network, namely that of the educational businesses who stand to gain by providing this development in people I highlight how this industry has aligned their efforts with the human capital thrust in math education. This occurs mostly through their efforts to define what it means to be ready for "college and career," a notion I will explain alongside my presentation of the network actors that articulate it.

The network actors examined here articulate their commitments to human capital via a notion of "college and career readiness." These actors, in one way or another related to the testing business, provide services that they claim will determine which students have fully developed human capital, either for use as a producer or a professional in the economy. Career readiness, taken to mean those students who do not pursue college after high school, refers to the qualities needed by industries for people to produce things, rather than professionals in the economy. College readiness resonates with a push for the higher education as needed for professional careers like computer programming for information and communications technology.

One network educational business, ACT, can be credited with providing the definitive research indicating that, as the organization posits, the type of education required to develop human capital for both professionals and producers is one and the same. In their research report, I first draw attention to how they articulate the testing industry's commitments to develop human capital:

> The primary mission of our public education system is to give every student the opportunity to live a meaningful and productive life, which includes earning a wage sufficient to support a small family. All students need to develop the knowledge and skills that will give them real options after high school. No student's choices should be limited by a system that can sometimes appear to have different goals for different groups. Educating some students to a lesser standard than others narrows their options to jobs that, in today's economy, no longer pay well enough to support a family of four. Widening access to the American dream through public education has always been one of the foundations of our society, and it is more critical than ever to our ability to remain competitive in today's global economy (ACT, 2006, p. 2).

Notably, this quote pays reference to US economic competitiveness and a euphemized definition of human capital ("...the knowledge and skills that will give them real options...."). The passage also contains references to the knowledge economy and equity, two aspects of progressive math education that can be argued to advance national math education for their relevance to human capital.

The point of the ACT report is to suggest that the needs of human capital are the same whether someone pursues higher education or not. "Whether planning to enter college or workforce training programs after graduation, high school students need to be educated to a comparable level of readiness in reading and mathematics" (ACT, 2006, p. 1). The research uses the similarities between ACT tests that assess "workforce readiness training" and the ACT, an aptitude test used for admission to colleges, to prove that the needs for both college and career are the same. In further analysis (Wolfmeyer, 2014), I examine their specific conclusions to indicate that "college and career readiness," the notion that preparing students for college or the workforce are one and the same, rests on shaky grounds. There I also provide the reasons why the testing industry promotes such false research: the testing industry's need for standardization will increase the efficiency because they provide the service of testing all students. In other words, ACT and other testing companies will require less real capital to test all students if all students are educated the same way.

Conclusion

I have provided exhaustive evidence that math education's policy network contains the interest of human capital. Human capital theory comprises the idea that nations should invest in education for the development in its citizens of those intangible qualities usable by businesses. This is first expressed by the number of actors in the network who stand to gain from investment in human capital. Next were those actors that represent such businesses. Together, these explorations revealed that the financial, energy, militaristic, pharmaceutical and information and communications technology industries believe that math education can develop the human capital they require. Finally, I offered examples from two sets of network actors that adopt the human capital interest including those that state the connection between math education and the US economy, and those that compare US math education to that of other nations. I have also inserted various considerations regarding human capital theory and its relation to math education. I have drawn from human capital theorists, and its critics, to indicate how national investment in human capital development aids multinational corporations and lowers real wage earning potentials for both professionals and producers in the economy. I suggest the importance of these points given that educating for human capital is the primary interest in national math education. These considerations came about as the strongest theme upon my reading of math education for America's policy network.

Appendix

Table 1
Network Individuals and Human Capital

CE1	Robinson
ES1	Clough
ES10/M17	Zimba
ES2/ME5	Daro
ES3	Gong
ES4	Ladd
ES5	Miller
ES6	Mullen
ES7	O'Callaghan
ES8	Schwartz
ES9	Vasavada
G1	Arispe
IE1	Forgione
IE2	Kraman
IE3	Slover
IE4	Sovde
M1	Andrews
M2/ME2	Bass
M3	Bressoud
M4	Browder
M5	Dossey
M6	Fristedt
M7	Howe
M8	McCallum
M9	Milgram
M10	Milner
M11	Peck
M12	Schmid
M13/CE2	Simons
M14	Treisman
M15	Wilson
M16	Wu
ME1	Ball
ME3	Carpenter
ME4	Clements

ME6	Fennell
ME7	Ferrini-Mundy
ME8	Fuson
ME9	Hiebert
ME10	Kepner
ME11	Kieran
ME12	Kilpatrick
ME13	Ma
ME14	Ramirez
ME15	Schmidt
OE1	Gersten
OE2	Hakuta
OE3	Loveless
OE4	Stotsky
P1	Day
P2	Eddins, Susan
P3	Pardo
P4	Williams
PS1	Benbow
PS2	Berch
PS3	Boykin
PS4	Brophy
PS5	Embretson
PS6	Geary
PS7	Lane
PS8	Linn
PS9	Mayer
PS10	Miller, Kevin
PS11	Reyna
PS12	Siegler
PS13	Whitehurst
S1	Faulkner

Table 2

Network Organizations and Human Capital

F1	Carnegie Foundation for the Advancement of Teaching
F2	Charles Dana Foundation
F3	Greenwall Foundation
F4	Houston Endowment
F5	Noyce Foundation
F6	Simons Foundation
F7	Spencer Foundation
G1	Department of Defense
G2	Department of Education
G3	Department of Justice
G4	National Aeronautics and Space Administration
G5	National Institutes of Health
G6	National Science Foundation
G7	Office of Science and Technology Policy
GS1	Academic Benchmarks
GS2	ACT
GS3	America's Choice
GS4	Carus Publishing
GS5	College Board
GS6	Consortium for Math and its Applications (COMAP)
GS7	CTY, JHU
GS8	Educational Testing Service
GS9	ExxonMobil
GS10	Grow Network, McGraw Hill
GS11	Guaranty Bank
GS12	Holt-Reinhart
GS13	MathCounts
GS14	National Center for the Improvement of Educational Assessment
GS15	New Teacher Project
GS16	Oxford-Sadlier
GS17	Pearson
GS18	Renaissance Technologies
P1	American Association for the Advancement of Science
P2	American Educational Research Association
P3	American Mathematical Society
P4	American Psychology Association
P5	American Statistical Association
P6	Association for Mathematics Teacher Educators
P7	Association of State Supervisors of mathematics
P8	Conference Board
P9	Conference Board Mathematical Sciences
P10	International Commission on Math Instruction
P11	Mathematics Association of America
P12	National Council of Supervisors of Mathematics
P13	National Council of Teachers of Mathematics
P14	National Council on Measurement in Education
P15	National Education Association
P16	Psychology of Math Education

P17	Society for Industrial and Applied mathematics
QG1	Capstone Research
QG2	Center for Proficiency in Mathematics Teaching
QG3	Instructional Research Group
QG4	International Educational Assessment
QG5	Mid-Atlantic Center for Mathematics Teaching and Learning
QG6	Nat'l Center for Research on Evaluation, standards and student testing
QG7	National Assessment Governing Board
QG8	Nat'l Cent. for Improving Stud. Learn. and Achvmnt in Math & Science
QG9	National Academy of Sciences (and NRC and MSEB)
QG10	Organization of Economic Cooperation and Development
QG11	RAND
QG12	Sandia National Laboratory
QG13	TERC
QG14	US National Commission on Math Instruction
RP1	Achieve, Inc.
RP2	Beckman Institute
RP3	Brookings Institute
RP4	RAND
RP5	Council for Basic Education
RP6	CT Academy for Ed in Math, Sci, Tech
RP7	Fordham Institute
RP8	Honest Open Logical Debate
RP9	Institute of Math and Education
RP10	Mathematical Sciences Research Institute
RP11	Minority Student Achievement Network
RP12	National Center for Edcuation and the Economy
RP13	National Math and Science Initiative - Uteach
RP14	Pioneer Institute
RP15	Strategic Education Research Partnership
RP16	Student Achievement Partners
RP17	TODOS
RP18	US Teacher Ed Study in Math

References

ACT, Inc. (2006). Ready for college and ready for work: Same or different? Retrieved from http://www.act.org/research/policymakers/reports/workready.html

Becker, G. (1994). *Human capital: A theoretical and empirical analysis, with special reference to education*. Chicago, IL: University of Chicago Press.

Bressoud, D. (2011). Statement of Dr. David Bressoud, past-president of the Mathematical Association of America. Retrieved from http://appropriations.house.gov/_files/MathematicalAssociationofAmerica.pdf.

College and career readiness standards for mathematics: Draft for review and comment. (2009). Retrieved from http://www.gatesfoundation.org/united-states/Documents/MathStandardsSources.pdf

Common Core State Standards Initiative. (2011). *Common Core State Standards for Mathematics.* Retrieved from http://www.corestandards.org/assets/CCSSI_Math Standards.pdf

Hanushek, E. & Woessman, L. (2010). How much do educational outcomes matter in OECD countries? CESIFO Working Paper No. 3238 Category 5: Economics of Education. Retrieved from http://www.cepr.org/meets/wkcn/9/979/papers/hanushek_woessmann.pdf

Harvey, D. (2005). *A brief history of neoliberalism*. New York, NY: Oxford University Press.

Howe, R. (1999, September). *Knowing and teaching elementary mathematics* reviewed by Roger Howe. *Notices of the AMS*. 881-887.

IEA. (2007). Trends in international mathematics and science study 2007. Retrieved from http://www.iea.nl

Keeley, B. (2007). *Human capital: How what you know shapes your life.* Paris: OECD Publishing.

Linn, B., & Baker, E. (1995). What do international assessments imply for world-class standards? *Educational Evaluation and Policy Analysis 17*(4), 405-418.

MathCounts. (2007). MathCounts annual report. Retrieved from https://mathcounts.org/Page.aspx?pid=1856.

National Governors Assocation. (2009). *Press release: Common core state standards development team and feedback group announced*. Retrieved from www.nga.org.

Noyce Foundation. (2011). About us. http://www.noycefdn.org/aboutus.php.

OECD. (2011). About OECD. Retrieved from http://www.oecd.org/pages/0,3417,en_36734052_36734103_1_1_1_1_1,00.html

TEDS-M. (2010). 2010 teacher education study in mathematics (TEDS-M), Frequently Asked Questions. Retrieved from http://www.educ.msu.edu/content/sites/usteds/documents/USTEDS-FAQ.pdf

US Department of Education. (2007a). Fact sheet: National math advisory panel. Retrieved from http://www2.ed.gov/about/bdscomm/list/mathpanel/factsheet.html.

US Department of Education. (2007b). Biography of Dr. Irma Aripse. Retrieved from http://www2.ed.gov/about/bdscomm/list/mathpanel/bios/arispe.html

Wedel, J. (2009). *Shadow elite: How the world's new power brokers undermine democracy, government and the free market.* New York, NY: Basic Books.

Wolfmeyer, M. (2014). *Math education for America? Policy networks, big business and pedagogy wars.* New York, NY: Routledge.

World Bank. (2008). About us. Retrieved from http://web.worldbank.org

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