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The realities that fuel the debates on the future of public schooling in America are obscured by commonly accepted maxims and platitudes. Contentious policy discussion is less interested in preparing young people for the jobs of tomorrow and responsible citizenship than in reinforcing social and economic hierarchies that are inexorably linked to the history of American society and the role of education. These are the central arguments that Gene Glass makes in his 2008 book, *Fertilizers, Pills, and Magnetic Strips: The Fate of Public Education in America*. Glass’s book provides a critical lens to the discourse on education reform that is rooted in demographical analysis. A review of Glass’s book would be incomplete without careful consideration of the rationale behind his choice.
for the book’s title, the thematically arranged quantitative evidence provided to support his claims of demographical shifts, and a discussion concerning how his arguments relate to the education reform ideas that are currently gaining momentum in America.

Gene Glass has been a professor of Education Policy Studies and of Educational Psychology at Arizona State University since 1986 and had previously worked at University of Illinois and the University of Colorado. He has made many important contributions to the field of education statistics, notably his development of "meta-analysis." Meta-analysis is a set of sophisticated analytical techniques that synthesizes multiple research studies of related topics. Glass’s most well known research concerns relationship between class size and achievement. His insistence on quantitative data to support qualitative claims is evident throughout the book, which features dozens of charts, tables, and graphs.

The title of Glass’s book is a tribute to the Pulitzer Prize winning book *Guns, Germs, and Steel: The Fates of Human Societies* by Jared Diamond. This book advances an elegant argument that environmental conditions, accidents of geography, and ease of domesticating available plants and animals are the most important factors in what areas of the planet experienced advanced civilizations. Like Jared Diamond, Glass makes a significant contribution to his field by providing a new lens to examine developments and arguments. Glass (2008) explains, “I have come to see the continues debates and attempts at reform of public education in America as linked to a set of influences largely unseen and unacknowledged, but when pointed out to any intelligent and objective observer strike a note of recognition and acceptance” (p. xiii). Also, both Glass and Diamond share a concern for getting at the root causes of inequality and social hierarchies.

There is a public perception that America’s public schools are failing to provide the tools necessary for the next generation to meet the challenges of tomorrow. It is popularly accepted that the quality of education in America is declining and that this decline will have disastrous effects on the future of America. Glass provides statistical evidence and explains the fallacies of
some oft cited studies in an effort to demonstrate that The American Public System, far from an abject failure it is frequently imagined, is doing a better job of education American students than ever before and compares favorably to other industrialized nations.

Closer examinations of test score data showed that nothing approaching a crisis ever existed. Creating the impression of a failing system depended on invidious and invalid comparisons of college applicants from different decades, students taking tests under vastly different conditions, or large heterogeneous populations of students compared to small privileged groups like the high school students in Finland or Austria (p.19).

Glass argues that this crisis is contrived in an effort to gain support for changing the educational system.

A central presupposition of Glass’s argument is that technological changes drive cultural and demographic changes. The title, *Fertilizers, Pills, and Magnetic Strips: The Fate of Public Education in America*, alludes to the three major technological innovations that he sees as the prime movers behind a transformation of the American social and cultural landscape. Each of these three technological revolutions warrants an entire chapter of analysis in Glass’s book. A brief explanation of how each impacted American society and spurred dramatic demographical changes is necessary before continuing on to a discussion on how the resulting population changes have driven educational reform.

The first invention that Glass regards as revolutionary is the rise in the use of artificial fertilizers. The invention and widespread use of agricultural fertilizers had a dramatic impact on human life, especially evident in 20th Century America. One consequence of this modification in farming practice is a large scale shift in population from rural to urban locations. “Cheap artificial fertilizers meant more fertile land. More fertile land meant fewer farmers needed to grow crops. Excess population migrated to cities” (Glass, 2008, p. 61). Rapid urbanization is one of the essential developments that changed America in the 21st Century. This urbanization resulted in a greater
emphasis on schooling as adolescents were no longer working on family farms. Industrial manufacturing in urban areas had a strong influence on school curriculum as preparing young people for industrial work became a vital part of public education. These developments lead to the development of tracking programs. Glass (2008) explains, “In 1914, Edwin G. Cooley, former Superintendent of Schools for the city of Chicago, proposed a dual system of secondary education in America. Students would be tracked at age 14 into either a college preparatory system or a system of training for an industrial job” (p. 68).

Urbanization also ushered in a smaller average family size as children went from being an asset (labor help on family farms) to a burden (another mouth to feed in a crowded urban environment). Glass also argues that the perception of children as an economic liability devalued young people and contributed to people thinking about children as a problem that needed to be solved. Therefore, an unforeseen and often overlooked effect of the changes wrought by artificial fertilizers is an emphasis on social control of the young people that flooded American urban areas.

Glass refers to a second technological change with the collective moniker of “Pills”. This term refers to the technological advancements of pharmaceuticals that can prevent pregnancies and extend the average lifespan of Americans. Thus, pills encompass a broad spectrum of pharmacology that changed the American population on both ends of the life cycle, birth and death. The impact of birth control can be seen in demographical trends that show a significant decrease in children born in America. “These innovations affected different social and racial groups differentially. The fertility gap between rich and poor and between White and ethnic minorities widened both for economic and religious reasons” (Glass, 2008, p. 77). Basically, the birthrates of different ethnic groups in America had long term consequences of shifting the population composition in the United States. In addition, medical technology breakthroughs have significantly lengthened the life expectancy of Americans, a development that has resulted in a demographical shift towards an older nation. Medical breakthroughs have had the compound effect of making the privileged white classes of America less represented in the younger
population segments and more represented in the older segments. Glass points out that this is no small demographical shift; rather it is a dramatic change that has substantial impact on how the privileged class sees itself in relation to public expenditures. Being motivated by self-interest, it should be of little surprise that funding health care and subsidizing retirement has become a bigger priority than paying for young people’s education for this aging segment of the population.

The third and final technological alteration described by Glass, magnetic strips, relates to the increase in the use of credit in the American economy. The invention, rapid adoption, and increasing reliance upon credit cards have changed the ways in which Americans regard money, savings, and public expenditures. Consumer debt represents a massive transfer of wealth and has contributed to an increasing disparity of wealth in America. For example, “The debt is not being carried by the rich, who became rich by lending money instead of borrowing at exorbitant interest rates. One third of households with credit card debt exceeding $10,000 have household incomes of under $50,000” (Glass, 2008, p. 90). Glass outlines the history of how credit came to have a leading role in the financial lives of most Americans. This history is riddled with deceptive and predatory business practices, the upshot of which is that Americans became more consumption oriented and the middle class has shrunken to a dangerously low percentage of the society. He argues that a large and healthy middle-class has traditionally been the supporters, both ideologically and financially, of an education system that was seen as integral to the health of the nation. The wealthiest segments of the population were more concerned with maintaining that wealth while the poorest were unable to provide the resource base that education systems rely upon.

Each of the three technological innovations had startling implications on how the future generations would be different than those that came before. Taken together, the three profoundly impacted the demographical composition of the country. Glass summarized these changes with the provocative chapter title, “America is Growing Browner, Older, and Deeper in Debt”. The U.S. population is rapidly changing in ethnic composition. One major demographical trend in America is the increasing
percentage of the population that is Hispanic. Glass explains, “This remarkable shift in the nature of the U.S. population arises from two sources: the greater fertility rate of Hispanic women and immigration to the U.S. from Mexico and Central America” (Glass, 2008, p. 98). This trend shows no signs of abating but rather looks to accelerate in the future. The implication for schools is that schools in America reflect, and will continue to reflect, this change in American population.

A second demographical repercussion is that America’s population is aging. The fact that an increasing percentage of the population is elderly has profound ramifications for all public policy. “As recently as 1960, Children under the age of 18 constituted more than one third of the U.S. population. In 20 more years, the percentage of children in the U.S. is expected to drop under one quarter, and they will be outnumbered by persons age 65 or older” (Glass, 2008, p. 109). This means that fewer families have children participating in school, and more elderly people competing for public resources. In this light, it should be no surprise that interest in and enthusiasm to pay for public education is deteriorating.

Americans are increasingly in deeper debt than ever before. Consumer debt has reached an all-time high and increasingly Americans are concerned about how they can fund several decades of retirement. Glass (2008) remarks on this development:

Older, White Americans entering their retirement years with diminishing assets and the prospect of continued work will be asked to support the public institutions that increasingly will be serving a younger, browner clientele. One may hope for a generous spirit among these older Americans; however, no one should be surprised if they demur (pp. 115-116).

The recent housing crisis, credit crunch, and increase in unemployment are examples of how a particularly bad economic downturn can exacerbate the structural problems outlined by Glass. It seems that each passing day witnesses further reports of underfunded and overburdened schools. If Glass is understood to be correct, these
problems will continue even if the general economy recovers to pre-recession levels of productivity.

Glass’s explanations of how technological changes are resulting in notable demographical changes are not idle sociological observations. They are all related to the debates currently occurring amongst policy makers, theorists, and practitioners in the field of education. Glass makes it clear from his analysis that he believes that the real crisis in education is not one of achievement but one of cost. He states, “The reforms proposed in the name of making education better and the nation’s children more competitive internationally are in reality proposals to cheapen education for the poor and privatize it for the White middle class” (Glass, 2008, p. 120). There is a tension present in public debates regarding education. This tension is purported to be about liberty (arguments of choice) and equality (education of all children is public responsibility) but is in actuality a competition for public funds and a social hierarchy of privilege long enjoyed by white Americans. “This search for privilege and reduced costs has spawned most of the education policy issues currently being debated: vouchers, charter schools, tax credits, homeschooling and virtual schooling, ESL and Bilingual education, alternative teacher certification, high-stakes testing, and open enrollment” (Glass, 2008, p. 146). Glass argues persuasively that most of what constitutes popular education reform is related to a hidden agenda to maintain the status quo in American social dynamics. The book includes a variety of charts and graphs chosen to show a correlation between education reforms, cost-savings, and a trend toward de facto segregation by race and socioeconomic class.

One of the most influential aspects of educational reforms in recent decades is the imposition of accountability standards. Glass views accountability as a mechanism for furthering cost-saving and privilege-maintaining educational reforms. He argues that the federal legislation, No Child Left Behind, is a culmination of a reform movement intended to destroy the American tradition of public schooling. “NCLB aims to shrink the public sector, transfer large sums of money to the private sector, weaken or destroy the Democratic power base – the teachers unions – and provide vouchers to let students attend private schools at public expense” (Glass, 2008, p.
Research indicates that accountability measures are unevenly applied on a state to state basis in a manner that seems to penalize minority students and communities. Glass (2008) argues, “Where highly punitive education accountability systems are installed, there one finds the politically weak and vulnerable members of society” (p.225). In other words, the more minority and poor students that are present in a given geographic area, the more likely that rigid standards of accountability are used to siphon funding away from the schools and to allow more children of privilege to opt out of the system altogether.

It is impossible to read Fertilizers, Pills, and Magnetic Strips: The Fate of Public Education in America without being startled by Glass’s near total lack of optimism. Demographical trends outlined in the book hint at a certain inevitability of a decreased support of public schools in America. Glass (2008) explains, “If demographics are destiny, then there are certain likely predictions that rest on the quite reasonable assumption that the majority will use government to promote material self-interest and secure safety and comfort” (p.233). As these demographical trends accelerate, problems related to competition for public funds, white middle-class insistence for privileged education for their children, and lack of equitable education opportunities for children of minority and poor families will increase.

There will be attacks on Fertilizers, Pills, and Magnetic Strips: The Fate of Public Education in America from people who see Glass’s work as some sort of hegemonic conspiracy theory. This would be a misunderstanding of his argument. Glass does not believe that educational reforms that are gaining traction in policy debates are the result of smoke-filled back room deals contrived by the elites of American society. Rather, he sees these patterns as an aggregate of self-interested individuals who, possessing political power and economic influence, are working to secure the best outcome as they see it for their own life situations. This includes several different demographical segments of America. It includes both elderly people who prefer their tax dollars going towards programs that benefit themselves and financially strapped middle-class parents seeking ways to secure high quality education for their children without paying the penalty of
funding both public schools in their communities and private schools for their own children. There is also a set of cultural and racial prejudices at play as white families, consciously and unconsciously, work towards reforms that will result in their children being allowed to be educated in settings where they are not the numerical minorities.

Gene Glass provides a contextualized argument and a plethora of quantitative analysis that details a massive shift in demographics that is the actual impetus for educational reform movements. These changes in the composition of American society have root causes related to the technological innovations referenced in the book’s title. *Fertilizers, Pills, and Magnetic Strips: The Fate of Public Education in America* is an insightful book that demonstrates that under the veneer of solving the crisis of achievement, educational reforms are actually a collection of initiatives designed to reduce the public burden of educational costs, maintain class hierarchies, and secure educational privileges for those in possession of power in American society.