

EDUCATION AND DEVELOPMENT

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I. INTRODUCTION: THE HISTORICAL PECULIARITY OF EDUCATION AND DEVELOPMENT

The idea that education leads to economic growth and development often seems so intuitive as to be not worth questioning. Sociologists have often joined with other social scientists in asserting, or often just assuming, that individuals, firms, regions, and nations are routinely and effectively schooled into the acquisition of the kinds of skills, habits of innovation, modern attitudes, and entrepreneurial casts of mind that produce higher levels of productivity and prosperity.

Development agencies, educational administrators, and politicians, no less than parents and their offspring, operate on the belief that a more schooled society, not unlike a more schooled individual, is more likely to be economically dynamic than is a less highly educated society.

This instrumental kind of thinking has not always dominated understandings of the purpose of education. In fact, the idea that economic growth relies heavily on the expansion of schooling and the related idea that the chief rationale for the expansion of schooling is economic development are both of relatively recent vintage. As Ramirez et al. (2006) point out, the very

concept “education for economic growth,” which is now virtually hegemonic, would rarely have resonated with earlier generations of political or even business and industrial leaders. While national visions of the purpose of education have seldom been monolithic, nation building, military might, religious orthodoxy, and political fealty have more often than not trumped economic competitiveness as the underlying rationale for formal schooling.ⁱ

But if nations have only recently looked to schools to provide the resources for economic growth, where did they look for skilled and willing workers before mass schooling became so widely disseminated across the globe? Unlike today where it makes some sense to think of “nations” as independent actors in the generation of manpower policies, in earlier eras this sort of agency was located elsewhere, in families, entrepreneurialism, or workplaces. Historically, urbanization has certainly done more to enhance economic development than has the spread of mass schooling. Schools came relatively late to the project of economic development.ⁱⁱ

But if schooling and economic development were once loosely coupled in the hearts and minds of scholars and practitioners, this is clearly no longer the case. The association between education and economic growth is now made virtually everywhere in the world. Indeed, schooling has become the virtually paradigmatic rational investment, whether this is the individual pursuing his or her economic future or a political state investing in the education of its citizenry. On a simple empirical level, there is ample warrant for making this association. Volumes of research have documented, recent uninformed diatribes doubting the value of pursuing a postsecondary degree notwithstanding, that more educated individuals tend to do

better economically than do less-educated people. Firms with many skilled employees are more productive than are those with fewer skilled workers. Regions with heavy investments in educational resources of various kinds are richer than regions that do not make these investments. And for the most part, highly schooled nations are wealthier than less highly schooled nations. While each of these statements merits an immediate “on the other hand,” each also contains enough empirical support as to be taken seriously and to establish the groundwork for any more nuanced causal accounts of just *why* schooling and development seem to fit together so snugly.

The reasons for the empirical relationships between schooling and economic growth are problematic. What we can say for certain about the causal chains and underlying mechanisms for the observed linkages between education and economic performance, at any level, is distressingly shaky. As I will explain soon, there are many reasons for this indeterminacy, but perhaps the most fundamental is simply that “the relationship between education and growth may not be directly observable” (Vogel and Keen 2010:384). That is, both “education” and “economic growth” are large, complex, and dynamic sets of structures and processes whose relationships defy any simple or reductive accounting (Tilly 1989). Neither the theoretical nor empirical literature on education and development has ever developed much traction by conceptualizing an educational input that leads to an unambiguous economic output.

The reminder that “correlation is not causation” is more than an adage learned in Sociology 101, and takes on particular force when applied to such heterogeneous and ill-defined concepts as

education and development. Two prominent contributors to the economics literature (Bils and Klenow 2000) believe that empirical analyses of education and economic growth have rarely been compelling enough to establish anything other than correlation. Much of the reason for this explanatory gap is no doubt due to deficiencies in research design, poor quality or inappropriate data, and badly conceived measurement. Other problems are more theoretical and conceptual. As a few examples of the challenges facing researchers in this area, consider the following.

First, too often researchers pay too little attention to apparently simple matters of the direction of causation. As Cvrcek and Zajicek somewhat caustically observed, “the whole education-growth nexus is riddled with endogeneity” (2013:6). The “endogeneity problem” (most simply, the indeterminacy of which variable is independent and which dependent in a given empirical relationship) is common in the social sciences, and sociologists have become adept at developing statistical ways to resolve endogeneity issues (e.g., Elwert and Winship 2014). At a simple empirical level, however, there is no obvious rationale for conceptualizing “education” as somehow causally prior to “development,” as if they were two uncoupled components of any given society. More accurately, the relationships between education and development are reciprocal, and in fact the effects of level of development on educational expansion are as interesting and consequential as are the more commonly considered effects of education on development (Chabbot and Ramirez 2000). While economic development often does follow educational expansion, this educational expansion in turn is often endogenous with respect to economic growth. As Aghion et al. (2009:1) observed, “a state’s education investments are non-random. States that are richer, faster growing, or have better institutions probably find it easier

to increase their education spending. Thus, there is a distinct possibility that correlations between education investments and growth are due to reverse causality.”

While the direction of causation between education and development is an open question in any given instance, it is also possible and in some cases probable that measures of education and development will be significantly associated with each other, but with no compelling causal component between them. That would be the case if there were a common cause, that is, a third variable or set of variables that “causes” both educational expansion and economic growth. It is not difficult to come up with such possible explanatory factors. Urbanization, the development of sanitation and other measures of public health, and demographic shifts might all affect education expansion and economic growth alike.

Further, even if we take schooling as exogenous with respect to economic growth, there are any number of variables that may intervene or mediate the relationships between education and growth. The search for the mechanisms that bring about the parameter estimates between schooling and development has not always been as aggressive as it has needed to be. It is possible of course that the largest contribution of schooling to economic development is the churning out of an endless supply of job-ready workers. More likely, it may be that schooling “causes” the production of healthier people with better work ethics and entrepreneurial attitudes who are poised to produce smaller families and serve as nodes on the social network that lead to spillovers and other externalities, and that some combination of these and other factors

eventually leads to economic growth.ⁱⁱⁱ The social science verdict is still very much out as to which of these factors are most consequential under varying conditions.

Finally, even now much of the received wisdom about education and development relies on the analysis of cross-sectional data, when the questions at stake clearly demand the careful assessment of longitudinal data. When combined with such methodological problems as inconsistent measurement, imprecise designation of regional units, and often shoddy data collection, our evidentiary base is far weaker than the amount of research generated on education and development would have been expected to produce. Inevitably, reading the literature leaves one with a sense of tentativeness and unsettledness. This is not because of any lack of ambition on the part of the research community. Political scientist Norman Baldwin and his colleagues observed that “The volume of peer-reviewed research on the impact of education on economic growth is staggering—at least eight reviews have been published since 1995” (2011:226). They add, though, that “this sheer bulk of rigorous research fails to produce cumulative, consensually accepted findings.”

Many reviews of the education and development literature are framed around an obvious paradox – if the linkages between schooling and development are so empirically shaky, why is the public (and to some degree, scholarly) faith in this relationship so strong? This is an interesting question that has produced some valuable insight into the role of mass schooling in the contemporary world (see especially Chabbot and Ramirez 2000). I will adopt a very different framing here. I argue that the relationships between education and development vary

across different units of analysis. The relationship is a nested one, calling for different sociological concepts and theories depending on whether one is trying to account for linkages at the individual, firm, regional, or national level. Sociologists stand to make their greatest contributions at the middle (or “meso”) levels, those of the firm and the region, and may be advised to at least temporarily shift their focus away from the individual and national levels.

In this essay, I will accept the fact of the (usually) positive empirical relationship between education and economic development, but problematize it theoretically and conceptually as a nested relationship. Given the limited space available here, I am going to hone in on economic development, ignoring for the most part the vast and important work on how schooling might contribute to, e.g., political development, civic involvement, human rights, or family structure and stability (Hannum and Buchmann 2004).

II. WHAT IS EDUCATION, AND WHY WOULD WE EXPECT IT TO PRODUCE ECONOMIC GROWTH?

Certainly there has been some simplistic thinking about education and development, but probably no one really believes that simply having a population amass years of class time in an educational institution is sufficient to drive economic growth. Still, at least until recently, many analysts have proceeded as if years of schooling provided a reasonable proxy for whatever it is about schooling that does matter for economic development. What might this contribution of formal schooling to the growth of the economy actually be? Why would we ever expect

education to be related to economic development? As we noted above, it wasn't until the rise of mass schooling that the belief that schooling provided the key to national economic performance became normative.

The convention among sociologists for many years was based on modernization theory. This theory held that modern schooling “makes men modern” (Inkeles 1969). For modernization theorists, education, even more than working in industrial or post-industrial occupations and workplaces, creates the casts of mind and ways of seeing and participating in the world that are prerequisites to economic expansion. Modernization theory has justifiably come in for its share of criticism over the years, to the point where it is now generally considered to have been wrong (Hout and DiPrete 2006). But while the theory has not held up well to empirical test, it at least was on the right track in seeking the mechanisms at work in the positive correlation between education and economic growth.

Modernization theory never provided a persuasive account of the role of schooling in development, but it may be premature to dismiss more sophisticated extensions of the hypothesis that schooling generates various non-cognitive orientations and perspectives in individuals, and that these orientations and perspectives in turn produce economic outcomes. Bangwayo et al. (2011:163), for instance, acknowledged that there is “no general consensus among researchers on the exact causal relationship between cultural values and economic progress.” Based on their careful analysis of the World Values Survey for 43 countries, the authors reported that both formal and informal education have significant effects on the relative importance than people

place on economic achievement relative to more traditional social norms. Thus, Bangwayo et al. provided some evidence that schooling can inculcate the kinds of cultural values that lead to economic growth.

A more common explanation for the contribution of schooling to economic growth is that it provides students with the kinds of cognitive skills that employers value and on which economic expansion depends. While human capital theory has rarely been portrayed quite this simply, certainly many of its adherents would be content with an explanation centered on cognitive skills. In a series of publications, economist Eric Hanushek (2013; Hanushek and Woessmann 2012) agrees that cognitive skill is the prime driver of economic growth, but does not believe that the most important skills are easily acquired. Nor are these skills adequately measured by years of schooling. Hanushek holds that societies need to invest heavily in the high-quality education that inculcates the most valuable skills. For Hanushek, the educational status quo – cheap, one-size-fits-all schooling – will do little to advance a nation economically. A crucial implication of this is that developed societies are in a strong position to extend their educational edge over developing societies. That is, closing the quantitative educational gap (i.e., years of schooling) between nations will have little impact on growth in developing nations as long as the qualitative gap in educational quality persists or expands. Thus, continuing to measure human capital as years of schooling is misleading and mistaken. Hanushek recommends instead that analysts adopt more finely-grained measures of skills of the sort available in the Programme for International Student Assessment (PISA) data.^{iv}

Modernization theory and the variant of human capital theory offered by Hanushek rest on the assumption that education influences economic development primarily by changing something about individuals and that these changes in turn aggregate up to societal-level changes. But schooling produces more than detached skills. It also produces a variety of meso-level outcomes in which both cognitive and non-cognitive skills are embedded. For example, formal schooling generates social capital. It produces knowledge, processes, and products. Formal schooling produces externalities, complementarities, and spillovers (I describe all of these processes below). It produces categories of workers certified to perform specific tasks in a society's division of labor (Meyer 1977). Perhaps the best way to understand these dynamics is by considering education and development as nested. We turn to this next.

III. ECONOMIC DEVELOPMENT AS A NESTED PROCESS

Sociologists often conceptualize social processes and relationships as being “nested” within processes and relationships at higher levels of analysis. Research on education, for example, might see students as nested within classrooms, which are in turn nested within schools, which may be nested within states, which are nested within nations. Gamoran et al. (2000) refer to this way of understanding hierarchical relations as the “nested layers model.” In this model, relationships at one level may influence those at higher and lower levels, and be influenced by them in turn. As sociologist Richard Child Hill noted, “In a nested hierarchy, parts and wholes are not subordinated one to the other; the relationship is one of ‘energetic tension’ and mutual adaptation” (Hill 2004, p. 374). The nested layers model is useful for clarifying the hierarchical

nature of many social relationships, including those between education and economic development (see Simon (1973) for a foundational statement on hierarchy in social systems).

Perhaps a bit arbitrarily, we can conceptualize the often reciprocal relationships between schooling and economic development as taking place on four levels. At the lowest level, more highly educated individuals tend to command higher incomes than do less highly educated individuals. How much of the greater earning power of the more highly educated comes about as a causal effect and how much can be attributed to such other factors as credentialism and signaling is not entirely settled (Bills 2003). Because the study of the individual-level returns to schooling is a mid-sized industry in itself and has been extensively reviewed elsewhere (Card 1999; Hout 2012), I will say little about it here, other than to point out that many of the same conceptual problems that plague research at this level recur at higher levels.

Second, we can ask about the relationship of education to economic growth or development at the level of the firm or workplace. While the study of organizational-level processes would seem to be natural territory for sociologists, our knowledge base here is surprisingly thin. I suggest that for sociologists to make an important contribution here, they need to engage more deeply with literatures that are typically unfamiliar to them, such as personnel psychology and strategic management.^v

Third, education may influence economic development at various regional levels of broader scope than particular firms or workplaces. The focus here lies anywhere between neighborhoods and states or even multi-state regions. Our sociological base here is similarly insecure, and sociologists might profitably turn some attention to such fields as economic geography.

Finally, we have quite a lot of research at the national level. This work has been conducted primarily by economists. Again, our knowledge is often shaky. In fact, the trustworthiness of our theoretical and empirical understanding of education and development not only differs across these levels but seems to become less secure as we ascend from the micro to macro levels. As Lutz et al. (2008:1047) observe, “The empirical basis for assuming an important positive effect of education on economic growth is, however, surprisingly weak. Although it is well-established that, at the individual level, more years of schooling lead to higher income, at the macroeconomic level, the empirical evidence, so far, relating changes in education measures to economic growth has been ambiguous.”

But sociological ambiguity and healthy skepticism do not necessarily entail cynicism and dismissal. I will argue that even the most suspicious observer isn’t justified in conceding the entire causal story of the effect of education on economic development, at any of the four levels. As Hout (2012:380) has concluded, “Being educated is not only good in its own right [] it also promotes good outcomes for individuals, their communities, and the nation as a whole.” While we should be cautious about the degree to which education leads to prosperity and be persistent about identifying the conditions under which this is likely to take place, there can be no doubt

that much of the association between education and development *is* causal. While the data are often fragile, problematic, contingent, and inconsistent, there is overwhelming evidence that schooling does produce outcomes— workers, skills, attitudes, products, processes, spillovers, and more – that at some times and under some conditions make societies richer. Specifying these conditions with some precision is the theoretical and empirical challenge to sociologists.

a. Individuals

Individual-level wage equations are not, of course, what people typically think of when they think of “education and development,” a relationship that usually evokes analyses of economic growth at the community, regional, or national level. . Indeed, research on the individual-level socioeconomic outcomes of the attainment of educational credentials is often preoccupied with individual agency and decision-making (e.g., career aspirations or personal motivations to succeed). This focus is quite different from the question of how the socially organized production and provision of education leads to aggregate economic growth.

Still, if schooling ultimately makes nations richer, it stands to reason that it does so to some degree by making individuals more productive and ultimately richer. This claim seems self-evident among many labor economists. Stevens and Weale, for instance, ask, somewhat rhetorically, “If people with education earn more than those without, should not the same be true of countries?” (Stevens and Weale 2004, p. 164). They answer their own question quite directly: “Any analysis of the determination of economic growth has to have some connection with the

microeconomic underpinning mentioned above. Because education delivers economic benefits to individuals, we should expect to see effects of education on groupings of individuals (nations)” (p. 167). At the very least, individuals converting their schooling into income returns is the first link in the long causal chain that runs to the national level. Of course making inferences at one level based on observations made at another level is risky and misguided, but the idea that societies become prosperous when their members become prosperous has considerable merit.

A simple listing of empirical studies of the individual-level economic returns to education would fill a good-sized volume. Most research in this tradition is derived to some degree or another from Human Capital theory and the justly famous Mincer Model (Mincer 1974). Without belaboring the finer points of human capital theory, it holds that employers reward individuals for the skills that they acquire in formal schooling. In its barest form, individuals invest in the sorts of human capital that make them more productive workers, this productive capacity is costlessly acquired by employers, and higher incomes accrue to those with the skills to command them.

The basic finding from this vast literature is clear – schooling pays off. Still, while the simple empirical fact of the effect of education on economic reward cannot be in doubt, the mechanisms underlying this relationship are more contested (Bills 2003). Even if we concede (as we should) that schooling imparts skills and dispositions that employers value, there are instances in which other mechanisms come into play. Schooling is to some degree a sorting device, permitting more able individuals to “signal” their exogenous productive capacity to potential employers. At

other times schooling may be a way for employers to select docile and dependable cogs for the machinery of industrial factories and post-industrial offices. Or the economic payoff to schooling may sometimes simply result from some large credentialist shell-game, in which employers unreflectively recruit the most highly schooled, even if there may be no productive advantage in doing so.

Muller and Shavit (1998), among others, have shown that the magnitude of and reasons for the individual-level relationships between schooling and incomes at the individual level vary greatly across societies and historical periods. Still, any reasonable reading of this literature has to conclude that more highly schooled workers are more likely to have the skills of interest to employers than are less highly schooled workers. The first link of the education/development chain is generally secure.

b. Firms

If people acquire skills in school that ultimately find their way to economic development at the national level, the location at which this is directly instantiated is that of the workplace.^{vi} That is, in its microfoundations, economic growth happens when a particular individual applies a particular skill to a particular task in a particular setting. One might expect that the effects of education on growth and development at this meso-level -what we might variously label organizational, firm, or workplace - would be a natural area of study for sociologists. Sociologists have, after all, long had interests in work groups, factories, offices, and other

settings for the organization of production. Still, while not been entirely absent from this literature, sociologists of work and organizations have yet to fully engage with the vast body of theory and research on education and economic development.

One could easily argue that the best and most rigorous empirical tests of the “education produces economic development” hypothesis are at the meso-level of the work setting. To the degree that educational credentialist processes can be verified at the individual level (that is, if formal qualifications are detached from actual skill), one can imagine a highly credentialed but incompetent performer holding a job indefinitely without being exposed as an unproductive bungler.^{vii} It is less obvious how rampant credentialism, where skills and their certification are decoupled, could persist at the workplace level, which is presumably more subject to the discipline of the market. Highly educated workers who underperform may slip by indefinitely, but poorly performing firms with highly educated labor forces seem less likely to do so (at least in markets where they are less subject to competitive forces). At the same time, empirical tests of the linkages between education and economic growth above the level of the workplace (that is, those levels more abstracted from the settings in which skills are used and work actually takes place) typically have to rely on less direct observations of the causal mechanisms in play. Sociologists, with their fine-grained understandings of work settings, bureaucracy, and informal relations, should have a comparative research advantage at the level of the workplace.

An important concept at the workplace level is that of *externality*. Economists, far more than sociologists, are concerned with the externalities that emerge out of social or economic relations.

Put simply, externalities are the costs or benefits incurred by one party from the actions of another party. Externalities may be negative or positive. A homeowner who keeps her yard in good repair and by doing so enhances her neighbor's aesthetic experience has produced a positive externality. A less conscientious and more slovenly homeowner would provide her neighbors with a negative externality.

There is considerable evidence that more educated workers bring positive externalities to workplaces. Put simply, more educated workers somehow create conditions that make their less educated co-workers more productive and more highly-rewarded (Lucas 1988, Moretti 2004; Mas and Moretti 2009).^{viii} There are of course a variety of mechanisms that could bring about this relationship. It could be that more educated workers establish processes and routines that can be usefully adopted by less educated workers. The more highly educated might model skills and other orientations that can be learned and applied by less educated workers. While it is probably true that more educated workers are attracted to workplaces that are more productive in the first place (thus raising a "sample selection" problem), the influence of educated workers on the productivity of the less educated is almost certainly largely causal.

Not surprisingly, much more is involved in the positive relationship between education and economic growth at the firm level than simply stacking educated people on top of each other and counting the benefits. Herrmann and Peine (2011) have shown that it matters how education and skills are distributed in a firm. Firms whose employees have widely dispersed educational qualifications are able to pursue some kinds of product innovations more efficiently and

effectively than they can pursue other kinds of innovations, and firms with educational qualifications concentrated in the hands of fewer employees (e.g., scientists) are better positioned to pursue others.

It may be that the preoccupation with individual-level wage equations that has guided the work of many sociologists has distracted them from pursuing interesting questions about the effects of education at the organizational level. This is unfortunate, because sociologists' understanding of organizations, workplace behavior, and bureaucracy would seem to position them well to contribute to our understanding of how schooling brings about large-scale economic change.

c. Regions

Things get even more complicated and empirically less secure as we ascend from the level of the workplace to the regional level (encompassing cities, counties, metropolitan areas, states, and any number of other agglomerations). As with the workplace level, the contributions of sociologists are less apparent than are those of the practitioners of other disciplines (such as economic geography or urban and regional planning). Again, the reluctance of sociologists to engage with the relationship between education and economic growth at this meso-level is a missed opportunity, because on its face this level is intensely sociological. My treatment of the relationship of education and development at the regional level will be very selective. I will highlight a few interesting questions where sociologists potentially could have a greater impact.

If schooling leads to growth at the regional level, how might this happen? This is in many ways a more difficult question than the comparable question on the organizational level. At least in a stylized sense, organizations have boundaries in ways that regions do not. Cities blend into metropolitan areas, which in turn blend into states and then into multi-state regions. Counties, school districts, or labor market areas intersect these agglomerations in often haphazard ways. Defining the proper regional unit is crucial, but this is not always fully acknowledged. As Abel and Dietz (2012:668) note:

“Because state governments are an important source of funding for US higher education institutions, much of the existing literature has attempted to examine the relationship between the production of degrees and stock of college graduates from the perspective of a state government analyzing the return on its investment... From the standpoint of local economic development, however, a state may not be a meaningful unit of measure because it is often too large to capture the local labor markets in which colleges and universities are located.”

Two crucial lessons follow from this simple observation. First, the effects of schooling on regional economic growth may be more or less localized. The magnitude and scope of any effects depend on the broader ecology – the specific mix of industries, other educational institutions, networks, and demography - of the area. The use of the term “ecology” to describe this mix and the interactions between the various “players” in a region was once ubiquitous in

the sociological literature, but has with some exceptions fallen out of common usage. It does, however, effectively capture the sense of a shifting and dynamic milieu within which the relationships between education and economic development occur.

A second lesson to keep in mind at the regional level is the fundamental importance of getting the counterfactual right. A counterfactual question is essentially a “what if?” question that forces scientists to think through a causal argument as if a set of conditions were in place other than those that actually exist. For instance, assessing the effects of an educational institution on the level and speed of economic growth that takes place in a region (keeping in mind that those effects run both ways) demands thinking about what the region would be like in the absence of the educational institution. Too often analysts proceed as if the region would have been a vacant lot.

To this point, we have been conceptualizing the “education” side of the “education and development” relationship basically as the enhanced capacity that schooling provides to individuals, acting both singly as wage earners and collectively as parts of workplaces. We shift our understanding of education now to think of it more institutionally. We ask how education as an institution or as a corporate form might influence economic development. Building on a few simple concepts drawn largely from the economic literature on regional development – spillovers, counterfactuals, externalities – we can ask a question on the minds of policy makers at all levels of government - can universities make states and regions richer?

Universities certainly like to claim that they have the capacity to produce economic growth. It has become virtually mandatory for postsecondary institutions to highlight their supposedly objectively and scientifically determined contribution to local and state economies, and a robust industry of consultants, analysts, and strategic planners has arisen to help fill this need. Politicians demand and universities provide “precise” estimates of how many dollars they return for every dollar that is invested in them.

Much of this “research” is little more than boosterism designed primarily to advance a fund-raising agenda, and would fail to withstand serious scientific scrutiny. Certainly the best of this work can be effective at clarifying how the placement and operation of an educational institution in the broader ecology of a given region can add to the overall prosperity of that region. Too often, though, “impact studies” are seriously deficient in their design, conceptualization, and conclusions. Siegfried et al. (2007) offer a serious critique of research on local economic effects of colleges and conclude that the claims of many university-generated reports about their contributions to economic development lack credibility (see also Drucker and Goldstein 2007). Among other shortcomings of college impact studies are “the specification of the counterfactual, the definition of the local area, the identification of “new” expenditures, the tendency to double-count economic impacts, the role of local taxes, and the omission of local spillover benefits from enhanced human capital created by higher education” (Siegfried et al. 2007:546).^{ix}

Bolstering this academic pseudo-science is an alliance of the popular press and industry boosters who have constructed an elaborate and widely accepted mythology surrounding the relationship

between higher educational institutions and economic development. The contribution of Stanford University to the success of Silicon Valley or similar tales about Route 128 or the Research Triangle are part of the common understanding of American economic growth. The reality is more complex. In an exceptionally interesting analysis, Feldman (1994) challenged the “conventional wisdom on state and local economic development [] that a research university is one of the necessary conditions for economic restructuring toward a technology-intensive industrial base” (1994, p. 67). Applying a counterfactual logic, Feldman showed that the efforts of even a great university (Johns Hopkins) were insufficient to foster economic growth. Instead, the inability of Johns Hopkins to drive the local economy was held back by persistent and chronic gaps in the regional infrastructure. In a similar vein, Mayer (2006) demonstrated that regions can prosper as high-technology areas even in the absence of major research universities. Mayer gives the examples of Portland, Oregon’s “Silicon Forest” and Washington, D.C. as illustrating that there are alternative paths to economic growth. Clearly, the relationships between education and economic development at the regional level are far from deterministic.

Many of the effects of education on regional development are quite straightforward. To a significant degree, schooling simply and unambiguously increases the human capital of those who attend and this enhanced skill aggregates up to regional growth. There is some evidence for this. Paulsen and Fatima’s (2007) careful analysis using exceptionally rigorous controls showed that spending on higher education increased state-level workforce productivity between 1980 and 2000. Baldwin et al. (2011) reported broadly consistent results for 1997-2005.

Many advocates and researchers want to claim a greater role for education than simply the provision of human capital, and have sought to demonstrate that universities have other impacts beyond the production of graduates with advanced skills. Some researchers focus on the “spillovers” generated by educational institutions - research and development, technology, innovations, and jobs (e.g., Abel and Dietz 2012). The presence of these spillovers is practically an article of faith among many researchers. Caspar (2013), in a generally skeptical appraisal of the literature on spillovers, asserts that “The concept of regional technology spill-overs created by university research is one of the most enduring theories within the economic geography and innovation management fields” (2013:13). But while many researchers take spillovers as foundational, sociologists have paid relatively little attention to this body of research.

Spillover theory may be enduring, but the empirical evidence for any unproblematic linkage between educational investment and the realization on that investment in the form of various spillovers is not always as compelling. While there is credible and even abundant research demonstrating significant spillover effects, we are a long way from establishing much cumulative understanding of how and under what conditions these effects are expressed. Hayter (2013:19), among others, has noted the “lack of empirical and systematic, longitudinal data” on the potential of university spin-offs to generate jobs and economic growth (see also Sand 2013). Perhaps to an even greater extent than is true at the workplace level, the direction and magnitude of spillover effects depend on contextual and ecological features of particular regions. Educational investments and opportunities that have economic benefits in one region do not necessarily do so in another.

There are many examples of the importance of different ecological contexts in facilitating the ability of universities to have spillover effects on growth. Hayter (2013) reported that the extent to which academic entrepreneurship can have positive spillover effects depends on a complex combination of individual, university, firm, and policy factors. He found the commercial success of university spin-offs to be significantly influenced by, among other things, “venture capital, multiple and external licenses, outside management, joint ventures with other companies, previous faculty consulting experience, and—surprisingly—a negative relationship to post-spin-off services provided by universities” (2013:1). Similarly, Cowan and Zinovyeva (2012) discovered that opening new university schools in Italy during the period 1985-2000 increased regional innovative activity in a remarkably short period of time (five years). The authors were careful to describe an array of conditions that had to be in place for this effect to occur. A Spanish case study by Capo-Vicedo et al (2012) found much the same thing. The university that they studied was able to influence the information and knowledge networks that developed in an industrial district, but only because of the prior ecology of the region.^x Research by Sand (2013) reported that “the effect of the share of college graduates in a city on wages is remarkably unstable over time” (2013:97). In the United States, there were spillovers of this sort in the 1980s but not in the 1990s. Demonstrating this instability is an important addition to the literature, although Sand provides little interpretation of why the positive effect in the 1980s dissipated by the 1990s (for other analyses of how ecology can influence the expression of spillover effects, see Strotebeck 2014; Giuri and Mariani 2013).

As with the workplace level, the direction of causation at the regional level can be reciprocal and at times ambiguous. Donaldson and O’Keefe (2013) showed that the manufacturing composition of US regions (at the level of the Metropolitan Statistical Area) predicted the level of educational attainment of the residents of that area. Specifically, regions with heavy concentrations of manufacturing industries have lower educational attainments but higher incomes. High rates of growth in manufacturing, however, decreased both educational attainment and income. Broadly the same thing seems to be true of cities as well. Cities that are already highly skilled tend to become more advantaged relative to those that are less skilled (Florida et al. 2012). Poelhekke (2013) found this in a sophisticated comparison of Munich and Bremen, the former having a much more skilled labor force than the latter. Poelhekke, however, identified a number of caveats and contingencies associated with this general finding. The author observed that the effects of skills on growth have typically been overestimated (because of using the “wrong” spatial area or failing to correct statistical biases). He added that the apparent educational benefits come not necessarily from college educated workers per se, but rather from the right mix of skills. At least in the case of Munich, these skills were more vocational than academic.

Put simply, social and institutional context makes an enormous difference in the ability of educational institutions to contribute to regional economic development (see also Lendel 2010). Strong and supportive networks have to be in place before universities can have their optimal impact on economic growth (Popp-Berman 2012). Efforts to synthesize and make sense of these regional contextual matters would seem a promising road for sociologists to travel.

d. nations

More educated people make more money. Companies with lots of educated employees adopt technology more effectively, innovate more rapidly, and facilitate workers learning from each other. Regions with educational institutions doing particular kinds of things tend to prosper as a result. But it does not necessarily follow that all of this aggregates up to any particular relationship between education and development at the national level. The relationship between education and economic development at the national level is surprisingly ambiguous and indeterminate (Hannum and Buchmann 2004).

Many sociologists have contributed to the literature on education and economic growth on the national level, but the field is dominated by economists. The worst of this research, the kind regularly spewed out by think tanks and development advocates, is so simplistic as to be completely uninteresting and uninformative. Assuming that educational inputs can stimulate growth, without a sustained account of the attendant institutions, resources, markets, and other meso-level processes and structures, is naïve. But in fact few serious economists produce such crude models, and theory and research on education and development is some of the most sophisticated in the economics literature (e.g., Lucas 1988, Barro 1991). Rather than rehashing that literature here, I ask instead what sociologists might bring to the table.

Some fifteen years ago, Chabbott and Ramirez (2000) reached a few generally reasonable and empirically secure conclusions about the relationships between education and development at the

national level from their broad and deep survey of the literature. They reported, among other things, that primary and secondary schooling have stronger effects on economic development than does higher education, that the economic effects of expanded schooling are stronger for poorer countries than they are for richer countries, that vocational schooling often has more payoff than does academic education, and that greater enrollments in science and engineering positively influence economic development more than do investments in other sorts of schooling.^{xi}

Even these generally straightforward conclusions must be routinely qualified by the contingencies of time and space. There are many interesting examples of research that searches for these complexities. Economist Robert Barro (1991), for instance, argued that educational expansion accounts for less of the causal story than does the simple stock of human capital residing in a nation. In his analysis of a sample of 98 countries in the years 1960-1985, Barro found that economic growth was more an outcome of the initial level of human capital in the society than it was a result of the expansion of any level of the educational system. Put simply, having lots of educated people around enhances economic growth more than does any skill augmentation of those people.

Gender also complicates the schooling-growth link. Benavot (1989:14) looking at the years between 1960 and 1985, found that in less developed nations, in particular those that were exceptionally poor, “educational expansion among school-age girls at the primary level has a stronger effect on long-term economic prosperity than does educational expansion among school-age boys. This effect was not mediated by women's rates of participation in the wage labor force or by fertility rates.” Krueger and Kumar (2004a, 2004b) add a further refinement by showing that in some eras (the 1960s and 1980s), the European emphasis on providing skill-specific, vocationalized education led to growth, and in other eras (1980s and beyond) it did not have this effect.

At the very least, phenomena like “educational expansion” and “economic development,” even if the relationship is salutary and causal, are huge and complex processes that take a long time to play out. Lutz et al, (2008) concluded, perhaps optimistically, that “better education does not only lead to higher individual income but also is a necessary (although not always sufficient) precondition for long-term economic growth. The fruits of investment in education need a long time to ripen, to translate the education of children into better human capital of the adult labor force. Education is a long-term investment associated with near-term costs, but, in the long run, is one of the best investments societies can make in their futures” (2008:1048). What sociologists can bring to this vast literature is a big canvas that focuses on context, that is, the ecology of education and development. Sociology can pay particular attention to the unexpected consequences of the linkages between schooling and development, and to the mechanisms that instantiate these linkages.

IV. CONCLUSIONS

The restrictively linear “effects of education on economic development” conceptualization is simply not an adequate way to think about the complex relationships between schooling and economic growth. The relationships between the vast categories of schooling and growth are reciprocal, contingent, conditional on time, space, and context, and systemic. Given the proliferation of better data, better models, and better theories that have characterized the social scientific literature over the past generation (a great deal of it from disciplines other than sociology), there is no excuse for clinging to simplistic theories with poorly defined counterfactuals and sloppy measurement and models.

My basic conclusions are not much different from that of other sociologists who have reviewed the literature on education and economic development. Schooling, in its broadest possible conceptualization, bears often tentative but undeniably real causal relationships with economic growth. Schooling has a wide range of non-economic benefits as well, which are related in complex ways to economic development. Schooling may, for example, improve the local cultural landscape or “cause” parents to rear fewer children in ways that promote economic prosperity. Analyzing these non-economic outcomes, rather than being a separate object of study, is in fact essential to understanding how systems of schooling contribute (or fail to contribute) to economic vitality.

Sociologists need first to think more self-consciously about how the linkages between schooling and development differ across the four nested levels of analysis that I have offered here. The causal processes and social mechanisms that produce the coefficients in impact models are not self-evidently the same at each level. My sense is that the most important contributions to our understanding of the relationships between education and economic development that sociologists are likely to make will come at the firm and regional levels. Sociologists will continue to conduct important studies of individual-level wage attainment (e.g., Bols 2014) as well as nation-based analyses, but the comparative advantage of sociologists in understanding context, networks, and conflicting interests position them well to move the field forward.

Sociologists would do well too to move away from a reliance on variables-driven studies of education and development and begin to conceptualize our object of study as systems of skill development. These four levels are only analytically distinct, and empirically there is a constant interplay between them. On the meso-levels, these systems of skill development include job seekers, students, community colleges, apprenticeships, partnerships, company training, industry certification, on-the-job training, states policies, production strategies, party politics, and so on. Of course, some elements of these skill development systems are best measured on the national level. Baldwin et al. (2011:227), for instance, have directed our attention to gross domestic product (GDP), national savings deposits, spending on infrastructure, population growth, and initial GDP.

Sociologists, at whatever of the four levels they choose to operate, need to be more assertive about striving toward some consensus on measurement, models, and operationalization. Too often, “research findings on the relationship between education and state economic growth are unstable artifacts related to model specifications, sample sizes, and variable measurements’ (Smith, 2003, cited in Baldwin et al. 2011:240). A large share of the blame for the lack of cumulative research on education and development can be placed on simple methodological problems.

To fulfill this sort of research agenda, sociologists are going to need to read more widely and engage more inclusively with other disciplines than they have to this point. Despite much apparently common ground and explicanda, sociologists, with notable exceptions, have yet to fully engage with regional scientists, economic geographers, and development specialists.

Finally, while this essay has focused on the relationships between education and economic growth, the distributional effects of schooling are no less important. Any development policy, including those based on the expansion of schooling, creates both winners and losers. Wheeler (2005), for instance, demonstrated that in the period 1950-1990, American cities with more educated workforces were better able to both generate technological change and subsequently benefit from the productivity gains of those changes. The effect of this was to widen the economic gap between metropolitan and non-metropolitan areas. Sociologists might usefully build on their expertise in examining broad patterns of inequality on a variety of different levels (Hout and DiPrete 2006).

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ⁱ As one particularly lucid example, an innovative study by Cvrek and Zajicek (2013) showed that in the Hapsburg Empire (circa 1865), the provision of public schooling, while offering "practically zero return to education on the margin" (p. 1), was supported by political elites as a means of managing nationalist conflicts within the Empire. The masses who were supposedly the beneficiaries of the generation of human capital never agitated for expanded schooling, and were instead resentful of the costs that they incurred.

ⁱⁱ I am grateful to Hal Hansen for making me think harder about the argument of this paragraph.

ⁱⁱⁱ Aghion et al. (2009) mention migration and patenting, among other factors, that mediate the effect of schooling on development.

^{iv} Aghion et al. (2009) have made a similar argument. They conceptualize the relevant educational distinction as "low brow" versus "high brow" education. The former refers to schooling that is essentially imitative, while the latter is more innovative.

^v Again, I do not intend the delineation of four levels of education and economic development to be definitive or absolute. One could imagine, for instance, firms being nested within industries, or particular enterprises being nested within larger organizational fields (Fligstein and McAdam 2012). I am using the nestedness metaphor here primarily as a practical framework for working through some complex material.

^{vi} "Workplace" is an expansive concept, and includes any social setting in which someone is performing productive labor. In an ever-increasing number of settings the workplace consists of a keyboard and computer monitor.

^{vii} There are also reasons to expect highly educated under-achievers to be "found out" over time. The literature on employer learning shows that in time employers are likely to catch on to underperforming workers (Light and McGee 2012).

^{viii} Like so much of the knowledge base surrounding education and development, even this seemingly simple empirical finding is somewhat up for grabs. Canton (2007), for instance, found no clear evidence for human capital externalities in a sample of developed countries

^{ix} As just one example, the consultant's report submitted to (and accepted by) one major American university maintained that the university provided "a return of \$42 for each dollar received from the state." Such figures, by no means uncommon, lack any credibility.

^x The Capo-Vicedo et al study is especially informative in that the industrial district was a traditional one based on textiles rather than the sort of high-tech, information based district more commonly associated with university-business collaborations and synergies.

^{xi} They also found that the effects are reciprocal, that is, that levels of development affect educational attainments.