Globalization, interdependence and education

Abstract  Contemporary globalization is marked by rapidly and dramatically increasing interdependence, which operates both within and among countries. Increasing global interdependence has profound influence on education at all levels, such as how to deal with a world with more permeable boundaries in which people are on the move more frequently (migration) than ever before in human history, and in which urbanization is increasing at an unprecedented rate. This paper proposes a transformational analysis of contemporary globalization and identifies the increasing challenge for education due to the globalization, including the struggle to match the pace of technology change in society, to provide graduates with skills relevant to contemporary society, and to lead education students to an accommodation with persistent and rapid social change.

Keywords  globalization, interdependence, the chance of education, education development

摘要  当代全球化的一个重要标志是深刻而日益加剧的相互依赖，它不仅发生在国家内部，也发生在国家之间。日益加剧的全球化相互依赖在很多层面对教育都有着重要的影响，包括如何应对一个界限消融而相互可渗透的世界。本文对当代全球化进行了分析，并探讨了全球化对教育带来的诸多挑战，包括教育如何赶上技术革新的步伐，如何培养毕业生才能使其掌握与当今社会相适应的技术，如何培养学生才能使其适应持久而快速的社会变迁。

关键词  全球化，相互依赖，教育机会，教育发展


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1 Introduction

In this brief paper, I will explore some meanings and uses of globalization, examine a few of its properties, and relate them to a limited number of implications that this emerging system of global interdependence has for various elements of education. I offer these comments in the spirit of challenge that these dynamics of global interdependence present for all of education, especially higher education, wherever in the world it is practiced. The primary belief that underlies these comments is that all our educational endeavors need to be re-examined in light of the great and rapid changes that are sweeping through all of our societies.

Many definitions exist. Those supplied by Held and Blackmore have broad appeal to most observers. Held viewed globalization as “the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa (Held, 1991). Blackmore offered a similar definition seeing globalization as “… increased economic, cultural, environmental, and social interdependencies and new transnational financial and political formations arising out of the mobility of capital, labor and information, with both homogenizing and differentiating tendencies (Blackmore, 2000). Both definitions emphasize increasing levels of interdependence and the probability that localities will be affected by distant events. Blackmore also paid attention to the notion that globalization produces a series of outcomes that could be called homogenizing—they cause things in the world to become more alike—while others are differentiating—they cause things in the world to be less alike. This seeming confusion is part and parcel of the complexities posed by contemporary globalization.

2 Three theories of globalization

The many theories addressed to globalization may be summarized as three, which can be characterized as strong, skeptical and transformational.

The strong theory holds that globalization emerges primarily out of events taking place in the global economy, which itself is dominated by uncontrollable global forces in which nation states are structurally dependent on global capital. The creation and uses of global capital in turn are primarily determined by the activities of Transnational Corporations (TNC). In this view the power held by TNCs represents a drastic shift in structural power and authority away from the nation state towards non-state agencies and from national political systems to global economic systems. Evidence for this view can be drawn from a number of places, but trade is the primary instance in which TNC behavior represents market domination. TNCs currently account for approximately 80 percent of the trade in
global manufactures and even more remarkably, slightly more than half of that trade consists of TNC’s trading with themselves—that is one portion of a TNC operating in one country trades goods with another located in another country (Dicken, 2002). This strong view posits the idea that while the state may not be “withering away” in the historic Marxist sense, its meanings and “reach” are being transformed by the power and capacity of the global TNC system of manufacturing and service provision (Reich, 1991; Friedman, 2005).

The strong view is sometimes termed the “convergence” theory of globalization, referring to the element in Blackmore’s definition that sees the world as increasingly converging into a common system, with relatively similar behaviors and properties, albeit dominated by TNC activity. In fact, the very domination is taken as evidence of convergence: no economy can through its own resources resist the power and capital represented by TNC economic penetration.

The skeptical view holds that the notion of achieved convergence is both overstated and over-generalized. The world as given, especially the world represented by nation states is far more heterogeneous and independent in action than the strong theory would presume. If one carefully examines the data, this view holds, one will discover that globalization has produced a variety of local and regional responses. Trade is again a useful example. Whereas it is the case that the contemporary global economy has been organized in an unprecedented way by highly generalized trade regimes such as the World Trade Organization (WTO), it is also the case that the world is busy producing an equally unprecedented number of regional and bi-lateral trade agreements (Naya, 2005; Barshefsky, 2006). Indeed, some evidence suggests that contemporary levels of economic interdependence are not even historically unprecedented. Compared with former world empires and the level of economic interdependence present in the waning states of nineteenth century imperialism, the global economy can be argued to be less global in its geographic reach (Kitson and Mitchie, 1995).

The third view that of the transformationists argues that the current levels and extent of globalization are indeed unprecedented. They rebut the skeptical claim by pointing out that the reach of the economic, especially the extent of market relationships and consumerism, has no precedence in world history. However, unlike adherents to the strong convergence theory, transformationalists do not find such ready evidence for that outcome. Rather, they see a highly differentiated world in which some parts, some countries or some regions have grown more alike, but significant parts have not. This view focuses on the steady and worsening inequalities and inequities that result from globalization and see a new kind of global stratification, one that is intimately tied to what in the 1980s was being termed the “new international division of labor”, but which many have come to characterize as a “race to the bottom” in which highly organized global capital relentlessly searches for lower wage rates with the resulting disadvantages that accrue to labor throughout the world (Grieder, 1997).
The transformational view emphasizes that globalization has resulted in definite winners and losers through the process. The neo-liberal economic and political processes associated with globalization argue for a politics of inequality that promotes competitive market economies, tax reductions, militates against trade unionism (and protections for labor), reduced government regulation and a contraction of the governmental sector at the expense of a growing private sector. The overall result is increased inequality (Harvey, 2005).

My view, and that adopted throughout this paper is a transformational view. I believe that history will come to view the last forty to fifty years as significant in promoting overall economic, political and social change as those we mark for the industrial revolution of the nineteenth century.

3 Some globalization effects and their relevance to education

Many of the ways we “do” and understand education, both basic and higher education, grow out of the industrial age and the requirements of preparing people to succeed in its tasks and through its organizational structures. One element of the current era of contemporary global interdependence has been the creation of what is variously termed the knowledge society, the information society, or the network society (Castells, 1996). The kinds of institutions characteristic of this society are becoming increasingly visible, e.g. the extended, and organizationally “flat” transnational corporation. We have not yet extended many of our insights into this emerging kind of social organization to schooling and education.

3.1 Globalization is resulting in more permeable “boundaries” through which people, practices and goods may flow

The world is becoming a more permeable place with fewer boundaries and limitations on where people go, how they think, the kinds of stimulation they receive, the kinds of work they do, the kind of consumption they engage in, how they spend their time outside home and family, and ultimately how they think and believe. This is what Friedman meant when he said the “earth is flat”—in important metaphorically ways, we can all “see” each other in ways not possible previously (Friedman, 2005). Through inventions like cell phones, satellite communications, computers and the Internet, we can “communicate”—seek engagement and knowledge—in ways that increase both the frequency and net effects of our social, cultural, political and economic interactions. Social institutions and practices as different as soap operas, video games, and transnational work practices shift our “bases of reality” so rapidly and effectively that often we are—individually and collectively—unaware of the fact that it is happening.
Our educational practices have been slow to catch up with and incorporate these changes (transformations). While the “world outside” school—especially in the cities—has been transformed in some cases beyond recognition, the “world inside” school remain much the same. Instruction is highly structured, often based on rote learning, segregated by age groups (even while arguably one of the great insights to be gained from of our emerging world of knowledge societies is that learning styles, capacities and predispositions differ significantly by age and individual), organized into curricula that have changed little over the years, and produce graduates who often are ill-equipped to deal with the problems and issues they find in the “real” world.\(^1\) At university, students are then educated within organizational and knowledge structures that represent ways we use to organize knowledge, namely by disciplinary category—history, law, physics, chemistry, economics, political science, art—even as we know and recognize that increasingly the great issues of our interdependent world—climate change and the environment, conflict, migration and hyper-urbanization, food sufficiency, energy use and deployment, health and disease—are all multi-disciplinary “problems” that do not “fit” within any single category or discipline.\(^2\)

While the “real world” continues to change, adjust and adapt to this increased permeability of boundaries, the “world” of education lags behind. One could almost argue that we are continuing to organize education to train and educate people to work and succeed in a world that increasingly no longer exists. I discuss this further below.

### 3.2 Global inequality is increasing at a rate and magnitude unparalleled in human history

The richest person in the world has more wealth than the poorest 54 percent of the world’s population.\(^3\) The top 1/5 of income earners have been achieving their success at the expense of the other 4/5, especially the lower 2/5. The 80 poorest countries in the world are poorer in relative terms than they were three decades ago. Within-nation inequality is on the rise virtually everywhere, especially in the older industrial countries where retreat from the egalitarian policies of the post-war welfare state is having the effect of increasing inequality, as is the decline in the relative income shares available to labor (Fig. 1 illustrates the geographic distribution of income inequality in China.). Neo-liberal tax policies

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place a disproportionate burden on the poor and middle classes, lessening their relative social position.

![Fig. 1 Distribution of income inequality in China](image)

Significant and widespread inequality impacts education in every imaginable way. The most obvious one is access of the poor to educational institutions. The Global Campaign for Education estimates that 125 million children, most of whom are girls, are not in schools. Clearly the UN (United Nations) goal of education for all by 2005 will be widely missed.\(^4\) Wide-spread migration has the dual effect of moving millions to urban slums where schools do not exist, or creating a local version of the “left behind” in which rural populations, already poor in relative national terms, are challenged by having the well-bodied and the working young drawn to the urban centers. Interests of nation governments tend to be focused on urban centers. Disease and poor health are the handmaidens of poverty, and throughout the world children are differentially impacted by poverty-linked diseases. A global crisis exists with respect to water and sanitation availability. Approximately 1.75 billion people live with inadequate supplies of potable water and as many as 2.1 billion without adequate sewage.\(^5\) The burden of these deficits falls disproportionately on children, over 5 million of which die every year from water borne diseases.

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These facts are well-known and I do not wish to belabor them, but I do want to emphasize that our “ways of acknowledging” these data on inequality may have to change as the world grows increasingly interdependent. In an earlier world of tighter national borders and more structured migration, the ways in which nations dealt with the equity issues that arise from inequality were highly constrained by the cultures and societies within which they occurred. To some extent, this is obviously still the ways things are, but to a significant degree, inequality “leaks” to other kinds of globalized agendas. For example, with the nearly universalization of media and the authentic globalization of advertising, all but a small minority of the world’s population is inundated with advertising’s pervasive messages which de-code as: this is a world of goods, consumption is a primary goal, you are increasingly valued by your ability to consume and all should be accessible to you. These meta-messages permeate the world and create enormous expectations on the part of their recipients. Where these expectations are blatantly thwarted by the practices that produce and sustain inequality and inequity, they produce resentments and a politics organized to channel those resentments. Recognizing that this is a much longer and complex argument, I want, nevertheless, to point out that social science and historical analysis have quite reasonable data to suggest that it is relative inequality, the inequality that exists in the face of its wide-spread opposite, that leads to social instabilities and civic inabilities to maintain the kinds of order necessary for what we might term “livability” (Chandra, 2005). Without the social tools that education provides, only a relatively small minority can have access to the proffered bounties of a “world of goods” (Barnet and Cavanaugh, 1994). Meeting the demand for education for all children is the first step to confront these increasing inequalities.

3.3 Globalization has revolutionized communication, creating a digitalized world that is rapidly changing human behavior

Eight media firms, seven of them located in the United States, dominate the production of media. This is sometimes called the A-tier of media companies. Examination of the B-tier reveals a similar pattern in most developed countries—one or two companies dominate the media (McChesney, 2001). These patterns of domination have given the world new grammars of communication and produced “signal-dense” communication environments that lead our lives to be continually lived through these message environments. Cell phones and wireless communication have spread throughout the world at a dizzying rate. The Philippines may be the per capita text message capital of the world with an

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6The concept of “livability” under the conditions of rapidly increasing global interdependence is generating a new subfield of research. See M. Douglass, 2007.
estimated 250 million text messages per day reported in 2006.\textsuperscript{7} The UK reports that 41.8 billion text messages were sent during 2006, and 4.3 billion in January 2007.\textsuperscript{8} Similar patterns of cell phone/text message communication exist throughout the world. Video games now have a greater world-wide dollar volume than movies. Even though the Internet is barely ten-years old, it has radically transformed how information is transmitted and accessed. We now take the world of instant information access for granted. Table 1 provides recent data on internet reach throughout the world.

<table>
<thead>
<tr>
<th>World regions</th>
<th>Population (2006 est.)</th>
<th>Population of the world (%)</th>
<th>Internet usage</th>
<th>Population (Penetration) %</th>
<th>Usage of world %</th>
<th>Usage growth 2000–2006 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>915 210 928</td>
<td>14.1</td>
<td>32 765 700</td>
<td>3.6</td>
<td>3.0</td>
<td>625.8</td>
</tr>
<tr>
<td>Asia</td>
<td>3 667 774 066</td>
<td>56.4</td>
<td>378 593 457</td>
<td>10.3</td>
<td>35.2</td>
<td>231.2</td>
</tr>
<tr>
<td>Europe</td>
<td>807 289 020</td>
<td>12.4</td>
<td>311 406 751</td>
<td>38.6</td>
<td>28.9</td>
<td>196.3</td>
</tr>
<tr>
<td>Middle East</td>
<td>190 984 161</td>
<td>2.9</td>
<td>19 028 400</td>
<td>10.0</td>
<td>1.8</td>
<td>479.3</td>
</tr>
<tr>
<td>North America</td>
<td>331 473 276</td>
<td>5.1</td>
<td>231 001 921</td>
<td>69.7</td>
<td>21.5</td>
<td>113.7</td>
</tr>
<tr>
<td>Latin America/Caribbean</td>
<td>553 908 632</td>
<td>8.5</td>
<td>85 042 986</td>
<td>15.4</td>
<td>7.9</td>
<td>370.7</td>
</tr>
<tr>
<td>Oceania/Australia</td>
<td>33 956 977</td>
<td>0.5</td>
<td>18 364 772</td>
<td>54.1</td>
<td>1.7</td>
<td>141.0</td>
</tr>
<tr>
<td>World total</td>
<td>6 499 697 060</td>
<td>100.0</td>
<td>1 076 203 987</td>
<td>16.6</td>
<td>100.0</td>
<td>198.1</td>
</tr>
</tbody>
</table>

Source: World Network Usage Statistics

And much more is to come … soon. Google and Yahoo are discussing making entire print libraries accessible through their search engines. An examination of business environments from engineering to medical care to finance makes clear that whatever can be digitalized can be transmitted, and outsourced (Battelle, 2005). Who does what to which data is changing the way the world does its work, and the volume of the world’s work has begun to pervasively shift from cost environment to cost environment as clients seek lower labor and end-product costs. The mapping of the human genome has just begun to trigger the exploration of genetic engineering in ways that promise a fundamental reassessment of what disease, illness and health will mean (Hayes, 2007). Nano technology is in its infancy, but already we have begun to develop sensory equipment sensitive to the one molecule level … promising entire new ways of non-invasive readings of the


inside of the body … and levels of human surveillance previously only imagined in science fiction contexts. The list is almost infinitely extendable and each reader can readily contribute her/her own examples.

I draw out two points from this. For the most part, with the exception of higher-end university settings and elite schools, these things are rarely part of schooling and contemporary education. We still communicate with students in classrooms pretty much as we did one hundred years ago. A teacher stands (usually in the front of the class-thereby embodying an authority structure) and says things to (seated) students who are meant to “learn” them. From time to time students are given access to films, or television communications, or the internet, but these usually are the exception, or treated as “add-ons” to the core educational content. When students walk through the door of a school, they are meant to “check the real world at the door”, so to speak. All the ways that contemporary society with its complex arrays of technology has of promoting communication are meant to be held in abeyance “in school”. Throughout the world, we find evidence that students find school boring and irrelevant … its primary value is to prepare them for examinations which stand as portals to employment or higher levels of education (Which, however may not function this way any more. The Prime Minister of India has recently called for a reform of the university system, an integral part of the examination structure, because the educations being provided by that system do not prepare people for the jobs society needs to develop, leading to a crisis of mal-proportioned education.).\(^9\) We need to recognize that the “world outside” is a powerful education system with its own grammars, its own reward structures, its own pathways to success (Henry, 1965).

The other point is perhaps more contentious. It is a hypothesis about our contemporary education environments. Simply, the more our curricula become dated and lose relevance for our students, the greater effort will be required to teach them, and with diminishing returns. The converse is that to enhance student learning we will need to adopt learning tools and methods that have greater consonance with contemporary communication modalities. This will, of course, require a thorough-going revision of how we train teachers, especially how we train teachers to be life-long learners and early technology adopters.

3.4 Globalization is associated with increased migration (primarily induced by people moving to find jobs) and radically increased urbanization

We are in the midst of the numerically largest migration in human history, most of it from rural areas to urban. For the first time in human history, in 2000,

as many people lived in urban areas as outside them. The pace of increased urbanization is resulting in hyper-urbanization and the creation of mega-cities, or urban aggregations of 30 million or more. The rapidity and size of this migration to the cities often overwhelm government’s capacity to provide the minimal conditions for order and livability: clean water, adequate sanitation, power, transportation, minimal public health, or the conditions for civil order. For those in China who have witnessed both dramatic population increases and migration over recent decades, these outcomes may seem less evident and pressing, but for much of the world—in Africa, Latin America, and Southeast Asia—rapid urbanization weakens aspects of the social order even as it congregates people in areas that service global production, trade and consumption needs.

I make reference above to the UN Habitat review of hyper-migration, The Challenge of Slums (2003). Linking these conditions of palpable inequality with this pattern of rapidly increasing slum settlement underscores the global issue of providing even minimal education for children (see also the fuller discussion of this report in Davis, 2006).

3.5 Globalization is associated with the spread of neo-liberal economic and political regimes with similar neo-liberal policies

Neo-liberalism is the ideology of contemporary globalization. I would argue that it continues to spread throughout the world, carried in part by TNC’s, which are its primary beneficiaries (Steger, 2002; Harvey 2005). It is not necessary to reprise neo-liberalism in this context other than to state the obvious: to the extent its policies operate to restrict the proportion of national funding that enters the public sector (and this has been the 20-year trend in countries where neo-liberalism is most advanced) meeting educational challenges at all levels is made more difficult (if only because education then competes with every other element of public sector spending). The values of market competition central to neo-liberalism also privilege the private sector, which becomes valued as the source of innovation, the “modern”, etc. To the extent that the private sector is relatively un-regulated, it becomes the vehicle through which globalized education can enter society. These dynamics are at work throughout Asia as westernized higher education has been commodified as a product to be valued in local markets (Knight, 2002).

3.6 The primary pressures for social change are as likely to come from external sources and forces (e.g. international commodity prices) as from pressures and structures within countries

One element of this can be seen in terms of the relative age stratification that is occurring as youth are more likely to adopt “globalized” identities, personas
and consumption patterns than others. We can probably sense a globalization dimension to the normal elements of social change that separate any younger generation from its predecessor—a “globalization generation gap”. We can see elements of this phenomenon in text messaging and gaming, both of which are overwhelmingly youth culture activities, in clothing styles, drug use, music preferences, etc., in short throughout the circuits of consumption aimed at youth markets (Anderson, 2006).

Globalization pressures to “reform education” are closely aligned with the economic and educational agendas promoted by major international donor and technical assistance agencies such as the World Bank, the International Monetary Fund, the United States Agency for International Development, the Canadian International Development Agency, or the Japanese International Cooperation Agency, themselves influenced by more than two decades of “managerialism” of which perspectives have migrated to the public sector in general and higher education in specific (Trow, 1994). These agencies are, not surprisingly, inclined to put their money where their institutional commitments lie, and in education these are likely to be within the frames of reference of the Organization for Economic Cooperation and Development (OECD) countries. The operative question is the degree to which the “reforms” advocated by such agencies are appropriate to the needs of the countries for which they are advocated. Whatever else these reform pressures may be, they are an additional element of globalized attitudes, contents and often educational professionals that are interjected into the local.

Neo-liberal influences are also seen in the inclusion of education in the General Agreement on Trade and Services (GATS) that treats education as another commodity in the global economy. Education services are included in the current negotiation round that began under WTO in 2000. Trade in higher education services including exchange of international students is a billion dollar industry and growing rapidly as the demand for higher and adult education, especially in the professions and in non-traditional delivery modes increases. Knight has pointed out that as demand expands, the capacity of the public sector in many countries is insufficient to meet demand. This gap encourages groups seeking to expand the education marketplace through privatization (Knight, 2002).

As I argued above, globalization has innumerable properties and operates at many different geographic and social levels simultaneously. To better understand the import of a given globalization dynamic, for example labor offshoring and its implications, one can begin an analysis at the global level. What are the global consequences for offshoring? Who gets what? What circuits of global exchange are created or destroyed by offshoring? Etc. Similarly, one could focus on a geographic region and do a regional analysis asking, which regions of the world are benefiting and which losing out through greater offshoring? How do regional
trade and economic arrangements facilitate or deter offshoring practices? How does geographic proximity affect which things will be offshored? Etc.

These kinds of questions can be extended to the nation state itself. For example, how are India and China alike, or different in terms of how they promote or receive offshoring? Sometimes important historical data are lodged at this level of analysis. For example, throughout the decades of the 1960s, 1970s and 1980s, while the older industrial nations were significantly outsourcing (as it was then known), Japan was not, being able to drive its economy through almost maximal internal labor utilization. By the middle of the 1980s, however, Japan manufacturing costs, in part driven by rising labor costs, were no longer able to effectively compete with developing Asian labor markets and Japan also became a major outsourcing economy. The example demonstrates that analysis at this level needs to be dynamic and sensitive to rapidly changing patterns of labor costs and utilization. To continue our example, fruitful analysis can then extend to the sub-state level, where, as we can see in many instances variation is considerable. India and China are both significant examples of the clustering of global industries wherein the benefits are highly concentrated in a few geographic areas but not necessarily well-distributed throughout the national system. One can further pursue these questions about dynamics and impacts to group or individual levels and begin to examine how the dynamics of the global system affect the ways that specific groups and individuals behave, for example, how individuals make career choices, etc.

This kind of analysis, cumbersome through it may be, needs to be done with education. Some steps have been taken in this direction and suggest some of the detail that I have included under the previous globalization dynamics. To fully appreciate how globalization is transforming education, however, we require this kind of careful multi-level analysis.

4 Some likely futures

I would like to close this brief discussion of global interdependence and education by suggesting some “likely futures” that seem to be emerging. I encourage readers to speculate on their own likely futures for education that may emerge from increasing global interdependence.

One future focuses on greater pressure to keep up with technological innovation. Many students of technology change believe that we are literally standing at the frontier of yet another technology revolution anchored in micro-processing and nanotechnology that will impact virtually every way that we live in society. Above I have discussed briefly some of the stunning changes that are already taking place in how we communicate, share data, image the world, create and
search for information. Imagine, if you will, that we stand at the mouth of a funnel that is opening away from us, and that the enormous changes of the past twenty and thirty years are just the beginning of these kinds of technologies. This is the vision of the MIT technology guru Kaku for example (Kaku, 1998).

As educators we are pressed to ask ourselves: how should we prepare our students for such an emergent world? If we assume that a student entering school at age five will exit basic education at seventeen or eighteen, how do we begin to predict/guess the kind of world that person will enter and the skills and knowledge she/he will require? One answer that is much on the minds of many thoughtful educators is that our emphasis increasingly will have to be on teaching students to think, to problem solve, to adapt to new circumstance, to address the confounding predicaments that increasingly face us in the world, rather than current curricula emphases that focus on mastering discrete sets of facts about the world. Will such a vision of student learning require different ways of thinking about and doing education? One would think so.

We will also be confronted with the idea of life-long learning in a whole new sense of the term. Every educator will have to accept the responsibility to stay abreast of emergent technologies, to develop new literacies, and resist the temptation to freeze one’s own knowledge set as “what it means to be educated”. Engineers have already accepted this reality, as have many healthcare professionals and bio-scientists. The half-life of an electrical engineering education is about five years, after which most of what the graduate learned in school is obsolete. This places incredible pressures on the education system, pressures that require among other things constant demands for new investments in educational plant, equipment and personnel. In the United States, even the very best universities, such as Stanford and the University of California, Berkeley, have found that they need to work hand in hand with their client industries in science and technology to ensure that their graduates have the relevant skills to succeed. Again, throughout the United States and the European Union, “corporate training” has taken on new meaning as corporations find that traditional educational institutions are unable to keep up with the pace of knowledge change that their businesses require. Many have begun their own corporate universities … and the trend is continuing (Meister, 1998).

Two other implications flow from this observation: one is the increased pressure to create “adaptive learning” and “change response” environments; and two is the more private sector engagement in providing learning experiences. One can already see in the explosion of simulation teaching tools the attractions of adaptive learning environments, in which a student is engaged in exercises in which change is dynamic and the need is to develop responses to it (Learning Light is an example of a rapidly growing private sector enterprise targeted at
this “problem” for both industry and education. See Learning Light, 2007). The place to look for the educational tools of the future is probably in the computer, especially in its rapidly proliferating hand-held forms, and the on-line gaming world. Shorn of the violence and sex that are so much a part of these commercial products, intended to stimulate teen-age hormonal responses, games are popular in part because they are complex, fast moving, challenging and couched in visual idioms that people find attractive. They are a kind of learning simulation. While the number of educational games and simulations has grown enormously over the past decade, they are still a minor side-show when compared with the dominant gaming world. However, this, I would argue, will be the world that education must compete with, and it can do so with the appropriate levels of investments in time, energy, capital and creative genius (Castronova, 2005).

The private sector will be an active participant in these processes in part because it enjoys the luxury of targeting markets, developing “boutique” type solutions to specific education situations and groups, and because private institutions are free of the responsibility of generalizing their product to the whole of the population to be served. These attributes can have the positive effect of allowing the private sector to pioneer innovations that can later be adopted by public systems. Their negative effect is that they further stratify the educational environment, equipping those with financial means to be even more nimble in responding to social and environmental change than their less well-resourced counterparts.

These new stratifications could turn out to be novel, and perhaps even have the effect of creating new knowledge elites. A replication of older patterns of stratification would occur if those currently relatively advantaged simply perpetuated those advantages—yet another instance in which the rich get richer and the poor get poorer. Our accepted notions of how the digital divide stratifies people are a good example of how these dynamics are currently distributed in society.

New stratifications, however, could emerge from the very rapidity of change and the extraordinary levels of innovation being triggered by nano- and micro-technology wedded to digitalization. In highly dynamic situations such as these, it is often not the largest and most powerful corporations that are the sources of innovation, although they are all organized to “harvest” innovation in fields they wish to dominate. Microsoft and Apple, each in different ways, are stories of how early innovation adopters and organizers managed to succeed in the face of larger and better financed, but slower and more conservative industrial bureaucracies (see Battelle, 2005 for a review of these dynamics in the search field).

In the contemporary world, these are very complex dynamics. The United States government, for example, spends about $28 billion a year just in the general field of medical and health research—this is the research budget of the National Institutes of Health. Some of that money goes to government research laboratories, but most of it goes to the complex and highly decentralized research system dominated by the leading USA universities and affiliated research centers. What comes out of this enormous investment is an extremely varied product, including vast amounts of basic science for open public consumption in the USA and throughout the world. What follows from it is even more complex as increasingly research scientists participate in intellectual property relationships with these sponsoring agencies that allow for private sector exploitation of the science through new applications. “Government” science in this way “feeds” private industry with a rich supply of discovery, invention, information, knowledge and innovation.

How these discoveries and innovations then move throughout national and global circuits of exchange is the key to the creation of new knowledge networks, which can become new product modes, spawning in turn new industries and knowledge elites. As these are organized, they can produce new stratifications that challenge the position of older “players” in the knowledge environment, be they government-connected or parts of existing industry. In part it is this dynamic of seeking to “stay on top” of innovation that leads to the efforts in some knowledge based industries like pharmaceuticals to co-opt innovation, suppress competition by dominating markets, and above all seek to protect pricing policies to ensure corporate income streams.

The key point here is that the kinds of highly dynamic research environments that have been established by, through and in the interstices between government and private industry create new and potentially rewarding challenges for educational institutions to seize opportunity and employ new knowledge quanta for their own processes of innovation and learning.

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References