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explorations in education

The Educators Manifesto

Renewing the Progressive Bond with Posterity through the Social Construction of Digital Learning Communities

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Prologue

To educate educators! But the first ones must
educate themselves! And for these I write.
Nietzsche, 1875[1]

¶1:142 Educators, awake! Unite! We have a better future to make! We have new power and new influence, sufficient to make that future better.

¶2:142 Educators, we are many. We are diverse. We are everywhere. We are teachers. We are pupils and students. We are parents and professors. We are scientists, researchers, and technicians. We are writers, journalists, editors. We are physicians and lawyers. We are designers, artists, musicians. We are philanthropists, community organizers, civic leaders. We are tutors, trainers, counselors, conciliators, and shrinks. We are scholars, critics, curators, and clergy. We are everyone and anyone – anyone nurturing knowledge, values, and skills, putting them to work in the conduct of life.

¶3:142 Now, grasping new tools, we can make our work more progressive, more powerful. Our time to lead is here. We work in history. There, powerful forces meet to set past pedagogical limits aside. What should we do with our new possibilities?

¶4:142 Our work is transformational. Our reach is now global. We must renew our progressive bond with posterity. The peoples of the twenty-first century must instigate difficult, improving principles in the face of unprecedented complexities and pressures. The scale of human action becomes immense, at once ominous and luminous. Serious missteps are hard to avoid and may extinguish the humane adventure. Astute answers to deep dilemmas on a global scale can secure great, radiant hopes.

¶5:142 Educators must cease to tinker at the fringe of practice. Educators need to stretch their work to the horizons of the future. Universal education is an arduous aim; compulsory schooling supplies but a simulacrum of it. We have at our avail social energies sufficient to fill this shell with substance. We dispose historic forces that can advance the work of enlightenment toward further fulfillment. Educators must come to know these energies and forces; we must put them to pervasive, relentless employ. And coming to know the power of digital communications, we must discover and invent ways to use all our resources, the new with the old, to help posterity achieve more coherent, momentous measures of worth.

¶6:142 Educators, to make a better future, we must move humanity; we must disarm anxieties and rouse intents. For these purposes, let us join together. Let us work to lead. "The height charms us, the steps to it do not. With the summit in our eye, we love to walk along the plain."[2] Let us climb!

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[1] *The Portable Nietzsche* (New York: Penguin, 1968), Kaufmann, trans., p. 50.

[2] Goethe, *Wilhelm Meister's Apprenticeship*, Book VII, Indenture, Thomas Carlyle, trans.

Part 1 – Digital Technology as an Agent of Change

Technological Empowerments

¶7:142 Consider interactions between information technologies and educational practice as these play out in the fullness of time. Some events take place in a present tense that marks a short duration – days, weeks, months, perhaps a year or two. Others unfold in a prolonged process that spans a long duration – decades, generations, even centuries.[3] Over such a long duration, innovations in information technologies are interacting with new educational practices to make significant changes in human experience possible. As actors in that drama, educators must determine the human worth of those changes through the character of their practice.

¶8:142 With respect to events, "now," the present, can have varying duration, ranging from the instantaneous crisis of a high-speed accident to many decades for a global change in technology or demography. Prediction anticipates what will happen in a postulated future. Observation notes what is happening in the present, a present that may extend from the recent past, through the immediate instant, to well into the future. Let us not predict, but observe. Let us observe three things that are happening around us at a rapid pace in our extended present, the now that encompasses the incorporation of digital information technologies into our culture.[4]

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[3] Fernand Braudel opens *The Mediterranean and the Mediterranean World in the Age of Philip II* (2 vols., Sian Reynolds, trans., Berkeley: University of California Press, 1996) with a penetrating reflection on the importance of the *longue durée* for history.

[4] For those who like to have such phenomena dated, let us try the following chronology. The incorporation of digital technologies into our modes of cultural creation is following a classic S-curve course. The process begins with a sustained period of acceleration from roughly 1940 to 1980. The process then moves through a sustained period of rapid transformation from roughly 1980 to 2020. It then closes with a sustained period of deceleration, lasting roughly from 2020 to 2060, moving into an indefinite steady state of marginal improvements thereafter, having by then become the dominant infrastructure for cultural communication. For those who like some functional grounding to such dates, let us note the following: 1940 marks roughly the introduction of the first useful digital computers; 1980 is the approximate start of the broad application of useful microchips as CPUs to personal computers, with Moore's law, which holds, loosely, that digital device capacity doubles every 18 months, indicating the rate of transformation; 2020 probably signals when the rate of increase in device capacity indicated by Moore's law starts significantly slowing as the physical constraints of matter begin to impede the rate of improvement in circuit design and manufacture; and 2060 suggests an arbitrary terminus to establish an overall symmetry. Thus what we call the extended present through this document spans roughly 1940 to 2060, with 1980 to 2020 the most rapid period of transition in it.

While these dates suggest the chronology of technological possibilities, the potential for cultural lag in considerable – hardware advances faster than associated software, which in turn advances faster than the patterns of use that it enables. Consequently, the timing of technologically enabled educational innovation may stretch out considerably beyond this chronology. One might argue that from a cultural/educational point of view, the period of rapid transformation does not start until the mid-1990s (rather than 1980) with the broad public influence of the World Wide Web. If so, the period of rapid

- First, using emergent information systems, people are converting all the contents of all the world's cultures to digital form, making the results available to any person at any place at any time.
- Second, using digital multimedia, people are gaining flexible command of multiple ways to represent knowledge, simulate interactions, and express ideas, extending the reach of intelligence, altering the spectrum of civilized achievement, and lowering thresholds to cultural participation.
- Third, using powerful software, people are externalizing diverse basic skills – to calculate, to spell, to remember, to visualize, to compare, to select – into the digital tools with which they work, making practical mastery of such skills, once an outcome of education, increasingly a given at its outset.

These changes become increasingly evident in practice the world around, and educators who incorporate them into their activities sense that the spectrum of pedagogical possibility alters radically thereby. The constraints on feasible educational action loosen.

¶9:142 A shift in the spectrum of pedagogical possibility would not be an unprecedented human occurrence. Such shifts have happened before, both in education and in other sectors of activity. They are the very stuff of historical change. For example, consider the transformation of architecture since 1850. Until that time, throughout history and across cultures, people simply did not build tall buildings except occasionally a tower or pyramid for specialized, ceremonial or military purpose. Then a series of innovations occurred, for reasons quite extraneous to the will of architects, that made unprecedented structures feasible. With new materials like girders of iron or steel, reinforced concrete, and plate glass, with new techniques for managing water, heat, light, and air, as well as novel ways of moving people with elevators and escalators, these unprecedented structures proved so humanly habitable that high-rise buildings have been built the world around, with great variations of form and function, and with diverse triumphs and failures on all sorts of measures – social, structural, economic, and aesthetic. The new building technologies did not determine, in a strong sense, how any particular city would look, but they did open a wide new spectrum of architectural possibility. Within the range of this possibility numerous cities have developed imposing skylines like New York's, and even Paris, by largely adhering to traditional building codes within its city center, reflects through its conscious restraint one of the possibilities of the new architecture.

¶10:142 Digital technologies are for education as iron and steel girders, reinforced concrete, plate glass, elevators, central heating and air conditioning were for architecture. Digital technologies set in abeyance significant, long lasting limits on educational activity.[5]

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innovation may persist further into mid-century or thereabouts, with the period of deceleration stretching to the end of the 21st century. Pedagogically, our extended present, marking the restructuring of educational activity to make full use of digital communications, spans the period from 1950 to 2100 or thereabouts.

¶11:142 Existing limits are clear. Around the world, a remarkably ubiquitous educational system works well for some and poorly for others. Its elitism and class bias are global, structural features of the educational system built over the past four centuries. Educators designed the traditional system to make optimal use of a powerful information technology, that of printed text. In our extended present, the means of communication available to educators are changing rapidly, and educators now have to determine what to seek to accomplish with those changing conditions. Consider how this change in possibility occurs through the three strategic developments in our extended present – digitization, multimedia, and augmented intelligence.

¶12:142 First, a change in possibility results as high-speed wide-area networks, linking people through ubiquitous computers to copious digital libraries, transform the cultural conditions under which educational interactions take place. Traditionally, the school and the classroom have been places where teachers and students are isolated from the general culture and where information and ideas have been relatively scarce – the textbook was a meager selection of what a field of knowledge comprises, a skilled teacher was a bundle of ignorance relative to the sum of learning, and a school library a sparse sampling of the culture at best. Networks reaching through the school into the classroom and to the desktop are ending the isolation and substituting a rule of abundance for that of scarcity.[6] Such a new rule is not without its pitfalls, as the concern to protect children from pornography on the Web shows all too well, but to cope with its hazards we must recognize that it is a new rule, deeply different from the old. In our extended present, the root pedagogical problem changes profoundly, shifting from stratagems for disbursing scarce knowledge to finding ways to enable people to use with purpose and effect their unlimited access to the resources of our cultures.[7]

¶13:142 Second, changes in educational possibility arise as new media alter the ways of knowing and the opportunities for participating in the creation of knowledge. Multimedia, and its extension in virtual reality, is not merely a glitzy vehicle for edutainment hype. It is an epistemologically interesting development in our culture.[8] For the most part, the work of thinking has appeared to take place as people manipulate their spoken and written languages, with the formal symbolization of mathematics and logic appearing to be extensions of more everyday linguistic forms. Multimedia make it increasingly evident that the work of thinking can take place through many forms – verbal, visual, auditory, kinetic, and blends of all and each. Of

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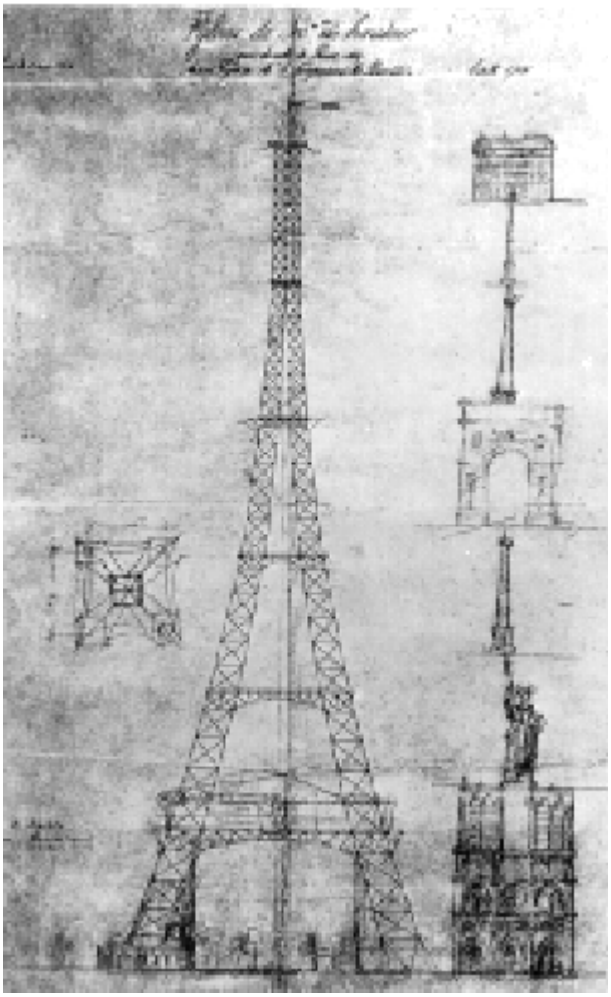
[5] It is difficult to convey the idea intuitively that fundamental potentialities in education are now different than they have been in the past. Nevertheless it is important to reason out the possibility so that educators can try arrangements and activities they would otherwise hold impossible. The task of communication was easier in architecture. Here is a working drawing from 1884 from an early proposal for the Eiffel Tower, in which the engineers sought to convey the idea that they could now develop structures built to an unprecedented scale. Unfortunately educators cannot make such a point as succinctly as structural engineers could. It took the seven tallest structures in Paris (the Statue of Liberty was then under construction there with a good deal of public attention to it). Note that only one, the shortest of the seven, was a building for everyday use. Reproduced from Spiro Kostof, *The City Shaped: Urban Patterns and Meanings Through History* (Boston: Little, Brown and Company, 1991) p. 320.

course, it is not the case that non-linguistic media are themselves new. Rather their status as serious means for creating knowledge is rising considerably, evident for instance in the rapidly spreading techniques of scientific visualization. The newness of the "new media" lies in their growing suitability for serious intellectual work.[9]

¶14:142 Knowledge consists primarily of cultural resources that people can store and retrieve on demand, as the need for it arises. Written, especially printed, media have long had a privileged place in the house of intellect because they were easy to store and retrieve to suit the needs of users.[10] Without random accessibility, continuously exercised, ideas become esoteric, hermetic, and then lost in the flux of time. Work in media other than print has been awkward, either to store or to retrieve. As words once were, music, theater, and dance have largely existed in performance, making them hard to



[6] Large-scale digital library projects can seem to be concerns primarily for rarefied scholarship. In fact they are developments of broad public import and care should be taken to widen the constituency for the effort. James Billington, Director of the Library of Congress, has been most alert to the potential public benefits of digital libraries. The Library of Congress is rapidly digitizing extensive portions of its collection, with the main discussion of its digital library plans at http://lcweb.loc.gov/rr/digital.html and with major examples such as the *American Memory Project*, building an ever-widening base of

store. They have achieved a lasting presence for audiences in the repertoires of recurring performances.[11] Painting, sculpture, and architecture have existed in unique materializations, creating a problem of retrieval. They have achieved currency by enduring in a known physical place as a monument or part of a public museum collection. Much in our cultural heritage has therefore required storage by recurring performance or retrieval by personal pilgrimage. Neither means is conducive to flexibility or equity. Such media are limited with respect to use on demand – only in special circumstances could they serve one well to make a telling point. Multimedia changes that condition. It subjects a far wider range of communications to the full rule of random access, changing the repertoire of resources that people can store and retrieve effectively and use on demand to serve the needs of disciplined thought and

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users. Major research libraries are collaborating (and competing) to develop components of the digital library. The Partner's page of the National Digital Library Federation (http://www.clir.org/diglib/dlfpartners.htm) provides a fairly full sampling of these. To form a sense of the depth of coverage open to anyone that digital libraries can offer, the Perseus Project at Tufts University (http://www.perseus.tufts.edu) is worth exploration as it encompasses a stunning range of sources, textual and archaeological, for the study of ancient Greek culture. In the sciences, major digital libraries of current papers in many fields are under development, and additionally researchers are creating on-line *collaboratories*, which permit the digital pooling of research resources located at many different centers. While everyone and anyone cannot usefully gain access to libraries housing large book collections or laboratories filled with instruments that are often both delicate and dangerous, the character of digital information and instrumentation is such to permit very broad access to the on-line libraries and collaboratories. Science educators are beginning to develop pedagogies for using these for inquiry-based education with children.

There is a good deal of divergence, circa 2000, about whether digital libraries should be proprietary and the degree to which owners of them should manage them to maximize income or intellectual facilitation. Retroactive digitization is costly and funding streams to support the process are necessary. Like building roadways, digitization is in large part a civic function. It seems very likely that free access to digital collections will displace access for a fee, for there are so many resources building up with no fees attached, that it is hard for information sellers to add sufficient further value to be able to justify potential access fees. Embedded advertising and public subventions are likely to finance open, no-fee access.

Students of information science are producing voluminous literature on digital libraries. A good discussion of issues, current to 1993 and oriented to the Bibliothèque de France, is in R. Howard Bloch and Carla Hesse, eds., *Future Libraries* (Berkeley: University of California Press, 1995). To grasp fully both the difficulties and the possibilities of digital libraries, readers need sustained engagement with the resources on-line, however. There is a huge, distributed effort taking place world-wide as libraries and archives metamorphose, the dynamics of which it is much easier to experience than to describe. Nonetheless, discussions of scholarly communication and academic publishing are contending with the dynamics of digitization in works such as Robin P. Peck and Gregory B. Newby, eds., *Scholarly Publishing: The Electronic Frontier* (Cambridge: The MIT Press, 1996). Unfortunately, such scholarship pays more attention to the processes of change and less to its cultural and historical implications. An excellent exception is *Avatars of the Word: From Papyrus to Cyberspace* by James J. O'Donnell (Cambridge: Harvard University Press, 1998).

[7] Humans live in self-sustaining collectivities situated in time and space. Historical and social conditions consequently impinge inescapably upon all their efforts and activities. Cultural history conditions psychology and human biology, not only as it influences the thinking of the working psychologists and biologists, but more fundamentally as it conditions the empirical subjects who provide the data about which the psychologists and biologists develop their explanatory theories and

inquiry.[12] People can use digital media both to acquire ideas and to express their thoughts across diverse modalities such as the verbal, visual, auditory, and kinetic. As a result, educators are finding it increasingly difficult to favor the linguistic modality over all others and they need to broaden the norms of academic excellence to include intellectual recognition of skills now put too often at the periphery of the curriculum.

¶15:142 Third, changes in educational horizons emerge as digital technologies expand personal potentialities. Distributed processing and ubiquitous computing may or may not aggregate into artificial intelligence, AI in the strong sense, creating a species of machines that think and act in autonomous, self-sustaining ways. But they are clearly coming to function as a means for augmenting intelligence with respect to our human

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data.

Interactions between human potentialities and the conditions impinging upon persons set determinate pedagogical problems for people who seek to make their potentials actual. In other words, under different historical and cultural conditions, their pedagogical purposes – what people can and should acquire through their education – change; so too, the educational conditions – the key difficulties that they must surmount in acquiring their education – also alter fundamentally; and finally, the educational means – the pedagogical strategies that will work with appropriate effect under the given conditions – adapt pervasively, continuously, and on occasion radically. For instance, the skills that convey cultural power in an oral culture differ drastically from those in a highly literate culture, and the basic challenges people must meet in order to become highly educated in an oral culture differ from the problems that people face in pursuit of education in a literate culture. At any particular time and place, the knowledge that educators need about what to do, how to do it, and why it should be done will derive in large part from their historical and social understanding.

Attention to the root pedagogical problem tries to go to the core of the interaction between human possibilities and historical and social conditions. Under diverse conditions, educational attainments by people are most likely to increase in substance and benefit as they become independent learners, individually and collectively capable of directing and sustaining their own development. Under different cultural conditions, as these impinge on individuals and groups, the key difficulties that people must solve in order to become effective as independent learners vary. Root pedagogical problems are these difficulties, these impediments to self-sustained, self-directed development, which people encounter in their educational conditions. To diagnose these difficulties and to develop strategies for surmounting them, educators need to develop interpretative insight into the educational affordances and limitations inherent in their particular relationships with their concrete circumstances. Doing so has been the object of "historical pedagogy" and "social [or civic] pedagogy" as these topics have developed in the educational literature.

Unfortunately, for reasons of historical accident, the traditions of scholarship in historical pedagogy developed by Anglo-American students of education have at best been very weak, with one great exception, John Dewey's *Democracy and Education* (New York: Macmillan, 1911). Dewey extracted a full educational agenda from reflection on the possibilities for human development under the conditions of life and culture in the early twentieth century. By and large, however, Anglo-American study of education has been dominated by the assumptions of psychology, which abstracts away the historical and social concretions of life. We need to renew our engagement with the pedagogical thinking of classical German humanists.

[8] For reflections on multimedia in a philosophical frame see Mark C. Taylor and Esa Saarinen, *Imagologies: Media Philosophy* (New York: Routledge, 1994). Janet H. Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (New York: The Free Press, 1997) and David Gelernter, *Mirror Worlds, or the Day Software Puts the Universe in a Shoebox … How It Will Happen and What It Will Mean* (New York: Oxford University Press, 1991) also raise interesting questions

intellectual skills, AI in a weaker yet important sense.[13] Computers are beginning to augment numerous intellectual skills, to the consternation of some. Word processors warn of anomalous spellings as they occur; spreadsheets allow anyone to perform complex calculations quickly and accurately; and databases permit those with good memory or bad to manage information sets that neither could handle on their own. All sorts of more specialized tools greatly lower the skill levels needed to participate effectively in wide ranges of cultural activity. Precision and exactness may become trivial proficiencies. Getting it right becomes easy, provided one does not get it wildly wrong through some accidental error. Such accidental error can be very portentous error. Hence, the ability to estimate and guess approximate results – to traditionalists an educationally suspect knack – is becoming an increasingly prized

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about the effects on digital technologies on our basic ways of communicating and representing the world. J. David Bolter's *Turing's Man: Western Culture in the Computer Age* (Chapel Hill: The University of North Carolina Press, 1984) is still worth studying. The most recent contribution, an important one, is by the philosopher of technology, Albert Borgmann, *Holding on to Reality: The Nature of Information at the Turn of the Millennium* (Chicago: The University of Chicago Press, 1999).

[9] With all the frenzy for e-commerce IPOs (circa 1998-99), we need to remind ourselves that the necessities that mothered most digital inventions were intellectual and academic, not commercial. Computational machinery was invented to help solve difficult design and decoding computations. The Internet was devised to facilitate communication among scientists, whether in times of peace or in times of war. The World Wide Web was the work of scientists and engineers at the European Center for Nuclear Research, who wanted to share publications more easily. And the ubiquitous web browsers are based on a implementation done initially at the Super Computing Center at the University of Illinois. The growing role of open source software reflects the extension of principles of open scientific publication of peer-reviewed papers into domains of software development. At the very least it is proving to be a creative drive to innovation on a par with, if not superior to, that of commercial profit. See Chris DiBona, Sam Ockman, and Mark Stone, eds., *Open Sources: Voices from the Open Source Revolution* (Sebastopol, CA: O'Reilly & Associates, 1999).

[10] The concept of *intellect* that Jacques Barzun developed in *The House of Intellect* (New York: Harper & Brothers, Publishers, 1959, esp. pp. 4-6) is useful in understanding why digital information technologies are enabling the transformation of education. The new media are technologies of intellect. For instance: "Intellect is the capitalized and communal form of live intelligence; it is intelligence stored up and made into habits of discipline, signs and symbols of meaning, chains of reasoning and spurs to emotion – a shorthand and a wireless by which the mind can skip connectives, recognize ability, and communicate truth. Intellect is at once a body of common knowledge and the channels through which the right particle of it can be brought to bear quickly, without the effort of redemonstration, on the matter at hand. . . ." Information technologies change the conditions under which people create and use intellect; they change the way intellect works. These technologies do not simply give people access to information, to data. In principle they change the access to intellect and control over it.

[11] The text of a play or the score of a musical piece, even the choreographical record of a dance in Laban notation, are partial qualifications on this assertion. But still the work in these arts lies in performance and until the era of audio-visual recording and playback, the ability to bring such performances into the realm of on-demand storage and retrieval, so important for the work of knowledge, has been severely constrained.

[12] A great deal of the work in the area of human-computer interaction involves a sustained effort to develop visual, auditory, and kinetic techniques for managing cultural storage and retrieval that will amplify (or possibly supplant) established written techniques involving keyword indexing and

skill. As they encounter work by their students using such augmentations, educators are sensing that changes in information technologies can deeply transform the hallmarks of having acquired a decent education. Established answers to the question – What knowledge is of most worth? – may not pertain under the conditions of learning and knowing that emerge with the digital augmentation of human intelligence.[14]

¶16:142 In sum, digital libraries, multimedia, and augmented skills change the limits of educational practice. Ponder this proposition, not as a prediction, but as an observation about the potentialities inherent in the communications innovations now taking place in our extended present. The basic proposition here is not so much a normative argument that educators should, for one or another reason, adopt the

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searching. For a discussion of some of these possibilities, see Shih-Fu Chang, Alexandros Eleftheriadis, and Robert McClintock. "Next-Generation Content Representation, Creation and Searching for New Media Applications in Education," *Proceedings of the IEEE*, Vol. 86, No. 5, May 1998, pp. 884-904.

[13] There is a great deal of polemical literature, pro and con, with respect to AI in the strong sense. The role of embodiment in intelligence merits much deeper consideration. One might define augmented intelligence as an effort to use machine processing to strengthen intelligent capacities embodied in human beings. AI in the strong sense, in contrast, tries to embody intelligence in the machine. The Turing Test, which is at the foundation of the drive towards artificial intelligence in the stronger sense, was originally framed as a curiously disembodied test – whether or not, through an exchange of messages, one can differentiate an artificial from a human source, having only the messages exchanged as data for the test. Of course, one could postulate a version of the Turing test requiring not simply an exchange of messages, but sustained, intimate co-habitation, but that leads to the transformation of the "artificial" in the concept of artificial intelligence into something insignificant, with the ultimate test, one supposes, being whether the human can successfully reproduce by sexually coupling with the artifice. From the opposite dimension, digital technologies are making possible the disembodiment of much human experience with the multiple forms of virtuality that are fast arising. We may have our doubts, however, whether these can remain experiential on the one hand and attain complete virtuality on the other. We need to ground considerations of intelligence, human and artificial, in the recognition of the inherent embodiments of intelligence. The mind-body problem only occurs in the experience of creatures who embody intelligence. Maurice Merleau-Ponty's *Phenomenology of Perception* (Colin Smith, trans., New York: Humanities Press, 1962) should be more central in discussions of artificial intelligence than it has been. For educators, it is unfortunate that the rather fruitless debate about AI in the strong sense has obscured attention to augmented intelligence, AI in the weak sense. This AI is fraught with extensive practical consequences for who can do what under which conditions, extensive human consequences of special concern for educators.

[14] Skeptics who intone that changes in the access to information do not necessarily lead to a better education, and may worsen it by furnishing people with a surfeit of trivia, miss the significant change. The new technologies do not simply enhance information access. They change conditions for participating in the creation of knowledge, the exercise of skill, the work of interpretation. With augmented intelligence, it is not information access but cultural participation that is widening significantly, for better or for worse. This development clearly poses difficulties, but it is a development that is deeply protean in historical character and potentiality. This development is also clearly not new, for participation in cultural activities has already widened discernibly throughout the nineteenth and twentieth centuries with the wide distribution of inexpensive, quality publications and the opening of access to institutions of education. Thus Thomas Hardy's *Jude the Obscure* depicted nineteenth-century social barriers internalized in institutions, situations, and persons operating to block what intellectually was both appropriate and feasible access. Many of these barriers have become much less rigorous as prevailing norms of experience by the late twentieth century. The historical

proposition that these developments are empowering the transformation of educational activity. Rather, the proposition is both more factual, although tentative. We are there, it seems. With digital information technologies, what is pedagogically possible changes. *Possible* educational attainments are different and greater than they have hitherto been. As educators, individually and in groups, encounter the changing conditions of communication under which they work, they sense that these changes inherently involve a profound alteration in the spectrum of pedagogical possibility. They do not adopt a new idea; they recognize an altered condition. With long-term developments like digital libraries, multimedia, and augmented skills, the spectrum of what may prove pedagogically feasible expands.[15] Historical circumstances challenge us to implement the new possibilities effectively, with their humane worth fully consummated.

¶17:142 This challenge brings us to the second topic, the social construction of complicated historical developments. For the most part, American educators have looked to the psychological sciences for guidance with respect to practical issues of educational application, while expecting the historical and sociological sciences to yield at most informative descriptions.[16] Such expectations are too low. We aim here at practical

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limits to a widening of participation in intellectual activities have by no means been reached, however – not even approached. Loosely but suggestively, entertain the following analogy – twentieth-century changes in cultural participation are like the nineteenth-century changes in travel occasioned by railroads, whereas twenty-first century changes in intellectual participation are like the twentieth-century changes in travel associated with the automobile and aviation.

[15] One may, of course, doubt this description of what educators working with new technology perceive as the inherent possibilities that they enable. Is it not the case that numerous educators, on encountering the new technologies perceive no new possibilities at all? It is important to recognize something like a Gestalt pattern shift in the phenomenon. Many do not see the sketch of a rabbit change to a face. That failure to see the face is not evidence that perceptions of the face are in error. Those who do not see it have a problem of explanation, having to account for the perceptions of those who do. In the case of educators who perceive new possibilities in the new media, the problem of explanation is rather extraordinary. The rhetoric of constructivist, learner-centered, collaborative pedagogy has been popping up the world around as advanced information systems have entered the field of educational practice. There is virtually no research evidence showing the superiority of such practices and there are neither impressively authoritative nor universally popular presentations of the key ideas pertaining to it in circulation within the public or the profession. Yet a startling consensus about how new technologies can reshape educational practice is emerging with unprecedented rapidity among those who seek to use them. Sample the conferences the world around. The same ideas are enunciated everywhere. What is most remarkable, they are ideas that run quite counter to the controlling paradigms in the field of instructional design that held sway through the 1980's. Instructional design geared to address narrowly defined objectives systematically, as in the work of Alexander J. Romiszowski, has not been shown wrong; it has been outflanked by a rapidly emergent common sense to which those prior principles appear irrelevant. The most plausible explanation for this global phenomenon is that educators share an independent, authentic "Aha!" as they engage in serious efforts to apply digital technologies to educational work.

[16] Educational researchers have struck a sort of *entente* concerning quantitative and qualitative methodologies, but in doing so they have left the organization and institutionalization of educational research largely unexamined. The educational research establishment has long been committed to producing knowledge *about* education, which they hope will then be applied *to* education. We need a much more vigorous examination of the uses of knowledge *in* education, as well as attention to the

applications anchored in historical and sociological thinking. Technological innovation in communication and education is not primarily a psychological phenomenon, but rather a significant driver of historical, social, and cultural transformation. Educators can ground thoughtful reforms in active response to historical change. We need to recognize that historical and sociological understanding can be an essential foundation for practical action, a grounding for a distinctive mode of action that is difficult to practice but powerful in its consequences. Social action is complicated action. As educators experience changes in the communications constraints, they sense that these developments open the existing educational system to new possibilities. Individual educators may or may not welcome that condition, but critic and evangelist alike recognize that the new conditions open educational work to significant change. The new conditions, however, do not determine what is emerging. People engaging in diverse activities are determining what emerges through the social construction of digital learning communities. Educational structures from Kindergarten through graduate school and adult education are increasingly in flux. Structures are wrenching open to change; but human agents must determine the course that change can and should take, working through the interplay of effort by many different groups. To understand such interplay, and what may be at stake within it, let us reflect on the dynamics of social construction.

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application of knowledge *through* education. Ellen C. Lagemann has open some of these questions up in her essay "The Plural Worlds of Educational Research" in The *History of Education Quarterly*, Vol. 29, No. 2, Summer 1989 and Stephen Tomlinson sharpens them in his article on "Edward Lee Thorndike and John Dewey on the Science of Education" in the *Oxford Review of Education*, Vol. 23, No. 3, 1997.

Processes of Social Construction

¶18:142 Significant educational change generally results from complex processes of social construction, yet professional educators and the general public too often do not think about the problems of reforming and improving educational efforts in this way. In recent decades, American educators, especially those ensconced in schools of education, have relied heavily on linear flow models for improving educational practice. Here educators ape the practices of the military, of industry and commerce. Linear flow models, if applicable at all, make most sense in managing large-scale engineering projects or the development of new or improved products for a variety of mass markets. According to the simplest version of this model, researchers discover, be it by serendipity or system, valuable properties or techniques. Developers prepare them for the market, testing and validating them for performance, safety, and cost. Management allocates capital to the innovation and develops both production lines and distribution channels. Aroused by advertising, the public finds itself enjoying the benefits of nylons, scotch tape, and Viagra. Variations on this theme of linear application abound – a causal flow moves from the origination of an idea to its elaboration in a plan, which provides the specifications controlling the work of implementation, with the evaluation of results through market returns or stipulated performance measures following in turn. This model has great simplicity. Innumerable people use it to describe diverse forms of activity in technology, science, medicine, industry, government, war, and education.[17]

¶19:142 Albeit simple, this model is often unsound. Historians of technology have been finding more intricate models necessary to make sense of the way that complex technical systems develop. Contemporary telecommunications has not arisen through a simple linear flow from Alexander Graham Bell's patent for the telephone. As a technical system, the telephone required many different people, working at different times and places, through different organizations, to solve many different technical problems. It resulted through a distributed accomplishment by diverse people and groups who understood the technical potentials of an emergent telephone system in similar, more or less parallel ways. Further, the emergence of the telephone as a social system required all sorts of non-technical people to form understandings of how to integrate use of it into the daily conduct of their lives. Some uses worked, others did not. Slowly, from bright schemes and dumb, from many trials and many errors, from innumerable differentiated actions, the telephone developed as a system in use, passing from an odd device to a ubiquitous resource in all aspects of daily life.[18] Virtually every major innovation arises through such many-sided efforts.

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[17] For a very important critique of such models of research and innovation, see *Pasteur's Quadrant: Basic Science and Technological Innovation* by Donald E. Stokes (Washington: Brookings Institution Press, 1997).

[18] Key sources on the history of the telephone as a social construction are Ithiel de Sola Pool, ed., *The Social Impact of the Telephone* (Cambridge: The MIT Press, 1981); Ithiel de Sola Pool, *Forecasting the Telephone: A Retrospective Technology Assessment of the Telephone* (Norwood, NJ: ABLEX, 1983); and Claude S. Fischer, *America Calling: A Social History of the Telephone to 1940* (Berkeley:

Confronting such complexities, historians of technology have increasingly displaced the model of linear flow with one of social construction, using the latter to show how major developments arise from independent actions by numerous people. Those actions cohere into a significant development because people base them on shared understandings of the potentialities implicit in the historical processes underway.[19]

¶20:142 In deciding what to do with changing conditions, educators are engaging in the social construction of a new educational system. It is coming about through a diversity of innovations taken here and there by people who share, to varying degrees, a common understanding of what potentialities arise in our world of practice with the new technologies.[20] Social action is far less precise and predictable than programmatic action is, but it is at the same time much more implacable and consequential. Programmatic action depends on explicit instructions. Social action results from the shared comprehension of possibilities, in this case from the potentialities arising through the use of information technology in education. Around the world, people working with the new technologies in education are widely orienting their efforts with reference to a shared, distinctive sense of the pedagogical opportunities that these technologies make feasible. This shared, distinctive sensibility amounts to a powerful basis for sustained social action – constructivist, progressive, inquiry-based, learner-centered, egalitarian and inclusive. . . . We can nurture the implementation of these possibilities through social action by bringing ideas about them to fuller awareness through reflection.[21]

University of California Press, 1992).

[19] For a good introduction, see *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, edited by Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch (Cambridge: The MIT Press, 1987). The concept of social construction used in this essay is somewhat broader than the concept used in the history of technology. Steven Lubar's "Representation and Power" in *Technology and Culture*, 36:2, Supplement (April 1995), pp. S54-S81, is an excellent survey of the relevant historiography. It encompasses the many sides of the problem of making thought actual in the realm of lived life.

[20] The work of Max Weber is fundamental to thinking about the social construction of significant historical developments. Paraphrasing Weber's definition of social action, we can say here that the social construction of technologies result because people attach similar subjective meanings to the potentialities they sense in their circumstances and they consequently act independently in ways that conduce to common purposes. See *Economy and Society*, I:1:a&b, and passim.

[21] We can treat the dynamics of education and technological change as processes of social construction without necessarily adopting the more epistemological argument that the truth of all knowledge, especially scientific knowledge, is determined by a process of social construction. Social construction provides a genetic explanation, telling us how something comes to be. How knowledge comes into being is not the same matter as how knowledge comes to be true, or false for that matter. Truths, conventions, beliefs, and falsehoods all come to exist in culture through processes of social construction. Other criteria, however, differentiate them as truths, conventions, beliefs, and falsehoods. Stephen Toulmin's *Human Understanding* (Volume 1, Oxford: Clarendon Press, 1972) provided a very thoughtful epistemology, oriented to scientific practice and based on ideas of social construction (although not the terminology of it). Scientists who object to the relativity (in the epistemological, not the physical sense) need to be careful to preserve in their scientific realism grounds for preserving the possibility that current physical truths can be held falsifiable.

¶21:142 Bringing ideas about implicit possibilities fully to consciousness helps combat an important drag on social action – cultural lag. A common response to changing conditions, whether in education or other domains, is the passive reaction that arises with the failure to perceive the full scope of the new possibilities inherent in significant technical innovations. The classic instance of this reaction was the way in which early printers crafted books that looked exactly like illuminated manuscripts. Passive reactions attach a timeless necessity to arrangements that are actually historically contingent. Passive reactions by educators amount to an inert effort to employ new information technologies to make the existing educational system work better, without significant changes in the structures and functions of the system. Educators thus act as if the given system is timeless and permanent. This course is fraught with ironies. Applying new technologies to current procedures, expecting given arrangements to work better but to remain essentially unchanged, neither introduces transformative improvements intentionally nor ensures continuity and permanence. Instead, by inadvertence, conditions for radical departures are put in place and innovators at the margin of institutional practice begin to have palpable success. Over time, the pressure of their success forces fundamental change from within, without providing a vision of where that change should lead. The human costs can be great.[22] If too susceptible to cultural lag, educators risk being caught

[22] One can depict, over-simplifying to show the general development rather than a myriad of details, the history of the Protestant Reformation and Catholic Counter-Reformation as an example of such cultural lag and its historical human costs. Early on, Catholic leaders used the printing press to lower the production costs for lucrative indulgences. They also put much traditional pietistic literature into print, but it did not change anything. Clerics at the fringe, disposed to long-standing marginal heresies about the relationship between the Bible and Christian teaching saw more potent uses in the presses. What once were fringe heresies became prevailing movements as they used the printing press with great effect in ways consistent with their doctrine. In a few generations, Western Christendom was mobilized in tremendous internal struggles that turned in large part over how cultural-religious work with the then new technologies were to be managed. Elizabeth Eisenstein provides a good over-view of the interactions between printing and the religious movements of the sixteenth century in *The Printing Press as an Agent of Change* (2 vols., Cambridge: Cambridge University Press, 1979, esp. Part Two: Classical and Christian Traditions Reoriented). Miriam Usher Chrisman's detailed study of the effects of printing in Strasbourg, *Lay Culture, Learned Culture: Books and Social Change in Strasbourg, 1480-1599* (New Haven: Yale University Press, 1982) delves into the cultural lag on one side and the aggressive activism on the other: "The production of this Catholic literature, much of which involved the printing of standard works from the Christian corpus, did not reflect a conscious use of the presses by the Roman hierarchy to educate the secular clergy or to reawaken the religious interests of the laity. It was this element that would make a marked difference between Catholic publication and the Protestant publication to come. The Protestant reformers, from the very beginning, recognized the usefulness of the printing press to their cause, and they used it to propagandize both clergy and laity, to educate the clergy, and to instruct their congregations. . . ." (p. 81) Eamon Duffy shows how sophisticated Protestant groups were in using media to advance their cause in *The Stripping of the Altars: Traditional Religion in England, 1400-1580* (New Haven: Yale University Press, 1992). Duffy shows the pre-Reformation Catholic culture to be a vigorous and vital culture with a distinctive internal system of communication, rooted in the liturgy and an associated explication of images. Protestant success was slow and hard-won. English Protestants not only made effective use of the vernacular in print to propagate a new the basis of religious authority. Perhaps more importantly, they also attacked the Church's media of popular communication forcefully, fomenting iconoclastic movements that destroyed much of the Church's sacred imagery and greatly weakened the capacity of people to interpret it by radically simplifying the liturgy.

unawares in a cascade of unexpected transformations. We can do better in our extended present by recognizing that the task facing us is to reconstruct the whole system in ways that allow educators to use new communications resources to overcome the inherent, structural deficiencies of the current system.

¶22:142 As educators bring ideas about implicit possibilities fully to consciousness, a second distraction for social action arises, programmatic encapsulation. To grasp the opportunities inherent in changing conditions, educators need to adopt a full, sustained, and active course based on our sense of potentiality for education, but we cannot rely on precisely planning that course. Modernity puts a premium on control and predictability, which can become a compulsion to be unduly specific about the actualization of possibilities. And educational institutions, in which predictability has long since become a fetish, are the most modern of modern institutions, having largely taken their present shape as putatively rational bureaucracies in the sixteenth century. Schools as we know them are one big plan, from the lesson plan expected daily from every teacher, through the curriculum scope and sequence, to the plan that governs every potential innovation. Reconstruction of the whole educational system is a supremely complicated process, one that does not come about by promulgating a neat plan and implementing it straight away. Education, like other domains of complex activity, turns on a myriad of significant variables. A plan cannot take all of these into account. Unexpected interactions begin to drive implementation. Hence, almost invariably educational plans do not work: plans address only a few of the innumerable variables determining results; plans deploy resources that are too limited relative to the scale of intended effects; and plans are subject to rigorous evaluation of results long before the actions they prescribe could take palpable effect.[23]

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[23] It is very difficult, as chaos theory increasingly teaches, to anticipate all dimensions of truly transformational changes. Henry Adams in his essay on "The Rule of Phase Applied to History" (1909) was one of the first (skipping over Hegel for the moment) to reflect on such changes. See Henry Adams, *The Degradation of the Democratic Dogma* (New York: Capricorn Books, 1958, pp. 261-305). Adams' speculations about changes of historical phase still have some interest – the basic metaphor is useful. In particular, the change of phase metaphor helps alert us to the problem of latency in assessing educational developments. With thorough-going changes, which changes of phase by definition are, a prolonged period of latency can precede the emergence of palpable evidence of what is taking place. In everyday physics, such latency phenomena are commonplace, for instance, whenever a variety of substances undergo a change of phase, as when ice melts or water boils. As the experimenter steadily heats cold water, its temperature increases at a uniform rate, increment by increment, until the water reaches the temperature of 100º centigrade. Then, as the source of heat continues, the water remains at a fixed temperature, until it absorbs a significant quantity of further heat, whereupon it starts boiling off as steam, remaining unless pressurized at 100º. The traditional correlation between amounts of heat added and changes in water temperature break down. With digital technologies in education, we are not simply adding inputs that make incremental improvements in the performance of the existing system. We are adding inputs that are forcing a change of phase in that system – in due course. We need to be aware, however, that this process includes a sustained period of latency in which much added input can have at the systemic level no discernable effect. All historical development, whether large or small, probably involves something like a change of phase in which evident interrelations between cause and effect may be punctuated by significant latency and transformative metamorphosis.

¶23:142 As a human experience, education is both an intensely personal process that unfolds over twenty years or more of an individual's life and a ubiquitous social operation that involves billions of persons the world around. It is too complicated for educators to plan a reconstructed system conceptually or implement it predictably. We can, however, shape an emerging system over time, effectively constituting key features of it through a process of social construction, if we develop a concerted sense of shared directions.

¶24:142 Coherent historical change wells up from many different acts that move parallel in time, spontaneously coordinating around an understanding of possibilities, at once emergent yet shared. Educators can best define the pedagogical opportunities arising with changing conditions by concerting independent actions, by developing shared understandings and purposes, by crafting a new common sense of where we stand and what we can do. This essay is an attempt to articulate from the field what such an emergent common sense might be. It is an act of reflection on practice, an "interpretation from within," as the great Spanish philosopher, José Ortega y Gasset, would put it.[24] It states an understanding of the educational situation. It does not adduce arguments that this understanding is either the one true understanding or the only good and upstanding way to see things. It is a probe; it puts forth a proposition for test – here is the basic understanding of the current juncture, an understanding that many educators share in a form that ranges from the tacit to the explicit, from the embryonic to the mature. This probe may prove apposite to the degree that educators, on reflection, hold a similar, shared understanding of the educational situation.[25] And then the probe can take on some power if it helps educators act with greater awareness of the common potentialities inherent in our situation as we adopt diverse programs and actions.[26]

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[24] "Pidiendo un Goethe desde dentro" (1932), José Ortega y Gasset, *Obras completas*, IV, Madrid: Revista de Occidente, 1957. pp. 395-420.

[25] It is important that educators test this probe fully in the Socratic spirit. A survey of opinions is too static and does not disclose well the recognition and conversion processes taking place. The degrees to which individuals are engaged with a development at any particular time varies and differences of engagement matter in the formation of their views. Surveys do not control for these differences. Querying educators and finding the proportion that would nominally agree or disagree with a proposition at a particular time tells little about the proportion that will cumulatively come to agree as, one by one, they come to engage with it across the span of an extended present. Hence the Socratic test – whether or not each person, on serious and sincere reflection, considers the probe to be sound – is a better predictor. Of course, the aggregate results of the Socratic test are most likely to be evident, *ex post facto*, in the substance of people's actions. Hence, even in an era of numerous programs of survey research, retrospective historical accounts have much to add.

[26] Theorists have long struggled to make sense of the process by which complex historical developments emerge in history. Some traditional formulations about the dynamics of public choice have more current value than they are commonly recognized to have. For instance, Rousseau's observations in the *Social Contract* about how people should deliberate in order to disclose the General Will are highly relevant in considering this process, particularly if one discounts the locus in a cantonal assembly that he used to situate his discussion. In the quiet of their own counsel, people do formulate, alas often with far-too-imperfect information, convictions about the General Will, with significant historical effect. See Rousseau, *The Social Contract*, II:3. Likewise, Reformation doctrines of Grace and Election, understood as a theological construct for describing observable historical, public

¶25:142 What educational options do the new technologies significantly empower, and how do they do that, and why do they have those empowering effects? What sorts of pedagogical options do educators sense the innovations in digital technology are empowering? Life poses such questions to us. Educators respond with a widespread, shared understanding that new technologies empower a significant transformation of the educational system, enabling it to become constructivist, progressive, inquiry-based, learner-centered, egalitarian, inclusive, and much more effective. Engagement with the new technologies engenders among educators a basic understanding that the fundamental problem to be addressed through education, the range of resources useful in addressing it, and the characteristic results of addressing it well are all open to historic transformation.

¶26:142 Social construction is a meaningful form of practical action, particularly with respect to complex historical developments such as the uses of new media in education. Social construction takes place in various domains as diverse individuals orient their activities with reference to shared ideas about what is feasible and desirable. Action in the midst of real circumstances always consists in small, concrete repetitions or innovations, not grand departures. How then does a significant historical change occur? It occurs when a myriad of small innovations in the midst of real circumstances gain a cumulative impact because each orients towards a common transformative possibility. Individual actions then aggregate into a grand departure, a social construction of a new reality. A willingness to engage in social construction brings educators to a third topic, that concerning the stakes of educational leadership.

¶27:142 Educators must develop a shared vision. Without an orienting vision that points to a significant departure, social construction reproduces given arrangements in successive generations. Without vision, social action consists in small historical repetitions. Their aggregate the amounts merely to an extension of the status quo. To force change through social construction, people often concentrate on a binary opposition between given actualities and new possibilities. This opposition frees people from the weight of historical inertia. As diverse people in diverse circumstances choose to act in pursuit of a clear-cut departure from the norm, they reinforce each other and enable themselves to develop more and better, concrete innovations in specific situations. Revolutions are clearest as they take place simplistically on the level of guiding principles. Continuity asserts itself as people engage the obdurate details of life.[27] The social construction of historical change comes about as many people in many situations develop similar understandings of the potentialities inherent in an historical situation. Development of the telephone system exemplified this process. Efforts to

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developments, merit some reflective attention in thinking about the dynamics of social construction. In ways that are virtually impossible to anticipate or fully explain, various individuals find themselves at the intersection of complex developments exerting influence derived from the situation and projected on them by others, influence that greatly exceeds their own intrinsic powers. Ortega saw this as a dynamic of exemplarity and aptness, Weber as one of Charisma.

[27] *The Structure of Scientific Revolutions* by Thomas S. Kuhn (2nd edition, Chicago: The University of Chicago Press, 1970) provides an excellent study of these dynamics in the area of scientific practice, as did Alexis de Tocqueville for political practice in *The Old Régime and the French Revolution*.

reduce the harm to health from smoking or poor diet do too. Even the simple but excruciatingly complicated process of replacing Anglo-American weights and measures with the metric system provide an example, one that may prove to be an historic failure, so complicated is the change. In social construction, people act on a shared understanding, enabling them to work, independently yet in concert, towards distant and demanding purposes. In this way, powerful goal-directed actions emerge in history.[28] This is the practical value of thought for action – clarity of vision allows people to adapt coherent, distributed innovations spontaneously to the complexity of divergent circumstances.

¶28:142 We need to form an orienting vision and through it to engage the issue of educational leadership. With the educational uses of new technologies, whose vision is gaining historic significance? Can educators shape the emerging system? Or does historic power lie elsewhere? Educators are developing a vision of new pedagogical possibilities as we work to integrate digital technologies into the educational process. This vision becomes evident in a rather sharp, binary opposition between traditional education and the new system under social construction. Can educators as a social group make it into the orienting vision effective in the social construction of a new pedagogical system? That is the core question. If educators lack sufficient social power to exercise historically significant leadership, there is little point to an agenda of practical action. The educators' agenda may be there. As diverse educators act in diverse ways on the basis of a shared sense of new potential, we begin to change the character of our general practice. Thus as a distinctive group, we have an historical mission at the current juncture, but do we have sufficient public power to pursue it with historical effect and cultural meaning? If not, despite our best efforts, we are recapitulating the status quo or serving as agents implementing a social vision of possibilities derived from the experience of other, more powerful groups.

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[28] If one relies only on causal explanations, with effect always following a cause that precedes it in time, it is hard to make sense of such potentialities, and more generally of the social construction of complex developments. When one plants a seed, or feels impressed by a child's future possibilities, or responds with excitement to an unexpected professional opportunity, one is dealing with "potentialities inherent in the present situation." One creates an extended present intellectually, which consist is numerous reciprocal interactions between states that co-exist across time and space. One feels impressed by the child's potentiality, not because the child's immediate capacities are so powerful that they directly cause a sense of respect and deference to a master, there, before one, in full force. Rather, one feels impressed by anticipating a trajectory of development, seeing signs of future capacities in present hints, feeling impressed in the immediate instant by that anticipated potential. In dealing with the fullness of life, we do not only think about things linked in a linear succession in time, with A causing B and B causing C and so on. We also think about things as they coexist through an extension of time and space with lots of different things all reciprocally interacting, sensing that later states are implicit in former ones, should all the ensuing interactions play out in certain ways. Immanuel Kant used this distinction to distinguish fundamental analogies drawn from experience – the principle of succession of time, according to the law of causality, and the principle of coexistence, according to the law of reciprocity (*Critique of Pure Reason*, b232-b264). This distinction is important throughout this essay. twentieth-century pedagogy has been obsessed with developing causally effective methods of teaching and has paid too little attention to reciprocal interactions between states co-existing across time and space to do full justice to the potentialities of educational work.

The Stakes of Educational Leadership

¶29:142 New information technologies open the system of education to a new spectrum of possibilities as surely as new building technologies did to architecture a hundred-fifty years ago. But building techniques did not by themselves design new skylines. Likewise information and communications technologies do not ipso facto implement a better program of educational activity for all. People, acting in the face of uncertainty, must determine what they can make of these emerging possibilities. Many groups and interests, pursuing many divergent inspirations, are vying for command, and a kaleidoscope of coalitions establish, through a diversity of initiatives, emerging norms of practice. Do we who work in intellectual institutions and knowledge communities – the world's schools, colleges, universities, research labs, libraries, museums, and professional offices – share social power sufficient to make ourvision of the potential educational uses of new technologies historically significant? It is one thing to have a sustained agenda with which to shape newly emerging educational practices, and quite another to have the possibility of shaping emergent practice in competition with other social groups.

¶30:142 Sociologists of knowledge attend closely to the ways in which shared patterns of experience lived by the members of various social groups lead them to develop a common outlook and set of ideas.[29] Each person, of course, dwells in actual life in many different social groupings. A focal grouping, in which all persons reside for significant periods and in which many dwell as the predominant situation of their lives, is the group of people living and working "as educators." Indeed, in these reflections our core point concerns educators – as we experience the new technologies, we perceive them to be empowering a significant departure from our current educational practices, making it feasible to displace the reigning status quo with a student-centered, inquiry-based, progressive pursuit of knowledge and understanding. And as more and more educators have this perception, the progressive movement writ large comes back to life.

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[29] Peter L. Berger and Thomas Luckmann with their influential book on *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* Garden City, NY: Doubleday & Company, 1966). In a stunning way, it adapted broad currents of European thought to the social expectations of American academia, limiting the issues and defining disciplinary boundaries within which students could concentrate without much concern for peripheral issues, theoretical or empirical. As a result, thinking about the social construction of knowledge narrowed into a sub-specialty in sociology; it percolated in diverse minds as Berger and Luckmann's highly readable book continued far more broadly to be assigned in countless introductory courses to sociology; and then it burst forth a quarter century later as a broader, apparently novel strategy of inquiry and explanation, applicable to diverse components of contemporary culture. A lot of the work on the social construction of science, technology, and innumerable facets of our civilization seems ungrounded in serious methodological traditions, and hence too easily propounded and too easily dismissed. A whole tradition comes with interest in the social construction of thought and action, which we can most economically identify as all the variations on Immanuel Kant's basic enterprise of critical philosophizing, his strategy of observing that interesting forms of thought and action exist and asking how it is that the existence of these forms of thought and action comes to be possible in human experience.

¶31:142 Potentially the class of persons acting primarily "as educators" is large and powerful. Let us entertain, for the sake of argument, if not (yet) as a matter of conviction, that this grouping is a *class* in something like the basic Marxian sense. "Educators" includes all people whose primary work engages us in the creation, dissemination, and application of knowledge, values, and skills in the conduct of life. Students, teachers, parents, researchers, artists, writers, scientists, clergy, most professionals, publishers, not a few journalists, and on, all live and work substantially as educators. Throughout historical time, educators have spontaneously generated a very attractive set of principles. We affirm human potentiality; we act with ideas and rely for effect on reasoning together with others, helping people carry out the entailments of their intentions, both talking the talk and walking the walk. Educators use doubt and skepticism to unleash effort and to sharpen skill. We nurture aspirations, elicit understanding, and form values. Through the work of educators, the stock of knowledge expands and its use in the conduct of life progressively improves. Educators naturally uphold the progressive principle and we work to bind the current generation to its progeny. With such a natural ideology, educators have long been a large latent class, one that is potentially gaining great power in our extended present by working with the digital information technologies. These technologies are transformative tools for people engaged in the creation, dissemination, and application of knowledge, values, and skills in the conduct of life. In the digital culture of the knowledge society, educators may control the essential means of creation and communication, the key material forces in history that are shaping life in the knowledge society.[30]

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[30] Those stuck in the mind-body problem, upholding a disembodied theory of mind, have trouble treating the state and movement of knowledge as a significant material condition of history. The rest of us see it as a palpable force, the driving force of history in the twenty-first century. As scholars develop an ability to deal with the effects of knowledge in historical life through the past five hundred years, educators can better comprehend their historical potential as a class. Such work of scholarship is dispersed across several literatures, however, each of which is diverse and demanding.

- Historians of science pay increasing attention to the conditions associated with the creation of new scientific practices and principles, with growing appreciation for the role of instrumentation, communication, and intellectual technique. In this area, the work of Peter Galison, for instance, *Image and Logic: A Material Culture of Microphysics* (Chicago: The University of Chicago Press, 1997) is exemplary. Such studies explain more effectively how people create scientific knowledge and bring it to bear in the flux of human activity.

- Historians of technology have contributed a growing number of studies concentrating on the implementation and historical consequences of large-scale technical innovations for a spectrum of concerns ranging from the structural-functional conditions of the world system to the design of simple artifacts and their effects on the textures of everyday life. Lewis Mumford's *Technics and Civilization* (New York: Harcourt, Brace & World, 1934, 1962) and Siegfried Gidion's *Mechanization Takes Command: A Contribution to Anonymous History* (New York: Oxford University Press, 1948) pioneered these inquiries, which have now concentrated multiple works on examining the human effects of time keeping, statistics and probability, weights and measures, electrification, mass production, communication and control principles, the pencil and the zipper, the automobile, the built environment, broadcasting, map making, visualization techniques, materials sciences, flight, medical technologies and knowledge, and so on.

¶32:142 Currently educators, in the most inclusive sense of this group, share an inchoate self-awareness.[31] Educators comprise an outsized, diffuse group. In this condition, we have rather consistently failed to concert our potential social power. During the past century, influential ways of thinking about education discouraged many people from forming a general awareness of themselves "as educators." Conditions of work in higher education differed significantly from those in elementary and secondary education, making commonalities of perception difficult to achieve. In addition, the general dissemination of knowledge was largely the activity of commercial publishers, whose primary interests were driven by calculations of profit and loss, not pedagogy. Early in the twentieth century, educators tried and failed to assert a progressive vision of education and public life. The progressive movement had its primary social sources among educators, as we perceive ourselves. Under early

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- Policy analysts are concentrating effectively on national innovation systems and their fruits for human life. The papers drawn together by Richard R. Nelson in *National Innovation Systems: A Comparative Analysis* (New York: Oxford University Press, 1993) indicates the global scope of efforts to apply knowledge; and those edited by Lewis M. Branscomb and James H. Keller in *Investing in Innovation: Creating a Research and Innovation Policy that Works* (Cambridge: The MIT Press, 1998) provide an excellent introduction to efforts to strengthen the uses of knowledge in American life.

- Historians of education, particularly higher education, are paying less attention to how educational institutions mirror and reinforce social structures and are emphasizing the broad historical consequences that accompany the substantive failures and achievements of educational practice. Two recent works on the history of American higher education reflect this increased attention to the effects of academic policy on the condition of knowledge – *To Advance Knowledge: The Growth of American Research Universities, 1900-1940* by Roger L. Geiger (New York: Oxford University Press, 1986) and *The Rise of American Research Universities: Elites and Challengers in the Postwar Era* by Hugh Davis Graham and Nancy Diamond (Baltimore: The Johns Hopkins University Press, 1997). Ellen C. Lagemann in *The Politics of Knowledge: The Carnegie Corporation, Philanthropy, and Public Policy* (Middletown, N : Wesleyan University Press, 1989) concentrates on how the uses of knowledge interacted with a major foundation.

- Economic historians increasingly take the condition of knowledge and the rate of its advance as a useful explanatory variable to analyze in studies of economic productivity. See for instance *The Lever of Riches: Technological Creativity and Economic Progress* by Joel Mokyr (New York: Oxford University Press, 1990) and *Favorites of Fortune: Technology, Growth, and Economic Development since the Industrial Revolution* edited by Patrice Higonnet, David S. Landes, and Henry Rosovsky (Cambridge: Harvard University Press, 1991).

- Critics of culture and education increasingly concentrate on the historical consequences, for better and for worse, deriving from different curricular developments, particularly in the humanities and social sciences. The fact that the curricular debates have generated considerable resonance outside academia, and have sustained themselves, engaging a wide spectrum of participants, suggests that many people are perceiving curricular issues to be of significant import. The most significant results of the debates take up matters at issue within them to deepen the terms of discussion, something done well for multiculturalism by Charles Taylor, et al. In *Multiculturalism and "The Politics of Recognition"* (Princeton: Princeton University Press, 1992); for academic freedom in Louis Menand, ed. With *The Future of Academic Freedom* (Chicago: The University of Chicago Press, 1996), and for affirmative action by William G. Bowen and Derek Bok in *The Shape of the River : Long-Term Consequences of Considering Race in College and University Admissions* (Princeton: Princeton University Press, 1998).

twentieth-century conditions, this group quickly proved unable to exercise effective leadership in American life as a whole. Soon too, progressive educators further lost the ability to shape pedagogical practice. Educational arrangements based on ideas about industrial production, the social sources of which lay outside the community of educators, came to dominate pedagogical practice.[32]

¶33:142 Let us consider, albeit most schematically, these alternative practices based on thinking about the dynamics of industrial production. Such ideas were mixed with the progressive vision from the start of the American common school movement, for educators then had little intrinsic power and had to appeal to leaders of the commercial classes for the wherewithal to build a public educational system.[33] That system (and others like it round the globe) uses the production principles of industry

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[31]Through the sum of diverse inquiries, educators can understand more clearly the historical effects of their work. Educators, people creating, disseminating, and applying knowledge, values, and skills in the conduct of life, become aware of themselves as a powerful class increasingly responsible in manifold ways for determining the quality of collective life around the globe.

Marx and his followers have been overly deterministic in that they reified their characteristic conception of *class* into substantive, active entities, into self-subsistent sets, with respect to which each person was existentially either a member or a not-member. We need to read Marx with a heavy admixture of Weber. Classes arise as individuals orient their actions according to the interests they form in the process of engaging in basic types of creative work. Accordingly, individuals can think and act as members of several classes, which are conceptual groupings that can map onto existential experience with significant overlaps. It is not so surprising that Marx reified class membership into an existential either-or. The material conditions of life in his time led naturally to it. Then, the status of many persons much more massively typed their experience, the conditions of life being far more homogeneous than now. A person lived life more exclusively as peasant, as laborer, as bourgeois, whereas now the farmer trades in grain futures, pork bellies, and stocks while the bourgeois even does a variety of menial household chores to a degree quite unthinkable in a well-to-do household early in the nineteenth century. Real conditions of life have thus become much more heterogeneous at the level of lived experience than they were in Marx's time. Hence, during the course of the day, individuals act as educator, as investor, as artisan, as consumer, and so on. In this condition, issues of willed social hegemony become far more significant in determining the overall direction of historical change than the supposed objective conditions of conflict between homogeneous classes were for Marx. The formulation – "the class of persons acting as educators" – reflects this mixture of basic Marxian and Weberian concepts. Class should be taken as a conceptual grouping linking all persons insofar as they are acting "as educators," that is, subjectively aware that they are orienting their actions towards other people by engaging in the creation, dissemination, and application of knowledge, ideas, and culture in the conduct of life. To a significant degree – within the range of choice enabled by the available materialities of action – people can choose to pattern their collective existence according to their interests as educators, as consumers, as spectators, and so on. The argument here is thus not one of historical necessity, but one of historical choice – people can deal with their present-day opportunities as educators and by doing so, they can create a more fulfilling future. Our lives become most meaningful, and human fulfillment becomes the greatest, if our interests as educators predominate.

[32] Lawrence A. Cremin's *The Transformation of the School: Progressivism in American Education, 1876-1957* (New York: Alfred A. Knopf, 1961) remains far and away the best book on the subject, although it may put progressive education somewhat too much in the historical spotlight and blur distinct, chronologically contemporaneous developments into it. There is a voluminous literature on twentieth-century school reform. A good guide to it through the mid 1980s is the bibliographical essay by Cremin in *American Education: The Metropolitan Experience, 1876-1980* (New York: Harper & Row, Publishers, 1988). For more recent perspectives see David Tyack and Larry Cuban, *Tinkering Toward Utopia: A Century of Public School Reform* (Cambridge: Harvard University Press, 1995).

to implement mass schooling. It treats educational processes as processes of production – X inputs processed by Y causal actions result in Z outputs. With this way of thinking about education, educators were unable to concert their views and interests over the past century. People came to understand education as a means set in motion to achieve extrinsic purposes as efficiently as possible – Americanism, the ability to follow instructions, punctuality and dependable attendance. Representatives of the public greatly elaborated the rational bureaucracies of formal education, defining numerous different specialties, each with separate qualifications, discouraging thereby the concerting of educational ideas and a pedagogical vision.[34] According to these production principles, the dominant groups in society owned the systems of pedagogical production; teachers were the workers, directed by

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[33] Much of the revisionist critique of the progressive movement does not take the real limits of historical conditions on action sufficiently into account. As a result, revisionists end by blaming the victim. Radicals and reformers – reactionaries, too, for that matter – frequently encounter the dilemma that arises when they realize they lack the power to achieve fully their driving purposes. They can be pure and settle for minimal results, or the can seek strategies that augment their historic power by compromising their purpose through combinations with other groups. Under such circumstances, those content with their ineffectuality, can scorn compromise and hold without effect to the purity of their principles.

Tyack and Cuban, in *Tinkering Toward Utopia* (*op. cit*., *passim)*, do a good job in showing how internal school conditions have limited the feasibility of reforms. Attention to the reality of limiting conditions can in its turn go too far, however. Translated into the present-day context, when educators have available to them real forces making radical alternatives feasible, Tyack and Cuban's realism can be read too easily as a rationale for inaction. Such quiescence surfaces in Larry Cuban's commentaries on digital technologies in the schools, for instance, "The Technology Puzzle: Why Is Greater Access Not Translating Into Better Classroom Use?" (*Education Week*, August 4, 1999, pp. 68 & 47). It is myopic to concentrate on immediate impediments to the effective use of computers without weighing into the balance long-term pressures for school transformation with them. Educators need to mobilize substantial historical forces sufficient to put their best ideas into effective practice.

[34] This process came to its peak with the reforms of the 1950s, represented at their best by James B. Conant's ideas about the comprehensive school. Conant recommended the elimination of small schools, most effectively in his influential book, *The American High School Today: A First Report to Interested Citizens* (New York: McGraw-Hill Book Company, 1959). This report explained well the rationale for the consolidation of schools and school districts. It, and the trends it represented, were driven in part by economizing measures and in larger part the desire to make schools more effective in serving multiple social function simultaneously – to provide a safety net of minimal skills to the least advantaged and least able, to prepare the broad middle-range of students for successful participation in the labor force, and to identify the highly talented and to provide them with a strong educational foundation for intellectual leadership in a society that would be increasingly meritocratic. For schools to perform these multiple functions well, they needed to employ a wide range of professional specialists, which was economic only if the scale of the school was large.

Such reforms were all too successful. The diversity of specialists has become a structural feature of schools throughout the system and professional schools of education have adapted their programs to this principle of specialization in the profession. Graduate schools of education are conglomerations of separate programs training this specialist and that, with nearly no overlap, no common professional ground between the many different programs. One consequence: schools of education are having great difficulty integrating new technologies, which are synthesizing, binding, uniting technologies, into the preparation of educators. The dance educators need something unique, as do the art educators, as do the music educators, as do the social studies educators, as do the language arts educators, as do the

administrators and other specialists; pupils and students, or more generically "learners," were their output.

¶34:142 By thinking of education as a factory-like process of production, educators suppressed pedagogical self-awareness, particularly among students.[35] Pupils and students are the most numerous, important component of the class of persons acting as educators. Students are continually deciding how to allocate their attention and to deploy their effort. These decisions shape the actualities of education, determining who masters what, when, how, and why. Pupils and students are in fact the prime causal agents in education. Despite the fact that they live and work substantially as educators, perhaps pre-eminently as educators, the production model of education encouraged students to think of themselves not-as-educators, for according to it they were not agents of the pedagogical production process, but its mere output. The production model also habituated everyone to expect educators, taken in the narrow sense of teachers and administrators, to serve as means, as causal agents, implementing the educational production goals that other groups should set. Framed in this way, education became a minor profession consisting of well-defined functionaries whose controlling norms and standards were set, not from within, but by groups external to the profession's practice.[36]

¶35:142 Such ideas about education have set the dominant standards for pedagogical toil around the world. Owing to the dominance of principles of production in education during the twentieth century, the ability to set the agenda of educational action possessed by people who work as educators, in the full, inclusive sense, has been weak. Policy and practice in higher education has had little in common with that in elementary and secondary schooling. Powerful informal educators rarely recognize

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TESOL educators, as do the guidance counselors, as do the school administrators, and so on. In the midst of this fragmentation, it is very difficult to draw the attention of all to the ways in which the new technologies potentially permit, even encourage, educators to reconstruct the entire system. It would be instructive to compare the degree to which students in law schools, medical schools, business schools, and schools of education have, within their respective systems of professional education, a set of courses and topics that all students in the field presumably master despite differences of specialization within it.

[35] I initially explored this miscasting of the student in the educational process more fully in "Toward a Place for Study in a World of Instruction." *Teachers College Record*. Vol. 73, No. 2, December 1971, pp. 161-205. http://daemon.ilt.columbia.edu/ilt/papers/studyplace/title.html

[36] For the concept of minor professions as ones that do not set their own controlling norms and standards, as distinct from the major professions, preeminently law and medicine, that do, see Nathan Glazer, "The Schools of the Minor Professions," *Minerva*, xii (1974), pp. 346-364, and Amitai Etzioni, ed., *The Semi-Professions and Their Organization: Teachers, Nurses, Social Workers* (New York: The Free Press, 1969). The hegemony of production in education accounts in part for the low status of schools of education in universities during the twentieth century. Other academics perceived faculties of education as providers of training for professional roles controlled by external groups. An indicator of who is winning hegemony in the knowledge societies of the twenty-first century would be an increase in the prestige, or lack of such, of schools of education within their encompassing universities. Currently, the situation is very ambiguous: on the one hand, universities are trying to enhance the place of schools of education within them, and on the other the leaders of those schools seem stuck in a cultural lag, trying to preserve their hermetic isolation within academe.

themselves as such. Vast numbers of parents think of education as a somewhat threatening legal requirement whereby the society legitimates passing to their children their own secondary status as members of the poorly schooled and poorly skilled classes. In the face of such conditions, the idea that educators constitute an autonomous profession, let alone a dominant class, seems contrary to evident realities.

¶36:142 History consists in significant part, however, in the rise of new classes. Although weak in the past, during the fast-moving, yet long-enduring, present, the class of persons acting as educators may be able to make itself dominant, to the great benefit of humanity. That is the gist of the reflections that follow; those are the stakes of educational leadership.

¶37:142 To start these reflections, inquire who might compete with educators for leadership in the historic future. Continued hegemony by the principles of production in education is possible. Or, some other vision of education, similarly rooted in social origins external to education itself, may in its turn become hegemonic. In the dynamics of social construction, the key orienting ideas in a domain such as education can often derive from the ideas of social groups not directly engaged in the domain. Such displacement happens when one or another group successfully attains hegemony in a culture. The twentieth-century dominance of production principles in education was largely a function of the power attained by ideas reflecting the rationalized organization of production during the industrial revolution. The hegemony of the production model reflected the primacy of the economic sector in generating the ideas controlling secondary activities such as education. Pedagogically, the hegemony of production principles has little lasting power, for it was an historical accident originating from the economic realities of the industrial revolution. Those believing in the inevitable primacy of the economic sphere in shaping the activities of life (and there are many on both the right and the left) are taking up the economic theme now supplanting the rationalization of production – ah! the sovereign consumer. Some wealthy corporations stand to profit if a consumption model of education can take over from the production model. Are principles of managed consumption becoming the new hegemony?

¶38:142 Highly industrialized societies have effectively developed their techniques for rationalizing production. With production under control, the primary economic challenge becomes managing the dynamics of consumption. Whatever the goods society and its members need, these they can produce, provided they can manage and maintain the requisite consumption demands. This was the message Keynes and the Great Depression delivered together. Many therefore expect the forces of market-driven consumption to become hegemonic in our culture in their turn.[37] Awed by this putative hegemony of consumption in the economic sphere, people adopt a depressing corollary: as surely as a production model of education drove out the progressive ideas of educators in the twentieth century, so a consumption model of education may drive out the progressive vision in the twenty-first.

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[37] TO BE FILLED IN.

¶39:142 Let us subject this expectation to critical scrutiny. Consumerist education treats it as a consumption good, shrewdly shaping demand and delivery to suit prevailing tastes through timely market research. Expectations that consumerist education can displace the progressive vision in our extended present may underestimate the power of educators, as educators, to shape the culture. In historical time, from within the living present, who has sufficient power to do what is inherently moot. Only time can tell. Past hegemonies do not lead necessarily to future ones. The long secularization characterizing modern history has consisted in a massive shift of power from people grounded in religious organizations to those rooted in the economic. Now, old captains of industry cannot necessarily choose their heirs and pass hegemony to the young procurers of consumption. To gain that hegemony, the procurers of consumption must win it by virtue of superior powers of action and control, which are not yet prepossessing. Educators might argue that the global society under construction in our extended present is not proving to be a global consumer society in which the manipulation and satisfaction of wants is the main venture of mankind. We might contend instead that the global society under construction is proving to be a knowledge society in which the foremost endeavors of humanity are developing the human potential to understand life in the world and to nurture its capacities to create meanings, to form ideas, and to achieve values within a sustained, sustainable measure.

¶40:142 Consumerist principles in education hold that education is a service, like any other service. Individuals should contract for it in whatever form and measure they see fit. The best educators are those who can effectively package and market educational services to the largest possible clientele, simultaneously building the market for educational services and expanding their share of that market. Those who taut education as a consumption good celebrate distance learning. They observe that changes in the mechanisms of delivering educational services enable new organizations to wrest control from traditional providers of education by using a new pedagogy. In order for the procurers of consumption to win their hegemony, they must wrest their control from educators, who, however imperfectly, have a base of social power in established educational institutions. Traditionally the delivery mechanisms of schools, colleges, and universities have required attendance by students and teachers at places of education – at a school or campus. The new technologies may significantly diminish the importance of such places to the delivery of educational services and it may follow then that established expertise in the provision of educational service may shift as well. Starkly put: cultural packagers, who can deliver in homes and the workplace standardized instruction inexpensively and conveniently via digital telecommunications, may drive traditional educational arrangements out of business.[38]

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[38] No one has yet advanced a fully developed theory of how consumerist strategies can decisively advantage new participants in education. There is, however, a good deal of attention to the possibility, driven partly by efforts to attract capital to new ventures, especially commercial ventures in distance learning, for instance, *For-Profit Higher Education: Developing a World-Class Workforce* by John Sperling & Robert W. Tucker (New Brunswick, NJ: Transaction Publishers, 1997), and driven partly by the warnings of social critics concerned to defend the purview of civic choice from the marketeers'

¶41:142 There are several planes of uncertainty to this prospect, however. For one, the degree is unclear to which "school's out," as the phrase puts it (in at least one of its meanings, at any rate[39]). Participation in activities located in a pedagogical place may continue to have great educational value, an in-place value enhanced by the links and interactions from the place to a greatly wider sphere of meaningful communication.[40] It is interesting that the largest *campus* built in the 1990's houses the design, development, and management staff of the Microsoft Corporation, no slouch at using networked systems. The possibility of getting rid of central offices has been an hypothesized spin-off from the rapid development of networked information systems. Hypothesized, but little realized: so far central offices have remained highly evident in corporate practice. Certainly, the goal of spinning action out to the periphery has

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celebrations of consumer choice, for instance, *Digital Capitalism: Networking the Global Market System* (Cambridge: The MIT Press, 1999).

Schiller (pp. 170-200) sees three forms of digital capitalism becoming significant in higher education – corporate in –house programs, for profit suppliers of educational resources, and proprietary schools both partnering and competing with educational institutions. The first of these, we might suggest, was simply the advanced wave of the third group, the proprietary schools, which, as 90's corporations became leaner are flourishing as an outsourcing of the prior in-house, corporate programs sets hold. Leaving the in-house programs aside, we might still identify three incipient business models for consumerist education. The most clearly defined consists of start-up ventures, such as the Apollo Group with its University of Phoenix, which seek to provide convenient, no-frills post-baccalaureate training to adults. The second, which overlaps a bit with the first, comprises established publishing companies, which may parlay intellectual property on their backlists or in their morgues, along with their ability to recruit and commission providers of content, into some sort of killer app that will be so effective relative to established means that it suddenly takes over provision of one or another area of education. The third is the looming shadow of the huge media conglomerates – Disney, Dreamworks, the News Corp, *et al*. Here there are a few trial balloons such as Time-Warner's Union City Project have had some prominence, but these companies seem to have no real plan that goes beyond their serving as a carrier and occasional provider of content to their becoming the full-fledged provider of education at any established level.

Influential media are paying much attention to the business of for-profit groups in education, especially the University of Phoenix and its corporate parent, the Apollo Group, in higher education and the Edison Schools in K-12. As James Traub summarizes the basic method in "Drive-Thru U.: Higher education for people who mean business (*The New Yorker*, October 20 & 27, 1997, p. 123) "once you conceive of education as a product and regress from the needs of the consumer [regressing entails surveying professed needs and working back to the cheapest, simplest way to satisfy them], a whole world of possibilities presents itself [in both higher education and K-12 schooling]." Arthur Levine, president of Teachers College, Columbia University, in "How the Academic Profession is Changing" (*Dædalus*, Fall 1997), discusses diverse forces that are causing thorough-going transformation of the academic profession. Levine suggests, according to Traub (p. 122), in a few generations there will be a new landscape of higher education as a result of for-profit pedagogues – "we'll still have some number of residential colleges and some number of research universities, but most of the rest will disappear." How far assiduous attention to the professed wants of students will carry educational innovators is a moot question, however. The Apollo Group is exploiting a clear niche within the market for higher education – as they put it on their website, "The University of Phoenix became the first accredited for-profit university in the United States with the sole mission of identifying and meeting the educational needs of working adult students." How big this niche is remains to be seen. A significant component of their actual competitors are the "universities" and training programs in major corporations. Currently *The Value Line Investment Survey* covers seven publicly traded companies serving it, with combined revenues for fiscal 1999 estimated at $2.8 billion,

not been the prime objective shaping real investment in real digital networks. Recognition of the precise opposite has driven the impetus for substantial investment in networked information systems: such investment makes loci of activity – offices, schools, and campuses – more effective as places of shared, productive work and interaction. Surely the new technologies promote fuller communication between such centers and the rest of the world than was previously the case, but that fullness of communication does not necessarily do away with the value of the shared centers of activity. Let us not forget: in the biological world, life forms that have the most fully developed central nervous systems also have the most sophisticated networks of distributed sensory and activating nerves ramifying through the entire organism, the

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versus some $250 billion for post-secondary education as a whole. Rapid growth so far has taken place in largely unoccupied niches and provision of service in these little contested markets is likely to saturate quickly (company growth rates have already shown signs of slowing). Fairly soon, to continue growing, such companies will have to compete against a large, publicly subsidized sector, graduate and professional education offered by state universities, against which they will have great difficulty being to low-cost providers. If proprietary schools have to go upscale and compete against the higher priced private universities, their no-frills, no-research product would seem to be at a disadvantage.

[39] It is a popular book title. In addition to several books for parents on after school activity, there is *School's Out: Hyperlearning, the New Technology, and the End of Education* by Lewis J. Perelman (New York : William Morrow, 1992), anticipating the demise of the school as the place of elementary and secondary education, which has gone out of print, and *School's Out: The Impact of Gay and Lesbian Issues on America's Schools* by Dan Woog (Boston : Alyson Publications, 1995), which has not.

[40] As many tremors rattling the left belie a baseless inferiority complex, so a lot of bravado coming from the corporate sector reeks with specious over-confidence. Arthur Levine reports as typical one leader's claim that higher education was ripe for corporate takeover – "As one visitor recently explained to me, higher education is a $225 billion industry with a reputation for low productivity, poor management, high cost and low use of technology." "Higher Education in the Digital Age" *1998 Annual Report* (New York: Teachers College, Columbia University, 1999, p. 8) The correct response is the intellectual response – "Are these judgments true and on what evidence can you ground them?" Expectations that corporate business can take over the provision of higher education are largely pinned on very poor comparative methodology, assuming, among other things, that businesses can reap all the benefits of new technologies and educators none. Dan Schiller, for the opposite side, makes the same assumption, a disempowering one. Use of technology through campus and school needs to be taken into account. These uses are sophisticated, fecund; they do not all simply serve to enrich corporate capitalism. In many cases they are advancing the state of the art very substantially. The same technologies that make distance learning feasible also leaven and transform on-campus pedagogical possibilities.

More generally, it is not clear that proponents of business solutions in the educational sector have thought particularly deeply about the essential characteristics of the educational sector. Corporate solutions are generally financing solutions, which proceed by concentrating large amounts of capital in proposed large-scale initiatives to be implemented according to a rigorous financial plan. Invariably, these sound impressive at the outset, but not infrequently they collapse after initial efforts show that the total returns may be more difficult and less profitable than originally hoped. Academic solutions have their roots, not in financial capital, but in knowledge, and they proceed by linking intellectual resources and working more haltingly towards significant initiatives. This halting, bottom-up procedure accounts for their reputation for low productivity and poor management, if you will, as measured by the accepted measures of corporate finance. But these measures are neither prepossessing nor obligatory. Financial

preeminent example being humans, who combine outsized brains with very highly developed nervous systems.

¶42:142 Learning is always an inner activity that defies distance, and surely distance is diminishing as an outward impediment to learning. But whether distance learning, in itself, is a significant new pedagogy is both questionable, and actively in question. Whether or not pedagogical places retain their past role in the delivery of educational services, new groups are jockeying to take over the delivery of those services at every level. Control does not rest securely with people acting and thinking as educators, over against those acting as procurers of consumption. Prospects are moot. Yet educators are in a better position to control our actions than we were in the late nineteenth century, when the progressive movement started. For one, educators are in a strong position to shape the educational agenda, perhaps even to make our leadership hegemonic throughout the emerging digital culture, a global knowledge society. For another, we are not in a weak position vis-à-vis a consumption model of education.[41] Whether educators can lead in the social construction of a new education depends substantially on the quality of our actions. To act on our shared interests decisively, we need an unprecedented confidence in our power and potentiality. Consider here four strong reasons why educators, as educators, should not underestimate our power to shape the pedagogical process.

¶43:142 First, the consumerist vision of education prepares the ground for its own marginalization. The production model habituated people to think of students, not as educators, but as product, the passive output of the system. The consumer model is greatly broadening the scope of the group aware of its self as participating in efforts to shape education, for students cease to be mere product and become the pedagogical consumer, the key actor who calls the shots. As a larger group begins to think actively about education as consumers, they begin to rehabilitate their capacity to think about education as educators. This enlargement reverses the narrowing tendency in the production model of education. Students who formerly were mere output, now make the determining choices. Within the consumption model, the expectations of students, even though it may be a caricature of what those expectations might be in full potential, increasingly come to control the whole process. Hence, the sovereignty of consumer preferences legitimates the idea that the

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measures are not the only relevant measures determining the effectiveness of large-scale innovations. For instance, developments of immense dynamism such as the World Wide Web were not creatures of finance. And initiatives of high finance, for instance Iridium, designed is an initiative of high finance to capture the future of networking with satellite systems such as Iridium, now bask in bankruptcy. Are corporate solutions so surely the higher productivity, better managed, low cost, and higher use of technology solutions compared to the knowledge-driven, incremental programs of universities? Educators do not need to tremble at the shadows of corporate giants.

[41] Educators need to be careful not to splinter their power by adopting narrow definitions of their power bases. In *Education and the Rise of the Global Economy* (Mahwah, NJ: Lawrence Erlbaum Association, 1998), Joel Spring is beginning to broaden the base for his critique of corporate interests in education by calling for an education in and through human rights issues, but he still defines a "we" that is much too small and a "they" far to large to have much hope of effecting real change. Educators need to be at once inclusive in their reach and authentic in their commitment.

goals of education derive from within the domain of education itself. Should students feel themselves truly challenged and decide to think about education, not as consumers, but as educators, there is little in the structure of the consumerist vision to prevent them from doing so.

¶44:142 Second, the nature of the issues that people face confronts them with significant educational challenges that reach far beyond the simple consumerist wants of convenience and immediate gratification. As Goethe observed, seriousness comes on one by surprise.[42] Students often begin with narrow ends in view, only to discover behind them much broader, life-long commitments and concerns. To rationalize the provision of education on consumerist principles, the entrepreneur must hold that the ends in view moving students are stable, predictable, and manageable. The issues people entertain, however, carry in them the tension between self-interest narrowly and broadly construed. The consumerist model assumes that people's narrow self-interests control their decisions, creating a preference for training in practical skills delivered with maximum ease and convenience. Ease and convenience may be what people want first. But they often go beyond those first wants as seriousness comes on them by surprise. To put it abstractly, the law of diminishing returns increasingly devalues the narrow constructions of self-interest that people make. At the same time, their growing capacity to develop, on behalf of themselves and the world in which they live, a clear calculus of risk, which they apply to large-scale activities of immense complexity, makes their broader constructions of self-interest appear much more fateful, attractive, and compelling in their calculus of aspiration. For instance, as the globe warms, issues of global warming command an increasing share of people's attention, with an ever-more sober recognition that the specialists must get the science right and the public must act upon it with foresight and clear intent. Environmental seriousness comes on people by surprise, even those in due course whose narrow self-interest pushes them to deny the very existence of environmental problems. In their personal and their collective lives, people feel themselves moved by challenging complexities and stirring opportunities, complexities and opportunities that they sense but do not yet grasp. Those are the uncertain grounds of inquiry and growth. In the face of these, is it unrealistic to expect a great many people to engage in education, not peripherally as consumers, but in great earnest, as educators?[43]

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[42] Goethe, *Wilhelm Meister's Apprenticeship*, Book VII, Indenture, Thomas Carlyle, trans. Education begins with the unreflective intentions of the student and draws those out, disclosing more and more fully the range of their implications and entailments. To make education nothing but the satisfaction of the student's ostensible intents is to convert education into a form of entertainment. Far better to aspire to art, which converts entertainments into a form of education.

[43] Let us differentiate *training* and *education* precisely with regard to what happens to a student's initial ends-in-view. People are fond of the observation that the root meaning of *education* is to draw out, to pull something out of itself as one pulls a ductile metal into a long, strong wire. What is it that the educator draws out in the course of education? In large part, what are drawn out are the animating intentions of the student. Educators work on these to disclose and empower the further and further implications for action and effort implicit in those initial intentions. To treat those as givens, as settled ends, that are to be directly satisfied, the transaction thereupon closed, is to provide training in lieu of educative service. I try to develop a clear distinction between concepts of training and education in the essay "Kant in the Culture Factory: On Design, Study, and Technology in Education," a preliminary

¶45:142 Third, in education, the procurers of consumption pay attention to only limited parts of the whole effort at the advancement of learning. They reduce a knowledge society to a mere information society.[44] It is too easy to scoff at the research work of universities, taking examples of pretentious trivia and obscure jargon as representative of the whole effort. It is too easy to discount efforts to construct meaning and to nurture values, pointing to the fringe fanaticisms in academe. Educators create and manage the uses of knowledge essential to our culture and economy. Educators provide powerful explanations to important phenomena; we are makers of meaning, interpreters of events, resources from which people form their controlling standards and expectations. Proponents of the consumerist model of education downplay the importance of academic research and participation in cultural inquiry. They rather blandly suggest instead that corporations could do it all in their own laboratories. Taking only its most pragmatic parts, this prescription would lame the American economy, or any other economy where it was adopted. It would create a large added cost for crucial whose conduct of their business requires the continued advance of science, technology, and applied research. It makes little sense for us as educators to abandon our vital role in the advance of knowledge and its application, in nurturing values, and in developing skills of worth to individuals and the society. We might better argue that the essential variable in the determination of how economies perform at the start of the twenty-first century is not how well they manage consumption, but how effectively they generate knowledge, values, and skills and bring these into play within the global community. Indeed, we should hold that the emerging society is not a consumer society, but a knowledge society in which an educational system that does not excel as a means to the advancement of learning, to the work of education in its fullest sense, is singularly wanting.

¶46:142 Fourth, providers of consumerist culture not only ignore the whole, they are undependable providers of those parts to which they do attend. They are unlikely to take on the full task of disseminating knowledge, values, and skills to all persons

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version of which is available at http://www.ilt.columiba.edu/kant/.

[44] In addition to differentiating education and training, let us distinguish clearly between an information society – a society with an economy geared to attain the maximum, most profitable, flow of bits, undifferentiated units of information – and a knowledge society – one fulfilled as all people participate to their fullest potential in the work of creating explanations, meaning, and control in their lives. A knowledge society, of course, presupposes flows of information that people generate as they participate in cultural activity. We might even hypothesize that as a society fulfills its potential for the advancement of knowledge, and the uses of it in the conduct of life, it maximizes its sustainable flows of information. If this is the case, there is no conflict between those whose economic interest is to profit from the flow of information and those engaged in the advancement of learning. Otherwise there may be a conflict. Whatever that case may be, however, information flow in a quantitative sense is not the proper measure of value in a knowledge society. Properly speaking information flow is not in itself a measure of *value* at all; it becomes so only in a particular commercial context where economic values, generated by trade in information as a raw commodity, accrue to those who provide the means enabling the information to shuttle among the various consumers of it in the society. The proponents of consumerist education miss the point that at bottom people do not simply seek quanta of expert information. They seek participation in the work of creating knowledge, values, and skills of service to them in the conduct of life. As always, the debate between Socrates and the Sophists about the nature and purpose of education is still deeply current in the contemporary conduct of life.

within contemporary societies. To be sure, many in journalism and commerce avidly attend to the entertainment industries as potential sources of educational innovation. They may be right in viewing practitioners of edutainment – the merger of education and entertainment in products, at once enlightening and engaging, to be marketed to both home and school – as strategic groups determining emerging pedagogical prospects. Certainly, a great deal of commercial capital currently drives efforts to develop edutainment products, and the makers of these products have powerful channels of distribution available to reach the public.[45]

¶47:142 Significant limitations to these efforts, as efforts to restructure educational practice, are at work, however. The stuff in trade within edutainment is a set of consumer products to be sold in the educational markets of home and school. Indubitably, schools and teachers and students, engaged in the work of education, constitute a market for the sale of various goods – food, books, clothes, pens and pencils, furniture, fuel oil, rings, air conditioners, jock straps, electronics, software, and so. Education, as such, however, is not inherently a market for consumer products, with success measured in market share and the relative efficiency in making and distributing the goods. As a human phenomenon, education is not a market for products, but a process of growth and transformation, one sustained over many years with success measured throughout the vicissitudes of personal and collective experience. Indeed, many companies may successfully sell consumer goods to educators. But producers of edutainment have yet to show whether they have either an interest in the human process of education, as such, or the capacity to give intentional shape to it as a whole, above and beyond determining what, within its precincts, may sell as a marketed product. Modern educational systems are huge civic undertakings and a serious responsibility that must be met regardless of whether the balance sheet is good or bad.[46]

¶48:142 Can Disney or Apple or Time-Warner take responsibility for the systemic character of educational experience as it occupies the central activities of over 50 million persons

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[45] Along with distinctions between education and training and between information and knowledge, we should distinguish between education and entertainment in some significant way. At root, to entertain means to hold or detain someone between things; entertainment thus helps to occupy the interstitial spaces of life. It is of the essence of entertainment that it does not really change the people entertained – it helps fill the space after this and before that. On the other hand, education in its essence does lead people to change, to draw themselves out. The commerce of entertainment requires stable formulas that work, week after week of ever-repetitive episodes holding a steady audience, constantly eager to return for more of the same. Education properly speaking does not serve such commerce well. As Walter Kaufmann said of Plato, a prolonged educative encounter changes a person.

[46] Reports indicate that the Walt Disney Company has been both parsimonious and timid in following through with its proclaimed educational commitments in the implementation of its private, planned community of the future, Celebration, Florida. See Michael Pollan, "Town-Building Is No Mickey Mouse Operation," *New York Times Magazine*, December 14, 1987, pp. 56ff. If a corporation of such stature will back away from a full effort in a high visibility, prototyping effort, can we expect such corporations to expend their capital on a massive scale on ever-rising expectations and risk steadfastly their good will in the face and ever-more-bitter controversies? The privatization of the polity is a corrosive concept. The real world has an enduring need for public choice and civic action by and for the whole community.

nationally for periods of fifteen to twenty years each? Can they extend that responsibility to the billion or so children and youths who globally are acquiring their education over the coming decades? Can major corporations satisfy their shareholders by tying up the scale of working capital that contemporary educational enterprises require for their decent operation, a scale on which there are many divisions, with each of these representing annual expenditure of another 100 billion dollars? Can they achieve high rates of return in the overall educational enterprise, providing full service to the whole society, to the global community? Would governments permit these companies to bail out of their commitment of such billions, nay trillions, should returns on the investment falter? Surely the activities of edutainment companies, like those of mass communicators throughout the twentieth century, are having significant effects on the cultural context within which educational work takes place. But the likelihood that the producers of edutainment, as such and single-handedly, can be the prime movers in reshaping the processes of education is insignificant.

¶49:142 Corporate newcomers are not taking on the whole job of education. Perhaps they are simply going after selected, lucrative parts. Successful corporate strategies, such as those of Federal Express and UPS, take a element of a more comprehensive service and build a profitable business by intensely rationalizing delivery of the one chosen element. Corporate entrepreneurs in education are not even, in the end, likely to compete very effectively in this way, going after a few well-chosen, very profitable plums embedded in the system, leaving those working as educators to struggle, underfunded and despised, with the vast remainder of routine chores in education. Education is not like the delivery of letters and packages. Delivery of the mail is a massive, yet simple and stable function; education a supremely complex one, susceptible to historic changes of phase. Entrepreneurs, who want to lop off this or that element of education, as it now appears to function, in order to subject the delivery of it narrowly to intense rationalization, can surely try to do so. They are likely to find to their surprise the whole process is changing in ways that leave their newly rationalized element without a purpose or function.[47] Rather than lending

[47] One of the commonly suggested implementations of this strategy in higher education involves proposals to use new media to package course lectures by those unusual professors who can be simultaneously engaging and authoritative. Why take a course from Joe Shmo at East Podunk when one can have it from Lustrous Ludwig at Virtual Ivy? The Teaching Company has been doing a pretty good job offering Lustrous Ludwig on audio and video tape for some time, without putting a big dent in East Podunk. The reason is that what Joe Shmo does at East Podunk is actually more complicated than deliver a set-piece lecture with pedantic mediocrity. Capturing his full role in new media may not be easy. East Podunk does not market mere quanta of information and skill. East Podunk provides *participation* in the creation, dissemination, and use of knowledge, values, and skills. Participation is hard to mass-market. Participation involves people deeply. To be genuine, its production values need not be that great. The would-be marketer of participation faces a serious problem – the would-be marketer does not control the transaction. Consider, for instance, the services of the minor has-been, helping to coach village youths on a rocky soccer field in rural Mexico, as the boys get ready to play against their peers from the neighboring village. They participate, and this has-been participates with them. It is not World Cup football. Nevertheless it has deep meaning to the participants and the washed-up player turned coach will not be made obsolete by world-class stars, no matter how well they may be packaged and marketed, for there is a difference in being a fan of the game and participating in

themselves to the piecemeal rationalization of selected parts, the new technologies enable more radical, thorough-going transformations of the whole education enterprise.

¶50:142 People acting as educators are very likely, across the full span of the extended present, to be dominant actors in using digital technologies to transform educational work across all its dimensions. There are, of course, no guarantees in history. Yet educators can be reasonably confident that we share the social power needed to make our vision of the potential educational uses of new technologies historically significant. All the same, many educators are anxious, withdrawing from the new technologies as if these threaten our tenuous autonomy of action. Let us not hold back. Exerting robust leadership with the new technologies strengthens us as educators, enhancing the effectiveness of our work. It strengthens our capacity to shape the quality of life as a whole. Whoever becomes involved in educational work with information technologies becomes engaged in the social construction of an emergent system. Our agenda, as educators, rather than as consumers, as producers, or something else, is shaping the decisive contributions in the construction of a new system. Whatever the anxieties that come with the effort, the public and non-profit educational sectors serve through the extended present overwhelmingly as the sources of education and intellectual leadership, the world around. These institutions, which are in rapid transformation, are a solid base from which the class of people acting as educators can work to make a better future. What agenda of action does this challenge entail?

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it. East Podunk serves would-be participants in the work of culture and Virtual Ivy had best gear itself to help East Podunk do that. Furthermore, Joe Shmo's in-person lectures may change, adapt, and develop just as rapidly as Lustrous Ludwig's. The in-person lecture as a form, already a highly adapted survival from pre-print pedagogy, is likely to change substantially with the addition of new media, making it possible for the lecture hall to open out to the world and for the lecturer, no longer a soloist, to act as symphony conductor, so to speak, bringing all sorts of interactions to and with the audience. If new technologies enable Joe Shmo to become better at facilitating participation in the work of culture by his students at East Podunk, they will celebrate his achievement more fully than they will the virtual appearance of Lustrous Ludwig. Those who would preserve the academic greats in sealed tins might remember that most of the time, fresh vegetables, even if grown in less-than-perfect soil, taste better in comparison to canned succulents.

Part 2 – An Agenda for Educators

To Act According to Our Thought

¶51:142 During our extended present, educators as a class – people working through knowledge communities and intellectual institutions, through schools and universities, through community centers and the press – all are shaping the course of cultural innovation, and with it, the dominant quality of life. Education is the work of educators, not movie producers, venture capitalists, or theme-park operators. Educational institutions – schools, universities, museums, laboratories, libraries – are the major factors in the social construction of a new educational system. Worldwide our educational institutions control a huge cash flow, derived from individual, governmental, philanthropic, and commercial sources, a cash flow more than sufficient to underwrite far flung innovation. Furthermore, educators control and produce intellectual property of extraordinary breadth and depth. The holdings of Hollywood are but a pittance compared to those of the world's universities, laboratories, museums, and libraries. And further, the changes wrought by the digital technologies are making precisely the holdings of great cultural institutions more accessible, more productive, and more meaningful in the lives of everyone. It would be a terrible abdication were educators to hold back and let other groups dominate the social construction of a new education.

¶52:142 If educators do not abdicate, if we assert our agenda well, that agenda can have the primary influence in shaping emerging practice. What might an agenda for innovation be like, one that puts the interests and aspirations of educators into action and draws fully on the strengths of the knowledge communities and intellectual institutions? As a class, educators are a large, diverse group, comprising many elements. This internal complexity makes it difficult for people acting as educators to achieve a sense of cohesion and historical solidarity. Divided, we have been ruled. This complexity, however, is a potential source of historic strength. With an encompassing unity, we can exert great influence for the betterment of life. To draw the main components of an agenda for educators together, let us be comprehensive in considering it. Let us, further, consider it as educators, as people engaged in creating, disseminating, and applying learning, ideals, and competencies in the conduct of life. Let us frame these considerations, starting with distinctions that often characterize intellectual and educational work, constructing a matrix that shows how educators characteristically think and act.

¶53:142 Begin with thought. As educators think about how people acquire knowledge, propagate principles, and employ expertise, we generally use an intellectual spectrum that runs from disinterested research – pure achievements of inquiry and reflection in science and scholarship – to the domains of professional learning – codified principles of organized performance based on acquired skill and experience. This distinction –

for shorthand let us call it the distinction between the academic and the professional – is the fundamental polarity defining types of thinking essential to the work of educators. Educational thinking encompass both academic ideas and professional principles and in contemplating the educators' agenda, we should remember Pascal's great maxim – "We do not display greatness by going to one extreme, but in touching both at once, and filling all the intervening space."[48] Great research universities include departments of sociology and schools of social work, departments of economics and schools of business, departments of political science and schools of public affairs, departments of biology and physiology and schools of medicine. Across every field, education included, people need both pure scholarship and professional learning. An agenda for use in reconstructing the educational system must touch both the academic and the professional and occupy all the intervening space.

¶54:142 It is not sufficient, however, in characterizing intellectual work to reflect only on the forms of thinking characteristic of it. "Art is long, life short, judgment difficult, opportunity transient. To act is easy, to think is hard; to act according to our thought is burdensome."[49] Education is a form of action, action of the burdensome sort in which thought guides the effort. If, from the perspective of people thinking, educators span a spectrum running from pure to applied, from academic to professional, then a gradient, one that runs from theory to policy to practice, generally serves to describe the forms of action through which educators seek to put ideas into operation.

¶55:142 Educators use theory, policy, and practice as means for determining how we are to act in diverse situations.

- Theory shapes action at a very broad level by providing educators with abstractions that enable us to think about the particulars in diverse situations and to develop courses of action that prove to be reasonable, sustained, and effective.[50]
- Policy controls action, not by providing tools of analysis, explanation, and prediction, but by setting standard procedures that suggest a proper course of action for the situation to which the policy pertains.
- Practice guides action by assembling reflections on the fruits of experience in a field, codifying what works and what does not, relative to common circumstances frequently encountered in the field.

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[48] Pascal, *Pensées*, 353, Trotter, trans. English translation on-line in one big Gopher file.

[49] Goethe, *Wilhelm Meister's Apprenticeship*, Book VII, Indenture, Thomas Carlyle, trans. (revised).

[50] Some may object that theory is a domain of thought, not of action. For that matter, too, one might object that policy, even practice of the reflective sort, should be in the domain of thought. Certainly intellection is fundamental in the process of theorizing, in policy making, and in codifying practice, in all forms of conscious action. Nevertheless theory is in its substantial use in human culture a form of action. It is an intellectual tool that allows people to act on and in the stuff of experience with significant comprehension and power. If it is not anchored in action, theory becomes idle speculation, fantasy. As a form of action, theory often makes the impossible possible, as in enabling the construction of machines that fly, even though they are heavier than air.

Properly speaking, these are ideal-types, like the poles of pure academic knowledge and applied professional learning. As ideal-types they are intellectual formulations applied to the stuff of experience, not empirical actualities substantially in it. Both sets of ideal types span the activities of knowledge and education. We can use them to form a conceptual matrix that is useful in raising to the full level of awareness the powerful, comprehensive agenda entailed for educators as we engage in social construction shaping a new educational system in our time.

¶56:142 Let us fill this matrix with the hard questions that educators face. In a systematic work, we could elaborate these questions, laying the groundwork for far fuller responses with respect to each. That is not fitting here; we must concentrate, with point and conviction, on the core matters. In the sections that follow, we explore the heart of the matter in the context of our extended present. We snake through the matrix, starting with "academic theory," across to "professional theory" and down to "professional policy," back to "academic policy" and down to "academic practice," and concluding with "professional practice." Educators understand something along the lines of each response as we integrate digital technologies into education and culture. Here is the educators' agenda, entailed of us as we become aware of ourselves as a dominant class in twenty-first century life. Determined to act according to our thought, here is our burdensome course.

		Thought	
		Academic	Professional
Action	Theory	Theory as a form of action combines with the work of disinterested reflection to put comprehensive worldviews into force within a culture. Here is the cultural crucible from which a people cast their standards of knowing, their distinctive values, and their prized skills. Here educators work as public intellectuals, addressing basic beliefs, creating a resonant aspiration through the polity. Hence the question for educators engaged in fully reflective action – What controlling principle or reflective worldview determines the overall standards and directions of intellectual and educational activity?	Theory as a form of action combines with professional thinking about education to organize and structure educational effort and activity. Here educators generate and manage our characteristic institutions. Hence the question – How should educators, reflecting on the ways by which people create, spread, and use ideas, principles, and skills in life, systematically apply our understanding of these processes to structure the overall work of education?
	Policy	Policy as a set of procedures controlling action meets with the work of disinterested reflection to deal with the basic conditions impinging on educational work. Here educators frame our basic rationales and justifications when challenged by internal doubt or external oppositions. Here are the fundamental directing strategies that educators develop to turn conditions to the best advantage. What basic tasks must intellectual and educational policy accomplish if people are to fulfill the educational potentials inherent in prevailing historical conditions?	Policy as a set of procedures controlling action meets with the work of professional thinking by educators to implement measures that will bring new pedagogical potentialities to full fruition. Here are the directing strategies – the designs and schedules, the tests and measures, the curricular organization, professional standards, and resources allocations – with which educators have to put existing educational possibilities into action. Here educators create different procedures for coping with particulars in restructuring education to make full use of new media. How can educators guide educational activity with effective policies that will advance the social construction of a new educational system?
	Practice	Practice as a form of action based on the codified experience of a field combines with the work of disinterested reflection to delineate a pedagogical commonsense that will serve educators dependably under established conditions. Here educators develop ideas by which we orient and sustain educational effort, enabling those engaged in pedagogical work to cope with limiting circumstances. Here is the grounding where educators make our basic assumptions about human potential. Who should do what with whom in the process of education in order for self-sustaining human development to take place?	Practice as a form of action based on the codified experience of a field combines with the work of professional thinking by educators to design educational environments that permit people to make optimum use of the pedagogical resources at their disposal. Here educators interact in the daily work of education. Here is the emerging system of digital pedagogy in operation. How should educators organize our conduct to enable people to fulfill the best possibilities inherent in their capacities and their conditions?

Extending the Enlightenment Vision

Academic Theory

Theory as a form of action combines with the work of disinterested reflection to put comprehensive worldviews into force within a culture. Here is the cultural crucible from which a people cast their standards of knowing, their distinctive values, and their prized skills. Here educators work as public intellectuals, addressing basic beliefs, creating a resonant aspiration through the polity. Hence the question for educators engaged in fully reflective action – What controlling principle or reflective worldview determines the overall standards and directions of intellectual and educational activity?

¶57:142 In an historical perspective, through the extended present, powerful protean powers are permeating all sectors of life. What basic worldview, what sense of life, forms as people engage in the everyday use of these powers? What structuring convictions, through which people see and interpret the world, do these experiences suggest?

¶58:142 Such questions may offend those still preoccupied by the post-modern debunking of grand narratives in the West, of modern rationalistic and metaphysical pretensions. Educators must engage a generative worldview, not as metaphysicians, but as historical sociologists. George Santayana, who found himself immersed in slightly earlier variations on this ageless struggle between doubt and conviction, recognized the ineluctable condition in his wonderful essay on *Scepticism and Animal Faith*.[51] As thinkers, we can be aware pervasively that our knowledge is imperfect, that every declamation demands doubt. But we live not by thought alone. In our deeds, we resolve ambiguities; we set doubts aside. And thinkers, too, must act.

¶59:142 As humans unable to escape the burdens of living in history, we must recognize, as Weber did so well, that life offers us simultaneously both the vocation of science, the relentless questioning of all things apparent, and the vocation of politics, the willingness to act purposefully and consequentially, uncertain what the outcome is to be.[52] The historical field of action, within which we live our lives, imperfectly embodies diverse principles. To perfect and improve the actuality of living ideals, people must be both aware and committed. In thought, all things must be tentative and relative; but in action they become definitive and final. These two sides of life take special form in the academic realm, which is *not* a realm consisting one-sidedly in thought alone. Ideas, the fruits of questioning scholars, often conflict with significant consequences in the world of action. When ideas contend in the realm of

[51] George Santayana, *Scepticism and Animal Faith: Introduction to a System of Philosophy* (1923, New York: Dover Publications, Inc., 1955).

[52] Translations of Max Weber's speeches on "Politics as a Vocation" and "Science as a Vocation" are in *From Max Weber: Essays in Sociology* edited by H. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1946).

action, it is the political vocation of the scholar to reflect, to weigh, and to take a stand on controlling principles. This vocation is obligatory. To take no stand is simply the weakest stand of all.

¶60:142 Here is the irony: the play of doubt, which brings diverse ideas into contention with one another within the field of action, entails the thinker to take a stand in favor of those principles that he deems in his political vocation to be most worthy of taking with steadfast conviction as if they were true. Building a fundamental worldview is the political vocation of the skeptical scholar.

¶61:142 Historically, the contemporary academic enterprise has its roots in enlightenment ideals.[53] There is perhaps no better example of what we mean here by the political vocation of the scholar than the characteristic intellectual practice of Enlightenment thinkers. In this practice, rational skeptics embodied a passionate commitment, in an act of animal faith, to reason, to the possibility of progress, to universal rights and human betterment through the spread of knowledge and education, to unflagging combat against superstition and ignorance. *Écrasez l'infâme!* Faced with consequential ideas in portentous conflict with each other, the reflective thinker must act on the political vocation of thought and take a stand affirming those ideas that disinterested reflection judges to be most beneficial in the conduct of life. So Voltaire and his peers acted. From them the modern intellectual enterprise stemmed. Whither are we carrying it?

¶62:142 A major theme of twentieth-century Western culture has been a sustained and many-sided critique of this Enlightenment commitment, this commitment to enlightenment. Over the past fifty years or more, scholars have increasingly shied away from embracing the political vocation that is their rightful one. Taking no stand for one or another worldview, or taking the stand that all worldviews are equally pernicious and radically unsound, does not make the clash of ideas disappear. It leaves the field to ideologues of party and market, to the purveyors of sectarian dogmas, and to the cruel megalomania of the blind nationalist. By not taking a stand for a fundamental worldview, scholars fail to secure and strengthen the most basic sources of their action and influence. Such withdrawal has spread far too far through academe as many scholars have retreated into a self-protective pursuit of rigor, deprecating comprehensive ideas as unworthy of serious professional effort. Powerful rationalizations support these self-interested professional retreats – the desire not to err in the eyes of critical colleagues; the effort to chart a predictable path to grants, to tenure, to promotion; the urge to limit, to stabilize, to control the demands on the personal comfort of psyche and spirit.[54]

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[53] Let us use the term "enlightenment" in a very broad sense to direct attention to developments rooted in Renaissance and Reformation, passing through the European Enlightenment of the seventeenth and eighteenth centuries, and sweeping through the age of democratic revolutions, imperialism, and the hot and cold warring of the twentieth century. In this sense, the enlightenment involves the historical construction of modernity, in particular the construction of secular cultures, scientific and technical reason, industrial economies, nation-states, democratic polities, bureaucratic management, systems of public health and education, massive cities, and global transportation and communications.

¶63:142 At their best, the thoughtful critiques of enlightenment aspirations rest on a largely tacit sense that the continuous, unchecked application of enlightenment principles has started to do more harm than good in the world. Good principles in excess become destructive. Too much schooling, too much bureaucracy, too much material production, too much human intervention in the natural environment, too many births with too few deaths, too much consumption of resources – it all exhausts, enchains, and disenchants. Such reasoning may be sound as far as it goes, but the critique is sound only if the repertoire of means for the pursuit of enlightenment aspirations is fixed and unchanging. So it seems. So the worry goes: the given forms of action are the best of all possible forms of action, and hence, the historical impasse is at hand; those familiar agencies, which we risk exercising to excess, are the only agencies with which we might advance towards enlightenment ideals; therefore, we must turn away, towards other, lesser goals, or suffer historical shipwreck.[55]

¶64:142 This doubting diagnosis stems from European experience and thought in the first half of the twentieth century, from the shock of the Great War, so uselessly destructive, from Depression economies that ceased to work, from Fascist and Nazi brutalization, from a second, sapping war of unprecedented civilian destruction, ending with the huge mushroom of destruction flattening Nagasaki. Little wonder these upheavals were followed by a fifty-year freeze on historic action with the major powers locked in Cold War. Western self-doubt about the efficacy of its aspirations to enlightenment was largely the conceptual complement to this Cold War check on historical action.

¶65:142 Times change. Let us not weigh whether this doubting diagnosis was right or wrong; let us observe that it is becoming historically passé. The human world is in rapid metamorphosis. It is as if history, having exhausted the creative possibilities of the nation-state and its attendant civilization, is entering into an Hegelian *Aufhebung*, a transformative upheaval of existing forms and resources into an unexpected system of new potentiality, through which the human spirit can continue, can extend, its

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[54] Educators must be cautious that hard-won means of securing intellectual autonomy do not become simple sinecures. Tenure must mean more than job security for like-minded colleagues and peer review must identify disturbing excellence wherever it has merit, and not merely reinforce the privileges of securely established academics. Like any other form of privilege, academic privileges must maintain their real value for the whole community or they will be excised as parasitic preferences for the undeserving as surely as quit rents once were.

[55] As Marx said in *The 18th Brumaire of Louis Bonaparte*, in history things happen twice, first as tragedy, then as farce. The European critique of the Enlightenment tradition, centered chronologically in the Interwar period was a serious critique. Robert Wohl's *Generation of 1914* (Cambridge: Harvard University Press, 1979) is a good introduction to the core waves of deep doubt. Martin Jay's *The Dialectical Imagination : A History of the Frankfurt School and the Institute of Social Research, 1923-1950* (Berkeley: University of California Press, 1996) provides an excellent introduction to the influential critique of Enlightenment and instrumental reason by Walter Benjamin, Max Horkheimer, and Theodor Adorno. The belated American flirtation with these problems has yet to generate criticism of equal stature. The best of it, say Fredric Jameson's *Postmodernism, Or, The Cultural Logic of Late Capitalism* Durham: Duke University Press, 1991) has the cloy of beaux arts Academicism to it, a predictable virtuosity within a bounded set of themes. We need more academics who do things, who act in the world on the world in ways consistent with their ideas.

enduring self-creation.[56] People, all sorts of people, across nations, ethnicities, cultures, and class, exhibit an intense curiosity, an intrigued sense of wonder with the new technologies. In community centers for the poor, in the meeting places of senior citizens, on planes and in trains, in homes of the sophisticated and the unpretentious, in all manner of offices, everywhere people are eager to get on the net, to exchange email, to play with the possibilities. These reactions go far beyond the American penchant for gadgets and gizmos. These reactions are the outward sign of the inward spirit silently experiencing rebirth, that transformative upheaval beyond which vast, uncharted possibilities unfold. Educators, your work is the driving force of that newly unfolding epoch.

¶66:142 Against this renewal, rhetoric of coming after, post-modernism in its various forms, appears increasingly to be an arbitrary, ungrounded pose. We are not coming after, but going onward, traversing a new plane of action. It again becomes possible, even necessary, to assert articulate views about the value of affirmative effort for the character of the human enterprise. We have consequential choices to make. We are inventing epochal forms of human culture. Let us do so, awake and intent. Let us, the world around, use new tools of communicative action to carry the work of enlightenment forward to unparalleled fulfillments. The work of enlightenment is far from historically finished, neither finished by being completed, nor finished by being dead or exhausted. The great destabilizing tragedies that potentially loom, not behind, but ahead, arise, not from an excess of enlightenment, but from the archetypal deficiencies that call forth the pursuit of enlightenment – from sectarian conflicts, nationalist inhumanity, and collective ignorance. Beliefs contend. Ideas still clash. Ignorance crushes multitudes. Where should the scholar stand? Ideals of universal education are all too far from fulfillment, even by traditional measures. And enlightenment is a fast moving goal, not a stable state: if we measure education as mastery of the knowledge and skills requisite to cope effectively with the complexities of human circumstances, people everywhere may be rapidly receding in their educational attainments. These attainments are remaining relatively static, yet issues for global action are becoming ones of an all-inclusive scale and astounding internal complexity and the available collective experience for dealing with them ranges from the negligible to the ineffectual.[57]

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[56] Georg Wilhelm Friedrich Hegel, *Phenomenology of Spirit* (A. V. Miller, trans., New York: Oxford University Press, 1979). Hegel's *Phenomenology of Spirit* is a book about education, undoubtedly the most significant and difficult book about education, one that educational scholars in America have virtually entirely ignored. I have examined it from an educational point of view in an essay from the early 1980s, "Notes on Education and Hegel's *Phenomenology of Spirit*: The Importance *des Begriffs des Anerkennens,*" recently put on the web at http://www.ilt.columbia.edu/hegel/.

[57] Henry Adams, in *The Education of Henry Adams* gives an extended meditation on the historical relativity of educational attainments and the terrible cost of remediating their debasement through the force of historical events. "The picture of Washington in March, 1861, offered education, but not the kind of education that led to good. The process that Matthew Arnold described as wandering between two worlds, one dead, the other powerless to be born, helps nothing. Washington was a dismal school. . . . Not a man there knew what his task was to be, or was fitted for it; everyone without exception, northern or southern, was to learn his business at the cost of the public. Lincoln, Seward, Sumner and the rest, could give no help to the young man seeking education; they knew less than he; within six

¶67:142 Educators, all peoples, have reason to fear historic drift, and to perceive the possibility of a liberating, fulfilling historic course – a better future that we have to make. As educators increasingly work with the new technologies in the extended present, we experience a buoyant antidote to the pessimisms of the recent past, at once so weary and so wary. Current innovations insinuate into daily circumstances reasons to recognize that the relevant agencies of action are neither finite nor fixed. The new information technologies provide potent, under-utilized tools for pursuing the ideals of universal education and the right of all to engage as equals in the common pursuit of life, liberty, and happiness. Engaged with emerging possibilities, working to apply digital technologies to education and life, people experience a sense of historical empowerment. In the experiential, common sense of the new enlightenment, digital technologies are an expression of the power of reason in human life, making plausible the hope and expectation that thought in action is still becoming an ever-more effective asset in the service of human betterment. Educators are far from having made our mission obsolete, and the digital technologies provide an important new means to advance markedly forward towards unfinished enlightenment aspirations.

¶68:142 In its political vocation, academic theory should advance a credo, renewing the progressive bond to posterity. In the natural order of things, humans are the beings that enter into the struggle to survive, aware individually of their personal mortality. *I shall die*: this personal awareness of impending death has deep effects as a condition of life.[58] It determines two of humanity's distinguishing qualities. It is the awareness of personal mortality that makes humans become the animals that are social and political by nature. The individual who knows that he or she is mortal, destined to die, can achieve survival only through the future of his or her collectivity. The person who knows that his or her death impends must either despair or sublimate the sense of self into the selfhood of an enduring group. The second distinguishing characteristic then comes into play: the human commitment to a social self entails a cultural and educational commitment to one's progeny. Aware of personal mortality, humans

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weeks they were all to be taught their duties by the uprising of such as he, and their education was to cost a million lives and ten thousand million dollars, more or less, north and south, before the country could recover its balance and movement." Henry Adams, *Novels, Mont Saint Michel, The Education* (New York: The Library of America, 1983), pp. 818-9. As the scale of human action increases, with irreversible global effects unfolding over decades and centuries, the human costs of historical remediation can now far exceed those which Adams rued. At the turn of the twenty-first century, educators need to keep in mind the extreme complexity of the world. It is all too easy to become obsessed with the digital surface of experience, as if in mastering that surface we master the full complexity of the human situation. A bracing antidote is Robert D. Kaplan's *The Ends of the Earth: A Journey at the Dawn of the 21st Century* (New York: Random House, 1996). Ronald J. Deibert's study, *Parchment, Printing, and Hypermedia: Communication in World Order Transformation* (New York: Columbia University Press, 1997) presents one of the few efforts to probe beneath the surface of digital innovations to think about their effects on the basic social structures in force around the world.

[58] Jean Hyppolite has an excellent discussion of the recognition of death in Hegel's understanding of life in *Studies on Marx and Hegel* (John O'Neill, trans., New York: Basic Books, 1969, pp. 3-31). Humanism as a philosophy of life would be stronger if thinkers more fully confronted the realities of personal mortality.

become educating animals. Humans take many years to develop from infancy to maturity and to ensure survival through the collectivity, members of it must nurture the young and impart to them the distinguishing characteristics of the group. Education is what people do, individually and through groups, to develop the shared capacity at the disposal of their progeny for pursuing meaningful well-being through their future lives. The great variations on human culture are complex constructions through which mortal individuals create transcendent selves, for the betterment of which they live.

¶69:142 This transcendent, collective self, binding mortal individuals into an immortal enterprise, creates a culture of enlightenment, the progressive bond with posterity. This bond with posterity is the most powerful of the cultural constructions that humans have devised to deny personal death through the life of their social self.[59] Rational persons, who struggle to survive, knowing they are going to die, naturally develop a commitment to the on-going bearers of their social selves, through which they try to pass to their progeny the possibility of a more secure, productive fulfillment than they themselves have enjoyed.[60] This progressive commitment to posterity has driven enlightenment aspirations, and it continues to drive them wherever people have a social, political self of enduring character. The creative bond with posterity, gives the work of educators meaning with respect to the basic human condition, helping to construct the collective effort at survival despite the mortality each person suffers. It follows from this bond that educators are the great universal

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[59] Religious cultures might seem far more powerful, measuring the matter by numbers of professed adherents, even in this supposedly secular age. Nominal adherence is not a good measure of historic power, however, as a glance at the historical demographics of the human enterprise will indicate. Historic power consists in the capacity to shape the character and meaning of the human enterprise. The progressive bond with posterity, the inner grounding of enlightenment effort, has had far greater effects on the aggregate conditions and quality of human life over the past two or three centuries than have beliefs in transcendent eternities. There are a growing number of studies thoughtfully examining the global historical transformations that have taken place since 1750 or so. David S. Landes, *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor* (New York: 1998) is a good starting point. That the human condition is still insecure and imperfect is not a sign of historic failure, but one of historic incompletion. Of those with a choice, the number who opt for seventeenth-century dentistry, sixteenth century surgery, fifteenth century court procedure, fourteenth century public health, or thirteenth century education, are not many. One might complain that such a measure is tendentious, for it turns on material indicators that do not touch on the lost meanings and values left behind in the material amelioration of life over the past centuries. Enlightenment humanism, as much as any other worldview, is replete with structures of meaning and value and no worldview has a privileged position over and against it. Which worldview leads to the fullest historical realization of all the potentialities of life? The progressive bond with posterity is a ground for finding meaning and value in life. *Posterity* is a far more concrete, palpable, believable ground for meaning and value in life than is eternity and the workings of a timeless, disembodied deity. Educators can address the grounds for belief, for the conviction of work, for meaning and value. Having the grounds, educators must voice their certainties and act with a conviction of worth and meaning.

[60] Kant's stricture in "What Is Enlightenment?" – "For himself (and only for a short time) a man may postpone enlightenment in what he ought to know, but to renounce it for himself and even more to renounce it for posterity is to injure and trample on the rights of mankind." – states succinctly this bond between the dignity of the rational individual and the rights of posterity. Beck, trans., *Berlinische Monatsschrift*. Dezember-Heft 1784, p. 490, equivalent to *Königliche Preussische Akademie*, 7:39.

class, comprising the young throughout the course of their own formation, comprising their parents for whom the young carry forward the hopes of living intimacy; and comprising all of those who are mature, whose grasp of an enduring meaning for their lives requires that they nurture the capacities of those who come after to carry forward their dreams and work, for them so actual yet so sadly incomplete.

¶70:142 Critics who complain that digital tools are not culturally neutral are correct.[61] These tools are expressions of enlightenment reason, the work of abstraction in operation. They subject time to an intense, rigorous subdividing and stretch out a speeding sequence of either-ors that subject matter and energy and the human spirit to amazing conformities. But from this exacting rational discipline, unprecedented capacities for nuance, suggestion and response, interaction, reflection, and choice arise. [62] Should we shrink from all this, as these critics imply? The digital tools renew the opportunity to reach out to all persons with the glorious challenge – "*Sapere aude!* 'Have the courage to use your own reason!"[63] The world, as it is, is not in equipoise. Educators working with the new technologies command potent resources, historically generative tools. Educators need to look beyond the myopic topic of computers in education to the question of what we can and should accomplish as educators making full use of our digital tools and every other resource in our avail. Educators have formidable instruments of action. Educators should use them to pursue historically challenging goals – achieving the fulfillment of basic human rights; securing physical well-being for all in a sustainable global environment; eliminating prejudice, poverty, despair, and disease. Progress is neither automatic nor secure. By the same token, it is neither impossible nor illusory. It is a work achieved through intelligent effort, a measure of fulfillment in life. That is the progressive bond with posterity that educators strengthen as we pursue enlightened hopes and aspirations.

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[61] A typical instance of this complaint is C. A. Bowers, *The Cultural Dimensions of Educational Computing: Understanding the Non-Neutrality of Technology* (New York: Teachers College Press, 1988). For a useful survey, see Daniel Chandler, "Technological or Media Determinism" (1995, http://www.aber.ac.uk/~dgc/tecdet.html).

[62] Scholars pay too little attention to the integral relationship between freedom and standardization. It may be a mistake to see standardization as the iron cage of modernity, following Weber, or the discontent of civilization, following Freud. The locus of freedom, the capacity to act effectively with autonomous intention, is far more complicated than the churning urges of the Id. Human options are largely created by accepting the necessities of nature and of standardized conventions. People need to internalize all manner of disciplines in order to have complex systems of action. A simple, everyday example: to drive where we may want to go, we must observe the elemental rules of the road, driving on the right in the United States and on the left in England. Most (perhaps all) enablements involve conformity to restrictive regularities, standards, and conventions. Political scientists and educators have failed to study constraint setting adequately. For instance, there has been far too little attention paid to standard-setting groups as powerful determiners of significant domains of autonomous action. The best introduction to these topics is James R. Beniger's *The Control Revolution: Technological and Economic Origins of the Information Society* (Cambridge: Harvard University Press, 1986), a book that is all-too-often misunderstood.

[63] Kant, "What Is Enlightenment?", *Berlinische Monatsschrift*. Dezember-Heft 1784, p. 481, equivalent to 7:35.

¶71:142 To read the *Declaration of the Rights of Man and of the Citizen*[64] as preparation for watching the nightly news or reading the daily paper is humbling: human behavior, locally and globally, is far from meeting the measure of such principles. Higher criticism easily deconstructs the language with which thinkers asserted the abstract universals of our political heritage. Thus "the rights of man" is a self-deflating locution for critics modestly alert to gender biases. Nevertheless, its principles, imperfectly phrased, have life and death import depending on whether they do or do not control the formation of intention as persons equipped with powerful instruments of destruction engage in social action in the heat of hate, resentment, and fear. Humans use abstractions both to enable action, and to ennoble it, to determine controlling intentions, and to adhere to defining restraints. In the social construction of a new educational system, educators need to possess and to impart principles suitable for determining intentions in a world in which the instruments of action are global, complex, and massive in effects.

¶72:142 Our world is the posterity of people who pursued demanding visions, initiating a rule of law, industrial production, systematic science, effective medicine, universal schooling. They asserted these possibilities often while living under atrocious conditions, and the measures of dignity, comfort, and well-being that we enjoy derive largely from their efforts, self-sacrificial yet creative. Still, our well-being is neither stable nor universal. And that of our progeny is not guaranteed. As educators now exploit the pedagogical power of digital tools, we need to be equally bold and deep, extending to our posterity a fundamental advance in the historic potentials of the human enterprise. Thus, in coming decades, people must extend their construct of posterity as they cope with immense complexities in an effort to secure a stable, global future. The ecological and geo-political challenges present stupendous difficulties to educators. Full historical use of the digital technologies is essential to meet them. To meet the challenge, educators must use every resource at our avail and harness to our effort all the power that we can.

¶73:142 "Enlightenment," and labels like it, are retrospective characterizations. They come into use because people historically engaged substantial problems and opportunities, accomplishing results of enduring significance. If educators using digital technologies can be no more effective in addressing the fundamental challenges of our time than we could be without those tools, our historic meaning is marginal. To construct a new educational system, educators need to engage the great problems and opportunities of our extended present with enduring effort and epochal effect.

- Suddenly, human productive and reproductive power has vastly expanded the scale and complexity of action and consumption, raising deep doubts about the long-term stability of both polities and ecologies. Can the world's peoples educate themselves sufficiently to make this expanded scale and scope of action both sustainable and perfectible?

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[64] The document is in many collections, on-line in English [INSERT URL] and in French [INSERT URL].

- Commerce, technology, industry, communication, global transportation have all thrown the world's peoples into highly organized, rationalized, mechanized surroundings, choreographed with intricate, abstract interdependencies in which the moving meanings of life seem challenged, suppressed by civilization, magnifying and multiplying the discontents each feels in accepting its complex constraints. In this iron cage of modernity, can the world's peoples achieve through their education both the measure of meaning and the command of competence with which they can make it a habitat conducive to their full human fulfillment?
- Through the foreseeable future, on the local, national, and global scale, economic inequality and cultural differences are going to persist, fomenting resentment and fear, misunderstanding and hostility, while even the lone extremist can wield weapons that challenge the stability of societies and states. Can the world's peoples develop educationally the ability to celebrate human differences, allowing everyone around the globe to answer that most difficult question – "Can't we all just get along?" – with an acclaim of robust and joyous affirmation?

These questions define bracing challenges. The human worth of technology in education depends substantially on how it helps educators answer them well with historic effect.

Reunifying the Educational Professions

Professional Theory

Theory as a form of action combines with professional thinking about education to organize and structure educational effort and activity. Here educators generate and manage our characteristic institutions. Hence the question – How should educators, reflecting on the ways by which people create, spread, and use ideas, principles, and skills in life, systematically apply our understanding of these processes to structure the overall work of education?

¶74:142 Consider the role of theory in professional learning – codified principles of organized performance based on acquired skill and experience. Theory shapes action at a very broad level by providing educators with abstractions that enable us to think about particulars in diverse situations. With these abstractions, we develop courses of action that prove to be reasonable, sustained, and effective. As people constructed the existing systems of education over the past five hundred years, they used two ideas to structure effort, ideas that diverged from earlier practice. The first powerful abstraction was the distinction between research and teaching, as laid out on the one hand in Bacon's *Advancement of Learning* and on the other in Comenius' *Great Didactic*. This distinction led to a significant difference between the institutions of higher education and those of elementary and secondary schooling. The second structuring idea was the principle that the language of culture and education should be the national language, not an ecumenical language such as learned Latin. From this idea, national cultures and national systems of education developed.

¶75:142 Technologies of print gave power to both ideas – the separation of research and teaching along with the primacy of the national vernacular in education – and the principles shaped the historic uses of the book. Innovators in research and teaching, as well as those engaged in advancing the cultural uses of national languages, were able to exploit the power of the printing press unusually well. Over the course of several centuries, these two principles have pervasively structured the provision of education around the world. Now, as educators start to work with new technologies, different dynamics of enablement take hold in our professional work. In contrast to the effects of print, in a system of knowledge based on digital communication, the distinction between research and teaching and educational reliance on national languages may both become increasingly anachronistic. With respect to the first principle, digital communications have a fluidity and ubiquity that make functional separations, between activities such as research and teaching, difficult to maintain. With respect to the second, digital media require operating systems, and there is a tremendous premium on having a single operating system shared by all. Further, there is perhaps no more fundamental operating system than the language that is the language of thought, and consequently, great advantages may accrue if one language becomes universal as the language of intellect. In these ways, technological

innovations alter the pressure of conditions on professional theory, on the distinction between research and teaching and on the dominance of national languages in education. Nevertheless, it may prove to be the case that a shift away from the distinction between research and teaching may have great relevance to an agenda for educators while the question of language has minor importance.

¶76:142 Technological changes are only one of many matters affecting choices making one or another language primary in the processes of education. Historically, the economics of print publishing promoted the use of vernacular languages and the uses of print flourished as larger and larger segments of the population became literate in the vernacular.[65] Distribution costs were, and still are, a high proportion of the costs of printed resources, which leads to a distribution structure that favors compact markets, e.g., national markets deeply penetrated by reliance on the local language. Global digital networks have a very different structure of distribution costs, which are very low once the infrastructure is in place. Further, they are not sensitive to distance. As a result, digital networks are inherently global and the Web is world-wide both in fact as well as name. Digital technologies have already had a marked effect promoting English as a global language of scholarship and education. These effects, however, are only pat of the matter. Whether education remains primarily national in language and structure, or whether it becomes increasingly global in character, with English becoming the great ecumenical language of learning, probably does not depend on the social construction of a digital educational system, at least until its late stages.[66] The

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[65] There is a rich, rapidly growing literature on the ways in which printing enabled important cultural developments in Western history, a literature highly instructive in efforts to understand the sorts of enablements developing with digital communications innovations. In 1958, the French scholars, Lucien Febvre and Henri-Jean Martin, provided the foundation for much of this scholarship in *The Coming of the Book: The Impact of Printing, 1450-1800* (D. Gerard, trans., London: NLB, 1976). This work culminates with a discussion of printing and language – "Just as printing favoured the growth of the Reformation, so it helped mould our modern European languages" (p. 319). Elizabeth Eisenstein has a good discussion of the relation between printing and the primacy of national languages in *The Printing Press as an Agent of Change* (2 vols., Cambridge: Cambridge University Press, 1979, esp. pp. 349-364. In *The History and Power of Writing* (L. G. Cochrane, trans., Chicago: The University of Chicago Press, 1994, esp., Chapters 5, 6, and 7), Henri-Jean Martin is especially effective in his explanations of the processes through which printed books were incorporated into European culture during the sixteenth and seventeenth centuries and his discussion of how the various markets for printed works operated early on is particularly clarifying. Harvey J. Graff gives a thorough survey of the literature, current through the mid 1980s, in *The Legacies of Literacy: Continuities and Contradictions in Western Culture and Society* (Bloomington: Indiana University Press, 1987, esp. pp. 108-172).

[66] The interactions between languages of learning and new communications media through the extended present require a separate essay, which would distract this one from its purpose. Let us here take note of one complexity in the question. Over-determination exists on both sides of the development in the sense that there are many distinct causalities working to globalize English and many distinct causalities working to preserve the uses of national languages. Benjamin R. Barber analyzes a ominous globalizing causality in his critique of the American commercial culture as global culture, *Jihad vs. McWorld* (New York: Times Books, 1995), as well as in his very thoughtful essay, "Democracy at Risk: American Culture in a Global Culture," (*World Policy Journal*, Summer 1998). We should join Barber in his critique, and even more in amplifying his sustained call for strong democracy, and at the same time we should observe that other causalities, less ominous ones, also work to globalize the use of

importance of national languages in life and education is a thoroughly over-determined phenomenon in the sense that there are many, many causalities, each of which is sufficient to account for the effects taking place. In the face of this over-determination, the social construction of a digital education system may extend the use of English globally as a language of specialized learning, while national languages remain the primary language of diverse education systems, upheld in this role by other dynamics and causalities.

¶77:142 In contrast, for educators developing the pedagogical uses of digital technologies, new media are increasingly having very significant effects on the distinction between research and teaching, between the interactions of elementary and secondary schooling with higher education. We can understand the distinction between research and teaching as something that educators developed because they conceived quite different strategies for taking advantage of printed resources, one for research and one for teaching. Starting in the sixteenth century, those who worked primarily as researchers, aiming to advance the state of knowledge, used print media to promote principles of open communication to a community of peers, to amass and to share complex collections of data, and to design and to perfect instruments that were costly and difficult to operate. This research apparatus, culminating in the publication of findings and theories, posed increasing demands on educators, for it required systematic care and substantial expenditures. Relatively quickly the research function became a matter for small, self-selected elites, which required expensive support and which eventually found a primary home in universities that traditionally had provided the locus of education in the major professions. The idea of research and the systematic advance of knowledge took hold in professional education, as well as in the sciences and scholarship. Since the late eighteenth century in Germany, higher education has progressively become a costly pursuit of new knowledge and nurture of elite skills for a small, advantaged segment of the population.[67]

English and to promote common cultural resources shared by all humanity. Powerful educational aspirations coursing through humanity, which are far deeper and more powerful than the induced desires of McWorld, also drive the emergence of a global culture. The strongest democracy may be a cultural democracy, one in which each person participates with intellectual and civic autonomy in the work culture and education. Educators can build a cultural democracy on a global scale, but to do so they must preserve, perfect, and complete their command over resources of digital communications. Both Jihad and McWorld are two dystopias, which will come about should humanity disavow enlightenment.

[67] Francis Bacon expressed with the most prescience the ideas guiding research efforts through the modern period. In *Francis Bacon* (Princeton: Princeton University Press, 1998), Perez Zagorin characterizes Bacon's intellectual agenda: "Three closely interlinked thoughts or motives lay at the origin of Bacon's philosophy: the rejection of Aristotle; the conviction that the proper object of philosophy in seeking truth must be *scientia operativa* or a science productive of works for the relief and improvement of human life; and the belief in the necessity of a new method aimed at discovery that would achieve a vastly enlarged knowledge of nature" (p. 30). Rather than say that the modern agenda conformed throughout its course to the one that Bacon laid out, it would be more accurate to say that as the modern agenda has evolved, it has matured into a very full realization of Bacon's basic motives. Bacon had the power of prescience, not the power of prescription.

¶78:142 Starting likewise in the sixteenth century, other educators initiated the basic publishing strategy for the teaching function, developing well-designed textbooks to provide students a sequence of standard lessons leading to fulfillment of any given learning objective. As the apparatus of research became more costly and delicate, that of teaching became cheaper and more durable, making possible the spread of schooling throughout whole societies by implementing ever-more-inclusive systems of text-based instruction. As a result, two cultures of education were developed, that of elementary and secondary schooling on the one hand and that of higher education on the other. This distinction is so fundamental that educators rarely reflect on it. Describing it as a significant theoretical distinction may strike many as strange, for it seems to be a necessity of nature, not a consequence of thought. Yet the great gulf between the preparation of professionals for service in elementary and secondary schooling and for teaching and research in higher education follows much the lines laid out by theorists circa 1600. Likewise the norms of practice are significantly different, as are the criteria of success and the internal allocation of resources. As people perceive these professional domains, they link the culture of elementary and secondary schooling together and treat that of higher education, a.k.a., post-secondary education, as something radically different.[68] This differentiation of education into two realms, elementary and secondary versus higher, exemplifies how the material conditions of work can shape the way people think about complicated relationships. Expensive libraries and laboratories have become necessities of higher education, yet their expense is prohibitive in elementary and secondary schooling. Conditions have perforce differed in the two realms and ideas about education have reflected these different conditions.

¶79:142 Digital technologies, however, are rapidly enabling us to avoid these traditional constraints. The knowledge resources created to support advanced scholarship and professional practice are becoming ubiquitous. Where a digital infrastructure exists for supporting intellectual work, the marginal costs of using those resources do not increase greatly as more and more people make use of them. Consequently, the infrastructure of higher education is becoming available in schools as both levels develop their digital capacities. Here we have a major historical departure: the material conditions differentiating elementary and secondary education from higher education are disappearing. This change is apparent in schools that now have robust connections to the Internet. It is spreading everywhere. With this change, educators at all levels face a radical pedagogical challenge: to develop ways of making these ubiquitous tools of advanced research and scholarship pedagogically meaningful in the education of children. As children at different ages are distinctive, continuing differences between schools and colleges, between Kindergarten and research centers,

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[68] As early as 1630 in his *Great Didactic*, Johann Amos Comenius described systems of universal compulsory schooling that he perceived to be potentials implicit in the design of good textbooks and of schools pedagogically adapted to working with them. It took close to three centuries to implement those potentialities in the extended present of print-based educational reform. As with Bacon, no society promulgated a direct implementation of Comenius's vision, but all modern societies have worked their ways to complete, albeit highly secular, implementations of the agenda for schooling that Comenius set forth in the *Great Didactic*.

are necessary. Yet the conditions are taking hold for there to be one educational culture encompassing all the parts. Within that culture, educators should rethink how to handle differences of interest and development in very fundamental ways.[69]

¶80:142 Historically, the separation between early schooling and higher education has not always predominated. In medieval practice, the roots of what we now call secondary education assimilated much more to higher education than it did to elementary. Well into the nineteenth century, secondary schools usually linked tightly to colleges and universities, and in Europe to this day admission into the lycée or Gymnasium is the main cutoff, with all graduates of those schools virtually guaranteed general access to the university system. In many educational systems, especially those where the university derives from the medieval guilds of students, faculty members in secondary education substantially have the status and qualifications of their peers elsewhere in the university. Usage of the terms "pupil" and "student" still reflects this linkage between secondary and higher education, as "eleventh-grade pupils" would be condescending and "third-grade students" a bit pretentious. Let us infer from these residual characteristics that present theoretical constructs are not timeless and that renewed, expanded connections between higher education and elementary and secondary levels are well within the realm of historical possibility.

¶81:142 Several factors make it plausible that an alteration in the controlling theoretical conception about the knowledge professions is reinvigorating these latent connections between schools and the university. Over the past two hundred years or so, the apparatus of science and scholarship has become more and more elaborate and costly, restricting practical mastery to elites and forcing increasing specialization upon their members. Digital information technologies do not necessarily lower the cost of the apparatus, but they change the economics of participation significantly, making the marginal cost of broader participation minimal. To be sure, it is moot whether, given digital access to the tools and data necessary in creating knowledge and in forming professional skill, a larger proportion of people can make good use of it or be interested in doing so, but at least this possibility becomes a question! At least in principle, people at all levels of the educational enterprise increasingly share and participate together in one full and complex working environment through the digital infrastructure. Consider an instance so commonplace that we have difficulty reflecting on its larger implications. The average person regularly watches on the nightly news weather forecasts that use sophisticated data sets, and advanced modes of structuring and presenting them, along with quite complicated climatic theories, to convey a clear understanding of large regional weather probabilities. Ordinary people daily absorb both theory and data, synthesizing it into a useful understanding, that is quite close to the theory and data that the most erudite students of climate and weather simultaneously use. If educators find more and more ways to extend,

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[69] To a degree quite unprecedented in modern scholarship, university-based scientists and scholars are becoming engaged in using state-of-the-art data and conceptual tools as means to introduce students in elementary and secondary school to their fields of interest. One can find numerous examples of such developments on the World Wide Web. A comprehensive study of this trend would be very informative. It appears to be taking place across a wide range of fields and in many different countries.

activate, and deepen the possibility of universal participation in a unified environment for intellectual work, the spectrum of intellectual achievement by coming generations can greatly rise relative to current norms.

¶82:142 Several other long-term secular developments increase incentives for scientists and scholars to try to engage a wider public in their work. When the priorities driving much scientific research and technological development were weapons related, the selection of problems and the management of resources concentrated effort on the attainment, no matter what the costs, of narrow ends in view – bigger bombs, faster planes, more discriminating radar, and on and on. Public understanding was only tangentially important in the work of national defense. With the end of the Cold War, scientific priorities have been changing in interesting ways. Under conditions in which material well-being is largely a function of success in global economic competitions, the general technological efficiency of a population becomes highly consequential. Know-how and the ability to adapt to innovative practices needs to be distributed among all participants in the working population. Thus, effective education in technology and science is as important as good research in promoting such technological efficiency.

¶83:142 Even more important than the economic drive to higher and higher levels of technological know-how, people have a substantial interest in a high level of applied scientific understanding. As national defense diminishes in precedence, the enduring priority of public health and a sustainable environment regain their prominence as science-related issues of pre-eminent importance. Although both have critical research dimensions to them, both also have very difficult educational problems embedded in them. In both areas, and others as well, preventative strategies may prove far more cost-effective as the primary means of action than corrective strategies using heroic interventions in the face of crisis. As a result, high-level scientists and scholars concerned with these matters at the level of advanced research take a deeper, more active interest in educational issues, and those allocating research and development funds are more often supporting broader educational incentives than they did in the depths of the Cold War.

¶84:142 As universities become more sensitive to the fullness of their educational missions, a theoretical construct can take hold in which scientists and scholars understand the generative purpose, which they serve through the creation of knowledge, to be education, the advancement of learning at all its levels.[70] This comprehensive commitment to education does not result in everyone in universities and research institutes scrambling to usurp the work of schools of education, with all suddenly engaging in the preparation of teachers and school administrators. Rather it leads to a wider interest in the design and development of curriculum, reshaping the whole body of knowledge for broader and easier access, and in adapting it to pedagogical

[70] Such a purpose, making the broad education of the public integral to the imperative of advancing knowledge through research, is fully consistent with the original purposes set forth by pioneers of the modern intellectual enterprise in works such as *The Advancement of Learning* by Francis Bacon, which aimed to persuade the sovereign of "the merit and true glory in the augmentation and propagation of" learning and knowledge (I, "To the King," 3).

strategies, in which the processes of study and learning throughout education draw people into the work of producing knowledge from early in their educational experience onward.[71]

¶85:142 As Reformation pedagogues advanced the idea of "a learned clergy and a lettered people," they set forth the goals of the print-based educational system. A learned clergy and a lettered people was the original version of the controlling distinction between research and teaching . Functionally, the concept of "a lettered people" meant that basic schooling had prepared the ordinary person to receive effective tutelage from the learned clergy. Through a long process of secularization, this concept has continued to describe the theoretical structure between the general public and knowledge elites cultivated through the educational system up to now. Now new media enable educators to change this basic structure. The present-day version of the lettered people is "information access." It is a goal that falls radically short of our real possibilities. To pursue information access as the end and objective of the new technologies is to leave unchallenged a great limiting condition operative through the era of print. With the apparatus of research becoming ubiquitous, universal participation in the advancement of learning becomes a plausible ideal. The people

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[71] There is some danger that digitally enabled innovation in education will bypass schools of education, which are somewhat separated from developments in major research universities (even when functioning as a school within such universities). As the traditional system has solidified, there are two points of intersection between schooling and higher education – the selection process by which the favored few gain admittance to colleges and universities and the education process by which teachers and other professionals receive their preparation for jobs in the schools. Schools of education have, so to speak, owned the second point of intersection. They generally have been left to their own devices by the rest of higher education to engage in the professional development of teachers, except for periodic complaints by their colleagues in the arts and sciences, who from time to time become dyspeptic over the poor preparation of newly recruited students coming through the other point of school-university intersection. Hence those in schools of education have habitually experienced attention from their academic peers as an unpleasant challenge.

Digital technologies are changing the structural relationship significantly by creating a pervasive overlap between the intellectual resources of higher education and the intellectual resources available in the schools. Academics increasingly see the fruits of their inquiries potentially having a much broader, diverse audience, and they are beginning to recognize that they need to attend to the pedagogical issues arising with this broadening of their audience. Hence interest in the work of schooling is picking up throughout all parts of higher education, with the main issue being a pedagogical, curricular issue – how to enable the novice student learn effectively from direct involvement with the data and tools of advanced scholarship and science. This opens a whole new function for educators with pedagogical expertise in schools of education. The leadership of those schools, however, having been selected on the basis of their success under the traditional conditions, perceives the growing interest throughout the rest of higher education as an unwanted intrusion on their turf and reacts like a threatened turtle pulling into its shell. Unfortunately the shell may not be hard enough to provide safety under the resulting pressures. In the United States, much initial pump priming for a changed university role in education has been done by the National Science Foundation's funding of curricular initiatives at all levels, and by and large this funding has gone to state and local school systems or to university projects with roots in research science. It is important that faculty members in schools of education leave their familiar turf and involve themselves in university-wide projects as participants in much more complex development projects. Otherwise they may become terminally obsolete: as we suggested elsewhere, to work well with new media, teachers increasingly need different skill sets than the ones they receive in traditional schools of education.

can be not merely lettered, but learned as well. The community ceases to be one in which the lettered multitude is under the tutelage of the learned few. Instead all become learned citizens, a basic requirement of real cultural democracy. Consider as an initial intimation of the power this ideal can unleash, the tremendous intellectual energies surging into web site development, with many projects evident that go way beyond the facilitation of research in the narrow sense to the promotion of broad participation in intellectual work.[72] In the digital era, advancing knowledge becomes a defining good and necessary goal of the human polity, and full, personal participation by each in the work of education and culture becomes both a feasible endeavor and a basic human right for all its citizens.

¶86:142 A pedagogy that draws all people into the work of advancing knowledge, of forming values, and of crafting skills would be a highly empowering pedagogy and one that indicates how the roles of teachers may adapt to the new information conditions. Where all are to enter into the advancement of learning, educators must treat the student as an autonomous, responsible agent. A curriculum supporting work by independent students, answerable to themselves, embodies a pedagogy that facilitates three main functions: posing problems, providing data, and furnishing tools. The pedagogy itself involves various mentoring activities, helping to make sure that students really grasp the problems and questions, that they comprehend key characteristics of the data that they seek, and that they can use the tools of analysis, simulation, and synthesis available to them both purposefully and well. This is the pedagogy of research.[73]

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[72] One barrier to these developments lies in the inertia of promotion and tenure procedures, which may channel effort by many junior academics away from working with new media. Perhaps universities should start refereeing contributions to their web sites, not simply to guarantee the quality of research contributions, but also (perhaps primarily) as contributions to the educational effectiveness of the site. Among other things, throughout higher education new media will make a person's work as a teacher more accessible to unobtrusive peer review. It is important to estimate whether the dominance of research publications in promotion and tenure reviews results because this criterion is really held by academics to be the only significant criterion, or because it is the only one under the traditional constraints that is susceptible to well-grounded peer review, the fruits of research being public in ways that the results of teaching have not been. It would seem that the latter explanation accounts for a great deal of the pre-eminence of the research criterion and the conditions undergirding it are changing rapidly (historically speaking, at any rate).

[73] Much soul-searching is going on about the future of research universities, much of it very thoughtful – see Jonathan R. Cole, Elinor G. Barber, and Stephen R. Graubard, *The Research University in a Time of Discontent* (Baltimore: The Johns Hopkins University Press, 1994), Roger G. Noll, ed., *Challenges to Research Universities* (Washington: Brookings Institution Press, 1998), Ronald G. Ehrenberg, *The American University: National Treasure or Endangered Species?* (Ithaca: Cornell University Press, 1997), and William G. Bowen and Harold T. Shapiro, eds., *Universities and Their Leadership* (Princeton: Princeton University Press, 1998). The common criticism of the effect of the research mission on the quality of teaching in universities has triggered much of the concern. Two serious studies of this effect on the twentieth-century research university are *The Making of the Modern University: Intellectual Transformation and the Marginalization of Morality* by Julie A. Reuben (Chicago: The University of Chicago Press, 1996) and *How Scholars Trumped Teachers: Change Without Reform in University Curriculum, Teaching, and Research, 1890-1990* by Larry Cuban (New York: Teachers College Press, 1999).

¶87:142 Changes putting all persons into control of the resources of research and inquiry possessed by the culture lead to an educational system that effectively apprentices everyone to the work of culture.[74] One can imagine an emerging new structure to teaching, with general teachers in the school classroom managing a range of inquiries by their students and a network of consultants with special competencies activated by teachers and students via desktop video conference – a network of undergraduates, graduate students and professors who help field questions that neither students nor teacher in a class can answer through their independent inquiries. The whole process of consultation could rise up and down a hierarchy of expertise. Any question, if it touches a real point of expert ignorance and uncertainty, could push the structure of inquiry and response further towards the frontiers of possible knowledge.[75] When we speak of learning communities, we speak of something like such structures of universal intellectual participation.

¶88:142 Questions:

- What needs to be done to advanced knowledge resources to make them interesting and productive to children and novices?

With respect to the pedagogy of research, it is important to note that the question of the quality of university teaching, and the effect of research on it, is a rather different matter. American research universities attract top students from all around the world not because the quality of set-piece courses that they offer is overwhelmingly superior to what is offered elsewhere. Rather students come to apprentice in the research milieu of the universities, to work, and thereby learn, on projects, to engage in problem-solving with peers and professors. Education through participation in the work of creating knowledge, skills and values in American universities is excellent. The question with a pedagogy of research is whether educators can new media to broaden and open this very strong component of the academic tradition – the pedagogy of research.

[74] In programs such as *Archaeotype*, developed through the Dalton Technology Project, this pedagogical model seems to work very well as early as the middle grades. See *Evaluation of the Dalton Technology Project from a Thinking Skills Perspective* by John Black, Clifford Hill and Janet Schiff (New York: CCT, Teachers College, Columbia University, 1993). For a general statement of the design principles in such programs, see John B. Black and Robert McClintock, "An Interpretation Construction Approach to Constructivist Design," in Brent G. Wilson, ed. *Constructivist Learning Environments: Case Studies in Instructional Design*. Englewood Cliffs, NJ: Educational Technology Publications, 1995, pp. 25-31. http://daemon.ilt.columbia.edu/ilt/papers/ICON.html

[75] Such services to problem-solving groups in schools may be the response that enables the university to avoid the educational obsolescence anticipated by Eli M. Noam in "Electronics and the Dim Future of the University," *Science* 270:13 October 1995:247-249. Noam suggests that publishers and media companies will take over the traditional forms of university instruction and academia will find itself without a teaching function. Noam does not take very concrete account of the ways in which familiar instructional forms can metamorphose to take account of new informational conditions. Canned lectures by the putative great teachers of the world may have far less educative value than timely consultation via video conference with someone over a question of common interest. It is a commonplace in academe that one does not really learn a subject until one has to teach it and a very productive undertaking for undergraduates and graduate students may involve serving as sources of expertise over networks to children and teachers. To be feasible, such networks of consultation require an infrastructure that is rapidly coming into place with the spread of good Internet connectivity into classrooms around the world.

- Should commonsense expectations about what children can accomplish change as advanced intellectual tools and resources become available to everyone?
- Can educators develop new ways of identifying and evaluating contributions to knowledge?
- Can all this cause childhood to loose its charm of "innocence," or may in unexpectedly infuse adulthood with new currents of "childish" wonder?

Reconstructing the Educational System

Professional Policy

Policy as a set of procedures controlling action meets with the work of professional thinking by educators to implement measures that will bring new pedagogical potentialities to full fruition. Here are the directing strategies – the designs and schedules, the tests and measures, the curricular organization, professional standards, and resources allocations – with which educators have to put existing educational possibilities into action. Here educators create different procedures for coping with particulars in restructuring education to make full use of new media. How can educators guide educational activity with effective policies that will advance the social construction of a new educational system?

¶89:142 As we suggested above, theory in its professional context uses root conceptions to shape the most general features of an educational system. Policy in its professional context – the codified principles of organized procedure in the field – works in diverse sectors to manage and control how an educational system does in fact operate. Such policies are legion. Let us concentrate here on deep-seated professional policies within existing arrangements and assess their sources in experience. We can then reflect on possible changes in them arising as experience with a digital system of educational work progressively accumulates.

¶90:142 By a deep-seated policy, we mean the basic policy principle or concept, as distinct from one or another conception of it. For instance, elementary and secondary schooling around the world uses a deep-seated policy of age grading, the policy concept of managing the progression of pupils through the system by grouping them according to age. We are interested in basic policy concepts such as age grading, not the particular conceptions of age-grading policy that may distinguish French schooling, for instance, from English or Hungarian.

¶91:142 Education is not technologically virgin. As it has existed through recent centuries, it has a technology, one based on print. It also has a policy structure, which people have built up over several centuries. This policy structure gives rise to the characteristic set of educational institutions and procedures shared across nations and localities. If not determined by print technologies, these policies are highly adapted to the constraints and facilitations that print technologies offered educators. Here we can neither do justice to the complexity of this policy structure, nor unravel all the possible permutations of it in relation to the potential uses of digital technologies in education.[76] We survey, instead, five broad domains of professional policy in the

[76] I have discussed these five domains, how current policies in each represent adaptations to print technologies, and possible alternative policies that digital technologies may make feasible in greater detail in *Power and Pedagogy: Transforming Education through Information Technology* (New York: Institute for Learning Technologies, 1992, www.ilt.columbia.edu/power)

existing system of education. Each shapes major aspects of time-honored procedure. Our survey aims at three objectives: to show how key policies within each correlate with the constraints and facilitations of print technologies; to indicate how the constraints and facilitations of digital technologies may differ from, or prove similar to, those of the print technologies; and to itemize some policy departures that educators should try to substitute for existing policies in order to better use the potentialities of digital communications.

¶92:142 Professional policies that structure educational work the world around serve five foremost functions:

- To organize people in time and space for educational work;
- To motivate effort and to allocate opportunity;
- To structure the resources of the culture, its prized knowledge, values, and skills, for effective apprehension by students;
- To recruit and prepare professional educators for work in the system; and
- To mobilize the resources requisite to support its operation and maintenance.

¶93:142 Historically, the technologies of printing were of extraordinary importance in helping educators form, spread, and use available ideas, ideals, and abilities. Educators adapted their procedures in order to make the use of printing technologies full and effective. Insofar as they did so, retrospectively we say that the technologies determined the procedures. In doing so, we are not arguing a strict determinism, however.[77] Instead, we are saying that innovators in the pedagogical past developed procedures to take advantage of the various means available, a powerful category of which were printed books and related materials. In doing this, they adapted their procedures to make use of these means. They perceived printing to be an enabling resource. They might have adapted their procedures to the technology in other ways, or they might even have chosen to ignore the new means altogether. However, having acted to take the technology into account, having exploited its possibilities in pursuit

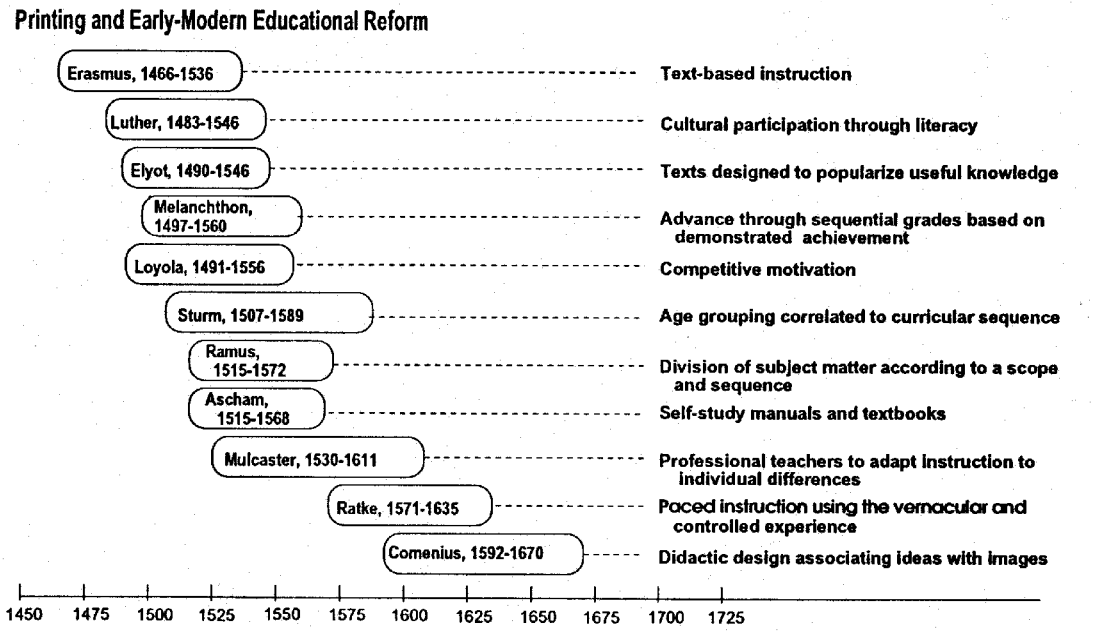
[77] Critics and educators have found the issue of technological determinism vexing. The set of essays edited by Merritt Roe Smith and Leo Marx, *Does Technology Drive History? – The Dilemma of Technological Determinism* (Cambridge: The MIT Press, 1994), provides an excellent introduction and over-view of the issues. There needs to be more discussion of the ways in which a large-scale collective choice can result in the determination of an extended present, which may be irreversible and may encompass most or all of our life spans. Many willed actions are voluntary, but once chosen are irreversible – try in mid-swallow to unswallow your next sip of coffee. There are many collective choices, which at the outset might or might not have been taken at a scale of cultural significance. The collectivity is like the boy at the bank of a brook, hesitating whether or not to venture a jump across. Once a people have taken one of these collective choices, however, they cannot un-take it, but have to follow through with it to some course of completion, able only to exert efforts at mid-course adjustment, much as a broad-jumper twists his limbs one way or another to maximize his leap. Large-scale technological innovations, once underway in a decisive historic sense, have this character of irreversibility. At the same time, they have major challenges of mid-course adjustment within the. For example, the on-going development of an air transportation system became irreversible early in the twentieth century; whether that system should rely on a super-sonic transport plane circa 1985-2015, or rely during that period on large, sub-sonic designs, was an issue of significant mid-course correction.

of their purposes, having done it the way they did it, we say in retrospect that their procedures were determined by or with reference to the technology.[78] Most major features of modern schooling result from professional policies, basic policy concepts, that were determined by print technologies in this sense. The vital step was the invention of the textbook.[79]

¶94:142 Books, and printed books within the larger class, have physical characteristics, a materiality, that conditions their use. Books take up space – a given number of people in a room of a given size can only work at one time effectively with a limited number of books. Books have a heft and size – only a limited amount of content can fit between the covers of a usable book. Books undergo production and distribution processes. When printed books first became available in the West, it was not

[78] The concept of "affordances" is useful here, but because it is useful, we avoid the term for fear of its being degraded into jargon. Donald A. Norman has a useful presentation of the concept in *Things that Make Us Smart: Defending Human Attributes in the Age of the Machine* (Reading, MA: Addison-Wesley Publishing Company, 1993, pp. 105-113). "The *affordances* of an object refers to its possible function: A chair affords support, whether for standing, sitting, or the placement of objects. A pencil affords lifting, grasping, turning, poking, supporting, tapping, and of course, writing. In design, the critical issue is perceived affordances: what people perceive the object can do. . . . Affordances also applies to technologies. Different technologies afford different operations. That is, they make some things easy to do, others difficult or impossible. It should come as no surprise that those things that the affordances make easy are apt to get done, and those things that the affordances make difficult are not apt to get done." Humans are relatively adept at perceiving the affordances in things and situations; hence we are tool-making animals. The problem, of course, is that things do not come with their affordances inventoried and labeled. People using things and technologies must discover and develop their affordances. Possible functions to complicated objects and technologies may go entirely unperceived and others emerge from a basis of widely shared experience.

[79] The following schema of print-oriented innovations, culminating in Comenius, may help summarize the key historical interactions between textbooks and educational practice in the early modern period.



Most of the main techniques of schooling were developed between 1500 and 1650, and printing was an essential means by which the reformers implemented their ideas.

immediately evident how educators should use them in pedagogical work. The printing of books transformed their availability to educators. In principle, books became available as a ubiquitous resource for educators in the sixteenth century. It took time, however, to convert what was possible in principle into what was actual in substance. Medieval educational practices had been poorly adapted to permit educators to exploit the pedagogical potential of print effectively. Step by step, educators built up the modern policy structure of education to enable them to use printed resources well. Let us reflect on their more significant strategies.

¶95:142 Note at the outset some things that educators could not do with printed books – much policy is hidden among routines that we now forget were once the fruit of conscious intention so natural they have come to seem. Educators could not permit each student to work with whatever book he or she might wish whenever he or she might wish it. Such laissez faire would have the responsive teacher juggling an impossible assortment of texts. Educators could not work with a fully integrated curriculum, with all subjects at all levels represented in texts available at all times. No adult, let alone a child, could tote the requisite tomes. If books were to become the primary communications medium for the work of education, certain pedagogical procedures, which in principle might have had value in a different communications context, would prove infeasible. Others, however, adapted well to print, and print to them in the form of textbooks, books specially designed to present a subject or skill with a measured scope and sequence.

¶96:142 Consider first the use of time and space. Why are the typical classrooms laid out as they are, students in rows sitting side by side facing a teacher? Why are school days divided into periods of equal duration, more or less identical the world around? Both typical classrooms and standard periods are adaptations of space and time suited to the textbook pedagogy, which has become the standard pedagogy in schools everywhere. Out of all the possible configurations the classroom might assume and out of all the possible groupings it might house, why should the classroom be a place for twenty-five, plus or minus students, and a single teacher? Educators laid the classroom out to facilitate the recitation, which they structured around the lesson, the basic unit in a textbook, which students the world around prepare according to their respective subjects and grades. In the classroom they engage in one or another kind of recitation, performing for their teacher, sometimes in sequence, sometimes in parallel or unison, to demonstrate and exercise their mastery of the lesson in the text. The period, unless now doubled as pedagogy breaks away from the text, is 40 to 60 minutes, a duration that represents roughly the collective attention span for the class, yoked to the recitation and the lesson. Outside of the context of recitation, the standard period is a span of time largely without meaning, and it is positively dysfunctional for many forms of pedagogy that students and teachers might practice.

¶97:142 Examine second the strategies of motivation. In the order of things printed, textbooks are a bore. To motivate wandering minds, educators learned to induce competition among students, with the allocation of further educational opportunities – dear to parents, if not to the students themselves – depending on the resultant rankings. To make the competitions fairer, and thus more effectively motivational, educators

developed principles of age and ability grouping. What a good student should know was basically a given through the textbook and the associated scope and sequence of the curriculum. Hence the competitions and rankings and sortings were possible according to the comparative performance by students on the recitation, the lesson, the test, the subject, the grade or form, the examination. This whole structure of motivation made sense on the assumption that similar students would be engaged in learning the same thing at the same time, an assumption that followed, from neither nature nor from the play of curiosity, but from the material characteristics of the printed book.

¶98:142 Ponder further the organization of the culture for use in education. The characteristics of printed books may have been surprisingly significant in determining the form and substance of the knowledge, values, and skills that the curriculum presented to students and teachers for their use. Books are material objects with physical characteristics and limits. Usability is not an issue new to computers. It has simply become something almost always minimally achieved with printed text. But look sometime at an early comprehensive text, for instance Johann Alsted's *Encyclopedia* (1630), a compendium of knowledge, too big to carry about easily, perhaps seven textbooks bound in one, perhaps a book of reference for library use.[80] Alsted's compendium was still a unified presentation of knowledge, one that could not quite fit in a single usable book, and already other educators were breaking things apart – creating textbooks devoted to the full presentation of a coherent component of learning on the one hand and alphabetic encyclopedias to organize the universe of discrete topics for easy recall on the other. In the process of making books usable, people not only shaped effective presentations of knowledge, but also the effective presentations began to shape the knowledge presented. Hence, we may now start to ask: is knowledge of the world and experience in it divided into various subjects because the world and experience in it inherently divides into those subjects? Or might it be that most of the familiar subjects and disciplines arose because writers found they could better create books, which were at once usable and coherent, by adopting one or another set of boundaries? Is the boundary between physics and chemistry a real boundary in the nature of matter and energy? Or is it a boundary in intellectual practice deeply embedded in our ways of educating and thinking as a result of choices scholars have been making over many generations in their efforts to present knowledge effectively through usable texts? Let us not venture here firm answers to these questions. Suffice it for now to recognize that it is a large and difficult question to decide to what degree our stock of knowledge has resulted from the medium becoming the message.

¶99:142 Probe now the recruitment and preparation of teachers. Prior to the print-based school, most education took place through apprenticeships, formal and informal, with the young learning by helping adults in the work of the world. As the textbook standardized the learning agenda for children in the school, so it spawned a new profession of the modern teacher. The textbook limited the problem of content, which became finite, relatively fixed, and predetermined. It accentuated the difficulty

[80] Johann Henri Alsted, *Encyclopædia* (Herbornæ Nassduidrum, 1630).

of didactics. The study of education became a search for the effective methods that would impart a standard selection of knowledge to many different minds. From the sixteenth century through the seventeenth, eighteenth, nineteenth, and twentieth, the principles of textbook design remained relatively constant. What changed in the profession was a consistent increase in the sophistication of didactic method. Able to start with content given by the textbook, teachers needed a sure art of teaching. Comenius put it well is the title of *The Great Didactic, Setting forth the whole Art of Teaching all Things to all Men, or A certain Inducement to found such Schools in all the Parishes, Towns, and Villages of every Christian Kingdom, that the entire Youth of both Sexes, none being excepted, shall Quickly, Pleasantly, and Thoroughly Become learned in the Sciences, pure in Morals, trained to Piety, and in this manner instructed in all things necessary for the present and for the future life* . . . . He concluded that for the strategy to work, rulers had to recruit a sufficient corps of teachers to staff the schools of every town and village, and for such staff to achieve their purpose, teachers and students alike needed one thing above all others, authoritative, well-designed textbooks.[81]

¶100:142 Observe that Comenius also indicated well, in the title of *The Great Didactic*, the relationship between the textbook and the civic commitment of resources to support organized educational work. A system of schools that exploited the pedagogical possibilities of print could ensure that all youths would be "instructed in all things necessary for the present and the future life." Comenius gave an earlier version of the progressive bond with posterity, a version not yet secularized. In this version, as in many later ones, the key action was instruction, the essential agencies were the schools and their teachers, and the root idea was that these could impart to each youth an epitome of knowledge, value, and skill that would suffice in the living of life. A deep paternalism pervaded this pedagogy. The textbook, an authoritative, bounded selection of those things deemed most essential, set an agenda in which the fruits of civilization might be dependably imparted to all its members. The textbook served well as a vehicle driven by the aim of disbursing the common denominator of a culture. New media may give civic significance to a more ambitious goal – universal, full participation in the work of culture.

¶101:142 Like printed books and related media, digital technologies have tremendous power and usefulness for the intellectual enterprise of educators. They are fundamental resources in the work of generating, spreading, and employing knowledge, values, and skills in the conduct of life. Educators are finding that digital technologies, like print technologies before them, have constraining and facilitating features for educational work. With new media, many of these are different from the constraining and

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[81] M. W. Keatinge, *The Great Didactic Of John Amos Comenius*. (Translated Into English And Edited With Biographical, Historical, And Critical Introductions. New York: Russell & Russell, 1967). "There is one factor which by its absence or its presence can render the whole organisation of a school of no avail or can aid it in the highest degree, and that is a proper supply of comprehensive and methodical class-books. Since the invention of printing, it has been an easy matter to find men who are able and willing to make use of it, who will supply the funds necessary for the printing of good and useful books and who will purchase books of this kind. . . . It is evident, therefore, that the success of my scheme depends entirely upon a suitable supply of encyclopædic class-books. . . . " (p. 296)

facilitating features that printed resources had for educators. It is these differences that make the digital technologies potentially transformative innovations in education. In essence, the pedagogical contents of the new technologies are more copious, fluid, responsive – the technological empowerments spreading into practice in our extended present. We are beginning to glimpse in each of the five broad areas of professional policy sustained departures from the norms of print-based practice.

¶102:142 *Time and Space*: Digital technologies transform the constraints of time and space. Content becomes ubiquitous. Human interaction can take many forms detached from distance and unfettered by time. Spontaneous, ad hoc groupings can cohere on the basis of shared interest and intent, regardless of location. Constraints of content once shaped the school. These fall away and the school can take many forms in many places. Traditionally, "class," "grade," "form," "period" – the terminology for managing space and time in schools – gave rise to the terminology of abstract regimentation in our cultures. Now, thinking about educational time and space leads to conceptions of flexible groupings, across ages and locations, as people interact according to their interests, needs, and curiosities.

¶103:142 *Motivation*: Where large numbers of people perform identical tasks, externally assigned, competitive rankings driven by extrinsic rewards were the natural motivators of educational effort. As inquiring groups, cohering through interest, learning in the course of shared projects, become commonplace features of educational work, cooperation becomes the prime motivator. Learning – the opportunity to realize the good life in an environment responsive to the play of interest – becomes its own intrinsic reward. On the collective level, the traditional responsibility of the educational system to allocate differentials of privilege and disadvantage becomes one of giving to each and all full opportunities for educational self-development through continuous, honest feedback and criticism.

¶104:142 *Culture and Curriculum*: Curriculum design shifts from making and justifying exclusions in a narrowly limited representation of the culture to effecting the comprehensive inclusion of all its resources and activating the interconnections between its diverse, innumerable elements. As all students, at any place at any time, enjoy access to all intellectual contents and pedagogical resources of their cultures, difficult pedagogical issues come to the fore. Inquiry and interaction must be made manageable and opportunities for the play of curiosity manifest.

¶105:142 *Teaching*: The balance between method and content in the preparation of teachers shifts significantly. Didactic methods were the primary concern when the teacher, having to impart straitened specialties secured by set texts, found the key factor limiting successful instruction to be his or her ability to awaken and hold diverse students' interest. In a digital system of education, the teacher needs a different range of skills – to put generative questions, to guide open-ended inquiry, to diagnose the diverse difficulties that may impede their students' efforts, to provide them continuous feedback that deepens and sustains their self-directed work. New methods, based on an empathy with the student's active acquisition of knowledge, value, and skill, rise in importance, as does the teacher's command of an expansive

understanding of the culture. Across the profession, these developments steadily diminish reliance on routines and work to raise both the status and the challenge inherent in the teacher's calling.

¶106:142 *Civic Rationale*. Here a major shift in democratic theory and procedure are underway. Up to now the democratic aspiration has sought primarily a measure of equality, legal and socio-economic. People have understood such equality to be necessary pre-conditions for attainment of civic participation, the ultimate goal, and they have considered education of value primarily as a significant means to the enabling ends in view, particularly the socio-economic means of a secure, well-paying job. In a knowledge society, participation becomes involvement in the work of culture and a digital system of education moves beyond the traditional propaedeutic tasks. In a knowledge society, education is not the means, but the end, the substance and reality of full democratic participation. The civic rationale for education becomes far less utilitarian. Education – full participation in the cultural work of the world – becomes a birthright of all. Meaningful access to, and control over, the resources requisite for full participation in the work of culture by each person becomes the defining good of the polity in a knowledge society.

¶107:142 What sorts of policies conduce to these developments?

- Policies that encourage the full development of the comprehensive digital library.
- Policies that bring high-speed wide-area networks to schools, libraries, and homes.
- Policies that encourage schools to shape their curriculum and teachers to design their courses in ways that help students to learn together in autonomous groups on substantial projects, within specific courses and throughout the curriculum.
- Policies that move institutions, which formerly were elitist by the structure of controlling constraints, to re-deploy once-closed assets in ways accessible to anyone who can put them to good cultural use.
- Policies that shift issues of curriculum design away from questions of scope and sequence towards ones of posing problems, initiating projects, sustaining inquiry, diagnosing blockages, facilitating exploration, suggesting possibilities, evaluating ideas, assessing results supporting effort, and on.
- Policies that redirect assessment away from measuring how well students know mandated minima to disclosing their ability to manage inquiry, marshal evidence, apply principles, generate hypotheses, solve problems, and explain their ideas, beliefs, and actions.
- Policies that situate the locus of learning in small, heterogeneous groups interacting with each other and the world at large in work on genuinely difficult concerns.
- Policies that allow schools to redesign the physical spaces of education and to restructure the management of time.

- Policies that make it the responsibility of everyone in education – students, teachers, administrators, and parents – to be simultaneously both teacher and student, to engage in their work of real inquiry.

The list might go on, but let it for now suffice.

From Cultural Scarcity to Profusion

Academic Policy

Policy as a set of procedures controlling action meets with the work of disinterested reflection to deal with the basic conditions impinging on educational work. Here educators frame their basic rationales and justifications when challenged by internal doubt or external oppositions. Here are the fundamental directing strategies that educators develop to turn conditions to the best advantage. What basic tasks must intellectual and educational policy accomplish if people are to fulfill the educational potentials inherent in prevailing historical conditions?

¶108:142 As we have seen, professional policy, policy relating to the codified principles of organized performance, pertains to a wide range of features in the existing system of education, all of which helped to adapt print technologies to educational purposes. As educators advance their agenda of change, they are developing new policies and adapting existing ones to make full use of digital technologies as educational resources. Academic policy, policy in the context of disinterested reflection, has an important, more unitary function, namely to legitimate both the distinctions among people and the shaping effects on people, which a system of education creates as a consequence of its actual operations.

¶109:142 Until the current historic juncture, the problem for academic policy has been to deploy scarce educative resources in ways that people would find just and proper. This basic problem is shifting in our extended present. Cultural resources are ceasing to be scarce. With the World Wide Web, we see a hint of the fullness of cultural participation that is becoming the birthright of each and every child. As it has existed, educational policy has been a complicated system for allocating differential access to the cultural assets of the world's civilizations and for legitimating the results. How could it be proper that some enjoyed the privilege of advanced education and others did not? In our extended present, reflective policy in education is being redefined to take into account a completely novel starting point – all the resources of the world's cultures are becoming in principle available to any person at any place at any time.

¶110:142 Cultural scarcities are sure to persist because some people are choosing for religious or cultural reasons to forego access, because some political regimes are imposing censorship and limitations, and because some individuals and organizations are exercising sufficient commercial leverage to price access to some resources beyond the means of many. Such retrogressions notwithstanding, the bulk of cultural resources are becoming available to anyone at any place and any time, and the problem of policy shifts significantly with that new condition. Of course, this new condition is becoming a reality for all people only over an extremely extended present. Hence, questions of equity are persisting, far too tenaciously, and educators

must act affirmatively, with greater effect, a more liberal spirit, to achieve equity for all in education.[82] It is taking, however, a very short time for a condition of cultural profusion to become an approximate reality for very large numbers of people living in the more developed sectors of the world.[83] As people in advantaged societies start to enjoy random access to unlimited cultural resources, the policy problem shifts from one of allocating scarce resources to managing relatively abundant ones. Let us explore the character and consequences of this shift.

¶111:142 Educational practice has been rife with privilege. Great differences in educational opportunity everywhere exist. The function of academic policy has therefore been to justify such privilege, to rationalize the differences, to legitimate the advantages some enjoy and the disadvantages others suffer. Academic policy has performed these functions by showing, in remarkably convincing ways, that the differences are in some significant way deserved and beneficial to the community. In many different ways, traditional educational policy has served to legitimate the allocation of scarce resources. Policy issues have turned on a fundamental trade-off between people and cultural resources. Under a regime of scarcity, educational institutions can avail a narrow selection of the culture to all people and a full representation of it to a few – almost everyone gets through elementary school but only a few receive MBA's. In

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[82] In thinking about the social history of technological innovation, it is important to distinguish two matters: the social dynamics by which the innovation comes into use; and the social character of the interactions enabled by the innovation among those for whom it has become a technology in common use. With the goal of achieving equity in historical societies, we should ask two questions. First, as it matures, does the implementation of a technology make it available pervasively through the whole society? Second, are the affordances provided by the technology such to provide all users relatively more equal opportunities and empowerments than they would have without those affordances? The new, by definition, is at the outset scarce. Hence the historical introduction of an innovation is almost always elitist – the rich and powerful have privileged access to the new developments or, in a few cases, those with privileged access to the technology become the rich and powerful. Nevertheless, within the circle of those using the new technologies, technologies introduced through elitist dynamics can have highly egalitarian effects, doing away with existent social differentials. Certainly with the digital technologies, some are gaining command of them much more rapidly than others. Among those who do gain such command, however, many pre-existing differences in opportunities for full cultural participation thereby disappear. In such a situation, it is especially important to develop policies that enable all groups to utilize the technology with full effect, and towards such ends, reports like *Falling Through the Net: Defining the Digital Divide: A Report on the Telecommunications and Information Technology Gap in America* (Washington: National Telecommunications and Information Administration, U.S. Department of Commerce, 1999) are very important. To the extent that the uses of a technology will have egalitarian effects, it becomes imperative to ensure and hasten the introduction of the technology to all components of society.

[83] We should not be surprised if this fast-emerging condition rather quickly has a significant effect on some issues of curricular policy. For instance, with publication of resources such as *Encarta Africana* on CD-ROM and associated websites, the situation for African-American studies in schools shifts. Previously, the subject was vulnerable because materials to support the subject in the ordinary school were scarce and the demonstrable results of student work with the few resources that were available would often be consequently sparse. By insisting on the value of such studies despite these limitations, proponents of the subject would often sound doctrinaire to disinterested observers. With robust resources, the judgment by observers of good will then changes. With ample, quality materials available to students and teachers, the depth and breadth of achievement in African-American studies can flourish, and the terms of curricular debate must change accordingly.

every polity and society throughout the world, formal educational systems consist of pyramidal structures in which very large cohorts receive instruction in basic subjects – reading, writing, and arithmetic. As cohorts move upwards from that base, their numbers dwindle as the selection of the culture received becomes fuller and more complex and testing, counseling, and the subtleties of suggestion make many stop the academic ascent. At the apex, a very few gain command of comprehensive research and professional collections.

¶112:142 On the whole, these legitimations have succeeded because the regime of scarcity has appeared to be a natural necessity. Only a few could rightfully gain access to the most comprehensive collections, for those were both fragile and costly. Universal participation in advanced cultural activities was a practical impossibility. The whole structure of educational opportunity necessarily identified and prepared a limited number who could make optimum use of the exhaustive resources while endowing others, in due measure, with lesser educational opportunities correlated to their aptitude and need. The extensive system of grades and record keeping, of assessing aptitude and measuring achievement, of guidance and counseling, works to match the quantity and quality of opportunity with the estimated potential and demonstrated merit of different individuals. It is a system legitimating differential access in the eyes of all – those who get the better opportunities, those who do not, and those in the whole society who presumably benefit from the rational allocation of limited educational resources.

¶113:142 Digitized cultural resources are developing very different economies from those of printed cultural resources. With printed texts, the bulk of production costs are absorbed in the costs of physical reproduction, along with the costs in libraries of storage and preservation. For printed information, the curve plotting cost relative to supply charts a steady increase, perhaps even a course that accelerates as supply builds and large collections require special buildings and staffs for their maintenance. The developing curve of cost relative to supply for digital resources is different. At the start it has a high threshold because initial investment in the digital information infrastructure is costly, although it is becoming lower as the infrastructure becomes fuller and more efficient. But once the threshold is crossed, both the cost of adding more resources to the set of those available and the cost of making the set accessible to more and more people is low. Legitimizing harsh differentials in the degree of access ceases to be a significant policy problem when everyone has nearly unlimited access to the full stock of cultural assets of the world's cultures.

¶114:142 What then becomes the challenge for academic policy, the commitment to legitimation? A major item in the agenda for educators is to develop a good answer to this question. Let us explore it briefly.

¶115:142 Note how a movement from the pole of constraint towards its opposite has profound effects on the formation of curricula. For some time, elite colleges and universities have used the elective system to include a very wide range of possibilities in the curriculum, putting their practice close to the pole of complete inclusion. In the mid nineteenth century the curriculum ceased to be prescribed and opened up to cover a

wider and wider range of courses with a great deal of control over what to study shifting in the process to the student. As it has expanded, the degree of inclusion has offended cultural conservatives, who attack it as an illegitimate watering-down of the core values of intellect and civilization. To those who believe their accidental privileges are essential to the welfare of the whole, this critique may be convincing, but for most it sounds shrill and self-serving. There are alternative routes to core values, consistent with open inclusion, to which the discussion shortly returns. For now, observe how the issue long festering in higher education is beginning to have a far more radical effect on elementary and secondary curricula.

¶116:142 Traditionally, curricular resources in schools represent highly constrained choices. Policies determining who teaches what to whom, along with policies governing how the resultant performances by students, teachers, and schools are to be assessed, all serve to manage and legitimate such constraints. The unenviable task of legitimating highly constrained curricular choices results in tenaciously ridiculous judgments of cultural worth as educators have had to rationalize a cramped canon and a sample of historical interpretations that have been simplified to the point of stupidity. In field after field the range of cultural resources that have substantial educative worth has far exceeded what publishers could cram into textbooks or schools could purchase for their libraries. Thus a great paradox arose – except at its most elite pinnacles, schooling has been a consistently anti-intellectual profession.

¶117:142 As digital resources become the basis of the curriculum, the need for curricular exclusions in principle disappears and the pedagogical strategy becomes one of inclusion. It requires on the one hand ensuring that the system represents all resources optimally and on the other that it avails to teachers and students navigational and analytical tools, which dependably enable them to engage a sequence of seminal questions, which let them identify and activate the resources that advance their power of cultural participation at the moment when they feel their need. With constrained media, policy enabled authorities to make choices on behalf of users,[84] and with digital media, policy shifts the power of choice to users, and authorities work to facilitate and assist users in the exercise of that power.[85]

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[84] Critics and thinkers of stature have examined the ways in which cultural and educational practices legitimate elite decisions on behalf of sub-groups within society. For the English tradition, *The Uses of Literacy: Changing Patterns of English Mass Culture* by Richard Hoggart (London: Chatto & Windus, 1957) and two books by Raymond Williams – *Culture and Society, 1780-1950* (New York: Columbia University Press, 1958, 1983) and *The Long Revolution* New York: Columbia University Press, 1961) – are excellent analyses of the difficulties in attaining a genuine democratization of culture. The work of Pierre Bourdieu – *Reproduction in Education, Society and Culture* with Jean-Claude Passeron (2nd. Edition, R. Nice, trans. Newbury Park, CA: Sage Publications, 1990) and *Distinction: A Social Critique of the Judgement of Taste* (R. Nice, trans., Cambridge: Harvard University Press, 1984) – examines such legitimizing functions in education and culture respectively. Among students of American education, Samuel Bowles and Herbert Gintis have developed the theme with respect to elementary and secondary education in *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life* (New York: Basic Books, 1976). Jürgen Habermas, *Legitimation Crisis* (T. McCarthy, trans., Boston: Beacon Press, 1975) gives a succinct overview of the problem of legitimation.

¶118:142 Rightly practiced, making choices for others differs from helping them make choices for themselves. The legitimation of choice under a rule of scarcity is the problem of distributive justice. Thus, over the past few centuries, people have situated issues of legitimation with respect to curricula and educational opportunity largely within the framework of distributive justice. Fuller, better opportunities went to those who had the highest aptitude and best preparation because they deserved them and would return to the whole society fuller service than would the lesser prepared. Arguments about whether on not a particular structure of opportunity was just turned on the whether or not one or another group received the educational opportunities and resources that they properly deserved. The good curriculum distributed educative attention to materials in fit measure to their cultural worth, the most attention going to the most important. Curriculum contentions turned on arguments over whether educators had committed injustices in assessing the relative importance of various materials and the relative potentials of diverse students. In contrast to this rule of scarcity, with the rule of profusion, where all opportunities are open to everyone, the issue of distributive justice in education in principle disappears. A problem of legitimation nevertheless remains.

¶119:142 Distributive justice is not the only type of justice. Aristotle formalized the problem of distributive justice, and in societies where economic power and differences are the main determinants of well-being, people perceive distributive justice to be the primary problem of justice for under the daily constraints it is surely the most pressing.[86] But as societies become affluent, other problems of justice increase in importance. Prior to Aristotle, Plato's *Republic* was another great work devoted to the problem of justice, but not to that of distributive justice. Most students forget chronology and assume that the proper context for interpreting Plato's views is the context of post-Aristotelian reflection on distributive justice. Consequently, they find the *Republic* essentially incomprehensible or perverse. In actuality, the *Republic* is not about distributive justice at all, but about what we might call developmental or regulative justice. Distributive justice concerns who deserves what share of available rewards and goods and why. Regulative justice concerns the problem of maintaining

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[85] Daniel Bell, to my astonishment, having always thought I disagreed with him, anticipates much of the argument here, stressing with considerable detail, how economic power is giving way to intellectual power in *The Coming of Post-Industrial Society: A Venture in Social Forecasting* (New York: Basic Books, 1973, esp., pp. 165-265). His study, *The Reforming of General Education: The Columbia College Experience in its National Setting* (New York: Columbia University Press, 1966) also envisions the primacy of educational institutions and presents a pedagogical examination of undergraduate education in which issues of distributive justice diminish and those of regulative justice come to the fore. Events did not treat that work well.

[86] For Aristotle's views on justice, see *Politics*, esp. III: ix, 1280a-1281a, and *Nicomachean Ethics*, V, esp. 1129a-1134a. John Rawls' influential study, *A Theory of Justice* (Cambridge: Harvard University Press, 1971), treats the problem of justice largely within the frame that Aristotle set. Rawls makes only passing mention of education, as an enabling good to be distributed according to a theory of justice. He makes mention of Plato only in two dismissive footnotes. There is a serious need for renewed interest in regulative justice on the part of serious students of education. What distributive justice is to the practice of politics, regulative justice is to the conduct of education: the lack of serious thinking about regulative justice is a scandal for the educators' profession.

relationships between differentiated parts within a self-sustaining whole in ways that allow the parts and the whole to fulfill their potentialities over time.

¶120:142 Think of a professional football team. The front office deals with distributive justice, at least within the tiny universe of the team and the league, in negotiating salaries and other terms of player contracts. The issue of distributive justice here (we'll forget about your pay and mine) is to justify differentials in compensation, making it clear relative to the market, or to some standard of intrinsic worth, why one player should get $7,000,000 and another a few hundred thousand. If the justification is poor, jealousies and resentment can wrack the team, leading fans to rail at the front office. The coaching staff, on the other hand, deals with developmental, or regulative justice in trying to bring each player up to his full potential and integrating them all into a resourceful, winning team. The issue here is to get each player into optimum condition for the role he has to play, to build the determination and elan of the group so that each plays with full intensity, and to develop and communicate to each player an astute gameplan that takes into account the unique capacities of key personnel and the vulnerabilities of opponents. Finally, regulative justice here consists in putting all these activities together, each in its proper measure, so that on the day of the crucial game, the whole team is strong, intense, and shrewd together, winning in a commanding performance.

¶121:142 Ah! Were the rest of life so simple, especially education. Even where the situations are far more complex, however, regulative justice entails perfecting the many-dimensional excellences of components and integrating them into an optimal performance. Theories of regulative justice in different areas of human activity enable people to think about how to bring potential excellence to fulfillment and people consider something legitimate according to regulative justice when they believe that efforts to bring potentials to fulfillment have been highly successful. In education, regulative justice is always important, but where scarcities abound, regulative justice recedes from the forefront of attention. Where curricular and educational resources are unconstrained, regulative justice becomes the prime issue of legitimation, however. Then, those responsible for the use of educative resources face increasing demands to show that their stewardship of the parts conduces to the optimum benefit of the whole, for the whole person acquiring education and for the whole community whose defining purpose is the fullest possible enlightenment of its members.[87]

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[87] It is very difficult to unravel the issues of distributive justice and regulative justice with respect to issues of race and minority cultures. *Brown vs. the Board of Education* is one of the few major educational actions to have been taken on the basis of reasoning about regulative justice – separate but equal schooling embodied a radically different relation of parts to the whole than did desegregated schooling, the relationships and interworkings of which the Court held to be more consistent with Constitutional principles. More recent controversies over affirmative action have largely cast it as a form of action controlled by principles of distributive justice – deciding who merits preferred access to scarce educational opportunities, with policies seen as righting accumulated wrongs in the view of some or violating due measure in the view of others. Issues of diversity and the incorporation of minorities into education and society are not well suited for resolution according to principles of distributive justice. Diversity, cultural multiplicity, is a conundrum for distributive justice, which can

¶122:142 It took Plato a supremely complicated and beautiful treatise to introduce his regulative theory of justice. It is neither our purpose here to explicate the *Republic*, nor to provide a new treatise following out the topic of regulative justice within a digital system where educational choices are essentially unconstrained. Educators have so far generated relatively little deep justification for existing practices.[88] For the most part, external constraints have imposed the elitism of the system on it. Those at the higher reaches have found their goods fortuitously in high demand. In the nature of things, their goods were scarce. Hence, they felt little pressure to explain well why their goods were better than others. As goods cease to be scarce, pressure increases to understand how various options affect persons and the polity so that people can make reasoned choices among those options on behalf of themselves and the polity. With a

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deal with it only by making comparisons, which are inherently dubious in the face of real differences, as old saws about comparing apples and oranges remind us. Diversity is not difficult to deal with in the context of regulative justice – *e pluribus unum*, the society that integrates complex parts into an effective whole is a more interesting, resourceful, and humane society than one of narrow homogeneity. Regulative justice exists as a human concern because people must deal constructively with their diversities, in the same way that distributive justice arises as a human concern because people must take their similarities fairly into account. The great importance of the study by William G. Bowen and Derek Bok in *The Shape of the River : Long-Term Consequences of Considering Race in College and University Admissions* (Princeton: Princeton University Press, 1998) lies in the way the authors clearly define the educational issue of racial considerations as an issue of diversity. We can do much more to clarify and celebrate the educative value of diversity by paying more attention to the role in the process of education played by reciprocal experiences of recognition, in the Hegelian sense of the term, in which persons and groups interact, clash and cooperate, and progressively learn through those experiences to recognize the humanity of self and other. It is no accident that Charles Taylor, a great Hegel scholar, has gone to the heart of this matter in his essay. "The Politics of Recognition" in by Charles Taylor, et al. In *Multiculturalism and "The Politics of Recognition"* (Princeton: Princeton University Press, 1992). It is unfortunately also no accident that his comprehension of the issue has had little resonance among American educators, whose grounding in the small, homogeneous circle of Anglo-American philosophy leaves them with little stimulus or drive to recognize recognition as a powerful process in education.

[88] Recent polemics about the educative quality of higher education, and the discussions, pro and con, of the canon, border on but do not grasp the issue of regulative justice in education. Criticism, occasioned in part by these polemics, assessing actual contributions to the canon is worthwhile, works such as Harold Bloom's *The Western Canon: The Books and School of the Ages* (New York: Harcourt Brace, 1994), David Denby's *Great Books : My Adventures With Homer, Rousseau, Woolf, and Other Indestructible Writers of the Western World* (New York: Touchstone Books, 1996), and Andrew Delbanco's *Required Reading: Why Our American Classics Matter Now* (New York: Farrar, Straus and Giroux, 1997). But for the most part, the recent discussions merit note mainly by virtue of their mediocrity – that must somehow signal something of historical significance.

Occasionally in cultural history, books that represent an important author's second-rate effort, an effort well below his normal stature, take on an inordinate power in shaping important discussions. One such book was Sir Karl Popper's *Open Society and Its Enemies* (Princeton: Princeton University Press, 1950), which anathematized a significant side of the Western tradition in a way that was at once highly distorted and all-too effective among Anglo-American educators. The resultant one-sidedness has reverberated through much historical thinking, and Allan Bloom renewed its currency in his influential critique, *The Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students* (New York: Simon and Schuster, 1987), another second-rate work of substantial influence by a scholar of stature. Bloom rehabilitated Plato from blanket Popperian-like dismissals, but he renewed the ban on Continental philosophies of history, a tradition of

change in constraining conditions, the question the young Socrates put so well in the *Protagoras* – What effect does an educational experience have upon the student who undergoes it? – increasingly confronts educators at all levels.[89] Regulative justice, pedagogy in its fullest sense, an understanding of how educational options affect self-actualizing persons in self-actualizing communities, becomes an integral part of educational work in the digital context.

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which educators have significant need in coping with the communications junctures of our time. Bloom's subtitle provided the public with a scapegoat for numerous discontents that people felt in the aftermath of the 60s and 70s. It might have been a time when educators began anew to probe the serious issues of regulative justice inherent in their work. Unfortunately, substantial parts of Bloom's own enterprise were lost from view as he was taken up by lesser followers. In the ensuing years, the pedagogy of higher education devolved into conventional polemics preached to the choirs of blame and defense.

It is unfortunate that negative polemics have dominated the issue, for it is raising almost the right question. Instead of what harm is one or another curricular choice likely to wreak, educators should pay more attention to the ways in which different curricular choices can benefit the person's full development.

[89] See Plato, *Protagoras*, esp. 313c-314c, 318a-320c. As Socrates both exploited it and experienced it, answering this question can prove dangerous – both in dialogue and in life. One might suspect that this danger accounts in significant part for the mediocrity of so much educational discourse. The mediocrity may be a form of self-protection that leaves the educator unexposed. If satisfied with such mediocrity, however, educators cannot fulfill the historic mission that they now have. Contemplating the demise of Socrates, Plato did not counsel mediocrity. Instead, he insisted that in the end each person's most significant educator is oneself and that each person bears the responsibility for his or her own education. "The blame is his who chooses," Lachesis, the daughter of Necessity observes in the existentialist close of the *Republic*. This is consumerism in education at its best, which will drive educational discourse, reflection on regulative justice, to a pitch of excellence, for this makes the student the fundamental educator, the person responsible for the quality of his or her own education. The work of the political theorist, J. Peter Euben, *Corrupting Youth: Political Education, Democratic Culture, and Political Theory* (Princeton: Princeton University Press, 1997) should be of major interest to educators willing to address the issues of civic pedagogy in our time. Benjamin R. Barber's *An Aristocracy of Everyone : The Politics of Education and the Future of America* (New York: Oxford University Press, 1994) and Amy Gutmann's *Democratic Education, With a New Preface and Epilogue* (Princeton: Princeton University Press, 1987 & 1999) are also important. These studies do not quite make the move beyond issues of distributive justice in education to develop a full educative theory of regulative justice, however.

Towards a Digital Program of Study

Academic Practice

Practice as a form of action based on the codified experience of a field combines with the work of disinterested reflection to delineate a pedagogical commonsense that will serve educators dependably under established conditions. Here educators develop ideas by which we orient and sustain educational effort, enabling those engaged in pedagogical work to cope with limiting circumstances. Here is the grounding where educators make our basic assumptions about human potential. Who should do what with whom in the process of education in order for self-sustaining human development to take place?

¶123:142 Throughout the era of scarce educative resources, the problem of practice has been to make these stretch as far as possible. The common practice has relied on the strategy of instruction, which requires large numbers of children to learn in unison. This strategy has been in force for centuries. As we noted, this strategy accounted for the design of schools, the way classroom practice worked, the organization of the day and year, the plan of the curriculum and the function of textbooks. Under a regime of cultural affluence, the effort to make a few cultural resources stretch as far as possible makes little sense. Other imperatives gain prominence. These are not entirely new imperatives, but their relative importance increases with the change in underlying economics as the information infrastructure shifts from print to digital networks.

¶124:142 Inquiry, study, problem solving can become the prime educational activities in a system making full use of digital resources. Under a regime of instruction, the crucial instrumentality in education is the teacher who imparts the properly packaged curriculum to the receptive learner. Under a regime of study and inquiry, the critical causal agent is the student who appropriates the content of his or her education, making distinctive choices and reaching out to peers and adults, especially to teachers, for encouragement, advice, and assistance. Educators have often commended study and inquiry as the best modes of learning. Despite numerous reform efforts, however, practice always seemed to revert to norms of traditional instruction. The reason is fairly simple – schools and teachers could not mobilize the diversity of cultural resources required in order to sustain the currents of substantive open-ended inquiry that many millions of children and youths would generate, with each sustaining his or her quest over twelve to twenty years of education. Under a regime of scarcity, locating the causal agency of education in the power of students to study and inquire would overwhelm the ability of teachers and the intellectual resources of the school to respond effectively to the avalanche of youthful questions. Consequently, given the constraints, with every departure toward student autonomy, educators have repeatedly relocated the causal agency with the teacher in a regime of instruction. When that regime works, a linear flow of knowledge and skill moves

from the teacher to a class of students with drill, practice, testing, and recitation pumping the flow onward – it being, alas, all too viscous.

¶125:142 Constraints, we recognize, are changing. Digital resources represent a powerful investment in the power of the student to inquire and to learn. Given effective tools of access, analysis, simulation, and synthesis, students can accomplish many things with these resources that they could not do without them. As a result of empowering students more effectively, new media enable teachers to alter their characteristic practices as well. For many teachers and observers of education, these shifts require a difficult change in mind-set about the process of education. All educational practices have implicit in them controlling assumptions about human nature. The controlling assumptions implicit in existing practices are pessimistic. People do not like to admit that external conditions determine what they will. Constrained to act thus and so, people adopt principles that convert the necessity into the fruit of reasoned choice.[90] Thus, it is not enough for many people to say that teachers must be causal agents of education because limiting constraints prevent the system from responding in effective, supportive ways to autonomous students. Since children are feckless, steady control by teachers becomes their adult duty, the fundamental responsibility of their chosen role. With the pessimistic view of the student that many hold, seeing the student as a dull, indocile, quiescent creature, they would find it quite imprudent to act on the presumption of the student's self-directing autonomy were it possible to do so. In the face of this pessimism, educators must now assert a strong optimism in their assumptions about the nature of children in order to develop the educational possibilities of the new technologies. They must assert this optimism and they must prevail, with articulate stands, in conflicts over such assumptions. Through such struggles, educators advance the continuing work of enlightenment.

¶126:142 By and large, the traditional system assumes the worst of students. If it has eased up on the adage, "Spare the rod, spoil the child," it is fast replacing it with "Scrub the test, wreck the cohort." One of the great ironies is that infants learn to walk and talk largely through their self-directed effort. They are, furthermore, remarkably dependable in achieving these first goals through their self-directed efforts. How wonderful it would be were our schools to have such rates of success! Adults, however, learn little from the example of infants. As children grow, becoming able to walk and to talk, they suddenly appear to their elders to have become willful. The elders then become far more paternalistic and start to assume that children cannot exercise wise judgment about their own education. Adults usurp control, convinced that they can speed the process and keep priorities in order. Parents easily find their usurpation of pedagogical control to be entirely legitimate in view of the child's recalcitrance in bringing the dread sphincter under voluntary discipline. The cost of this usurpation is a frequent estrangement of children and youth from their own education. The benefit is a speeding of the process, or so we think, as what might be

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[90] Marx's theory of ideology analyzed this process thoroughly. In a pragmatic sense, it becomes a distortion only when the objective conditions no longer require the pattern of action in question. See Karl Mannheim, *Ideology and Utopia: An Introduction to the Sociology of Knowledge* (New York: Harcourt, Brace and Company, 1949).

learned, slowly but autonomously, by a zigzag path of trial and error, is learned instead by the straight and narrow as the student is channeled along pre-designed tasks to the formal curricular objective. Alas, the estrangement becomes habitual and adults, who had been accustomed to it in their turn, can see issues of education only from the perspective of teacher control. Too often adults can only see, as external observers, a wasteful trial and error in what subjectively to the young mind is a course of challenging inquiry and exploration, leading to a construction of understanding and meaning.

¶127:142 Long ago Rousseau argued eloquently throughout *Emile* for a careful cost-benefit trial of this trade-off between educational estrangement and didactic acceleration.[91] To date, a significant trial at the level of organized practice has not yet taken place, largely because the strategy of acceleration has been the only organized practice within which results could be examined. The American progressive education movement tried to minimize educational estrangement by working with students as they set their own pace and direction, but we have noted before – this movement proved fundamentally impracticable under prevailing conditions. Now those conditions no longer prevail. As digital resources become the infrastructure for education, it becomes much more feasible to test whether or not paternalistic efforts to accelerate the pace of learning are in fact counter productive and whether both time and value can be gained by ceasing to understand the business of the student as learning what teachers teach and instead recognizing it to be what the student's name suggests, studying those things that the student finds significant.[92]

¶128:142 Perhaps the most deep-seated issue facing educators in the social construction of a new educational system involves their assumptions about human nature, particularly their assumptions about children and youth. It is an issue about which the Western tradition is deeply ambivalent, encompassing strategies of activation, which assume a natural goodness as the point of departure, and strategies of direction and control, which assume original sin as the starting point.[93] By historical accident, these

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[91] See the discussion of "gaining time by loosing time" in *Emile or On Education* Book 2, ¶¶ 271ff. (Bloom, trans., New York: Basic Books, 1979. pp. 93 ff.) (Foxley-Roosevelt, trans., 1998. http://www.ilt.columbia.edu/projects/rousseau/emile.html).

[92] Of course, historical constraints in the information infrastructure were not the only factors that led people to design the educational system around efforts to channel and accelerate the pace of student learning. The argument here, however, is that educational alternatives to such arrangements, although frequently suggested, have never been significantly implemented because the constraints in the information infrastructure rendered such alternatives impracticable. As those constraints change, the historical verdict potentially changes. Let us put it this way: If, broadly speaking, the introduction of printing in Europe empowered failed medieval heresies to become the dominant theology in major areas of western Christendom and to force deep reform throughout the remainder, so too may the introduction of digital technologies in post-industrial societies empower the failed educational heresies propounding child-centered schools and progressive education to become the dominant educational system in the twenty-first century.

[93] "The first question a philosopher faces is where to start," as Robert Denoon Cumming put it in *Starting Point: An Introduction to the Dialectic of Existence* (Chicago: The University of Chicago Press, 1979), p. 1. This study is a generally overlooked contribution that indicates an important issue on which thinkers should make themselves clear. Cumming's *Human Nature and History: A Study of*

differences have had relatively muted effects in education practice over the past few centuries. During this time, the means available for following through on the more optimistic assumptions were severely limited, and those that were consistent with a more pessimistic view of human nature were historically both more widely accessible and more effective under the prevailing constraints. Now this accidental muting of the issue is fast disappearing. Already, a significant strand of opposition to twentieth-century progressive practices attacked them for allowing children to grow up undisciplined. Critics rejected progressivism as a reckless abandonment of children to their willfulness and perversity, a callow failure by adults to implant a sense of order on the childish soul. As observers of our extended present, we are seeing a similar, serious conflict arising with respect to the use of the Internet in education. The Web is almost a perfect litmus test, disclosing a person's basic assumptions about human nature. Some predominantly celebrate its profusion as a wonderful opportunity enabling people to participate more fully in cultural activity of significance to them. Others dread that profusion as a terrible temptation that must be censored and controlled before the young can safely enter into it. At a time when the teaching of evolution can still come under challenge as an insult to strongly held beliefs about the origin and nature of human kind, one can easily envision strong objections to a pedagogy of student autonomy, gaining substantial public adherence..

¶129:142 Here is one of the points at which the new technologies may be associated with a significant historical change of phase, however. The parameters of past sensibilities may prove to have little to do with the realities of our emergent present. Significant realities widespread before the change, for instance, a pessimistic view of human nature, may simply be left behind in the transition from one phase to another. Past beliefs, therefore, do not necessarily predict emergent convictions. If we look, we can see that patterns of human trust and acceptance are changing substantially as the contexts of human experience change. Consider the hypothesis that modern conditions elicit a growing confidence that people are fundamentally good, and that the digital systems are extending that confidence in other people immensely. Complex systems of social action require that the people participating in them have internalized stringent standards of behavior and the conceptual assumptions that secure and reinforce those standards. When my action is tightly linked to similar actions by many others, with all of us acting according to internalized standards and codes, we develop very extensive spheres of trust and confidence, which encompass multitudinous strangers. In this way, people become natural Rousseauians, confidant that the love of self inherent in each person, leads each person to act in a way that protects both his or her own safety and that of others as well.

¶130:142 For instance, we eat foods that countless hands have processed and prepared, we know not whose, foods from unknown sources, shipped in unknown ways, packaged and sold according to unknown routines, going to millions of mouths in billions of meals, in an incredible network of trust and confidence in other people, nameless and entirely unidentifiable. For instance, too, as we drive our cars, we routinely risk our

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the Development of Liberal Political Thought (2 vols., Chicago: The University of Chicago Press, 1969) is also important for the topic here.

lives and those of others in acting on the belief that the behavior of other drivers is sane and highly predictable – virtually everyone continuously assumes the natural goodness of other drivers as each speeds hither and yon. When the light turns red, people stop, and whether drivers hold a pessimistic or an optimistic view of human nature, they stake their lives repeatedly on this expectation. Most complex systems depend on the intricate structuring of behavior, achieved through a pervasive expectation of conformity by all participants to rigorous standards and requirements. The expectation that participants in the system internalize and develop its standards and requirements is built into the system, and people do so out of concern for their self-interest, both narrowly and broadly construed, which is helped by observance and harmed by violations of the enabling standards. At the margins – beware the radar trap. But maintenance of the system is not achieved through enforcement at the margin, but by nearly universal expectations that all can depend on each to act according to the norms in force.[94]

¶131:142 How does such confidence in the other person spread through a population? One might observe that both optimists and pessimists about human nature are inclined to act, given the opportunity, on the basis of their view, and in both cases those actions embody self-confirming prophecies. Thus the pessimist creates authoritative systems of enforcement, the typical effect of which is to engender destructive, subversive opposition. The pessimist then takes this resistance as evidence that he or she was right all along. The optimist advances a self-fulfilling prophecy in creating internalized systems of self-control. If such a system is sufficiently attractive to people to elicit their participation, they indeed internalize the standards of self-control and the system flourishes, becoming evidence that the optimistic assumptions were sound. Circumstances have so far favored the pessimistic prophecy, at least within education. Now, however, it becomes possible to implement practice according to the optimistic prophecy. As we do that the evidence may build that indeed students deserve and merit trust. Digital technologies embody deeply optimistic assumptions about human nature and their efflorescence in our culture is a work, both sudden and vast, resulting as people internalize unenforced standards of operation and use them to advance their various purposes. Educators have the opportunity, finally, to open participation in the work of culture fully to all, and to grasp that opportunity educators need to advance a great, hopeful prophecy, that people who participate in the cultural work of humanity, thereby internalize the standards and discipline requisite for its effective operation.

¶132:142 In constructing a new educational system, centering initiative and control with the student is a fundamental principle of design and a measure of good practice. The role of teachers remains great: it is the role of fomenting questions, doubts, uncertainties;

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[94] The need to drive defensively does not contradict this point, which pertains to a more existential level of driving. On the freeway with traffic dense but moving well virtually all drivers are at ease driving in packed formations at speeds in which their reaction time would not allow them to respond to a rapid change in path or speed by a car close by. With respect to the irrelevance of enforcement at the margins, it is interesting how the American rules of the road have adopted traffic regulations with respect to speed in thorough contravention to the official limits, with even the police generally conforming to the ruling common sense, enforcing a margin some 20% above the posted limits.

modeling strategies of inquiry; and criticizing the quality of results. In this context, curriculum design becomes the art of posing problems and facilitating work upon them. To so facilitate autonomous work by students requires great skill and sensibility, and teaching may become a more prized and more demanding profession. As educators adapt work to empower the student, they create settings in which

- Students work primarily in small collaborative groups on challenging projects that take a significant period of time to complete and cut across normal disciplinary boundaries.
- Students have access to digital representations of nearly unlimited sources and data – documents, images, recordings, videos, maps, statistics, artifacts, monuments, and so on.
- Students can make effective use of digital tools that enable them to conduct sophisticated analyses, syntheses, and simulations with the result that the work students can perform is much closer in scope and quality to that of advanced scholars.

The transformation of education taking place is not a function of increased access to information. It is a function of increased *participation* in intellectual work – in advancing knowledge, in applying skill, in exercising judgment. Participants create, adopt, and maintain their standards. They do not have their standards imposed by external authority. The faith in human nature, which educators should profess with pride and vigor, is the faith that participants in the creative work of culture open to all, all naturally adopt its empowering discipline and work through it to make a better future, further strengthening the progressive bond with posterity.

Digital Learning Communities

Professional Practice

Practice as a form of action based on the codified experience of a field combines with the work of professional thinking by educators to design educational environments that permit people to make optimum use of the pedagogical resources at their disposal. Here educators interact in the daily work of education. Here is the emerging system of digital pedagogy in operation. How should educators organize their conduct to enable people to fulfill the best possibilities inherent in their capacities and their conditions?

¶133:142 One of the powerful predictors of how children fare in school is the educational attainments of their parents. This predictor holds across cultures, languages, races, ethnicities. It poses a difficult challenge. In populations where the educational attainments of parents are low, how can their children achieve educational excellence? To answer this question, we need to ask another. Why is parental educational attainment such a powerful predictor? The reason is not obscure. Parents with significant educational attainments have better insight into the processes of formal learning and the strategies for success at it, and they are more likely to surround their children with intellectual resources and helpful suggestions that prove supportive. In a myriad of subtle ways they pass their experience to their children. Parents who have not been successful in this formal schooling may pass on other kinds of knowledge that largely go unrecognized by the school culture. The challenge before us is to find a means to bring these ways of knowing together and to empower parental influence for all children in the processes of schooling.[95]

¶134:142 Use of networked technologies, combined with a strong community of people learning together, can alter this cycle of failure that our educational structures, inadvertently perhaps, have so-consistently helped to arrange. Throughout the twentieth century, educational and social services have been highly segmented and specialized. Segmentation is everywhere. Elementary schools serve children, aged 5 to 12, dividing them all up according to annual age cohorts. So too with the numerous other segments of the learning society – high school, middle school, adult education, job training, college, counseling, and so on. Schooling and other community services all occur in separate spaces because the information resources and specialists necessary for each different function have required a distinctive location and deployment. The information technologies of the twenty-first century change these conditions. The resources needed to sustain numerous different educational functions simultaneously in any place of congregation become ubiquitous. Far from distance learning taking education out of the school, new media make the

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[95] The main source here is *Reproduction in Education, Society and Culture* by Pierre Bourdieu and Jean-Claude Passeron (2nd. Edition, Newbury Park, CA: Sage Publications, 1990), Nice, trans.

school a community in which all ages, all interests, and all needs can again join together to pursue all aspects of human development in a shared and common space.

¶135:142 Hypothesize that this ubiquity of diverse educational resources permits educators to break the cycle of reproduction in educational attainments. Parental empathy with their children's processes of learning expands as the parents are fully engaged in learning themselves. So, too, with teachers and the surrounding community. The school, a nurturing, enclosing space wired to draw sustenance, stimulus, and collaboration from the entire world, should increasingly take on the characteristics of a *learning community*; comprising children, their parents, and professionals of all sorts, including researchers, scientists, and scholars as well, all of whom are engaged in serious efforts to extend their education further and to participate in the common intellectual enterprise. To prototype such a learning community and to show its potential power in breaking the cycle by which patterns of educational attainment reproduce themselves from generation to generation, imagine a digital learning community in which all members – students, teachers ,administrators, and parents – continuously work in collaboration with each other to pose difficult questions and to work on answering them with the full intellectual apparatus of the culture. Networked technologies and continuing involvement with other learning communities, universities, and public interest groups enable each community and each participant to have access to the resources and assistance to make headway on such goals. This learning community becomes the locus of universal participation in the work of culture.

¶136:142 Advanced information technologies make construction of integrated learning communities far more feasible than ever before. The ideal of parents and children, teachers and community members joining together in the shared nurturing of their human potentials is not new. It has been a difficult ideal to actualize, for the resources that can help the child take first steps in the course of education differ from those that can help the parent, or the specialist, or community member. Networked technologies make it possible, through a single location and all at once, to engage a diversity of people with challenging learning activities, providing each with appropriate resources and useful intellectual tools. Educators can construct such learning communities in the extended present in which we now work. To achieve the potentialities of a new educational system, educators must break the cycles through which educational institutions, despite endless intentions to the contrary, have perpetuated patterns of privilege and disadvantage. To be a significantly new system, the emergent system must stop reproducing accidental inequalities. This is the challenge, a challenge educators now can meet, and one they must meet now.

¶137:142 Over several centuries, educators have built the meritocracy of print. Let us put aside the traditional image of the educational ladder, with children clambering, rung by rung, up the sequence of grades, some falling off as drop outs, more and more scaling the whole way to college graduation, walking thereafter the plateau of middle-class affluence, and a few going higher still, up to the rungs of advanced knowledge and professional power. Instead of the educational ladder, let us image a learning community, warm and surrounding, with its youngest children entering at its very

center and then rippling outward as they grow through a series of concentric circles, with parents, teachers, and other adults ringed around them, with lines of interactive communication, both tangible and virtual, linking all, from the center of these circles out, joining them in reciprocal interaction with the full range of cultural institutions and all the specialized resources of global humanity. These learning communities pulsate with mutual support, bathing all in sustaining fluids rich with ideas, images, resonant voices, bracing criticism, and animating hopes. Here it is no longer that some have much and others little. Here each partakes from the richness of the whole and each adds back the full fruits of his or her abilities and efforts. These learning communities are the better future we educators now have to make. In constructing these, we forge anew the progressive bond with our posterity.

Envoi

¶138:142 Educators, awake! Unite! We have a better future to make.

Educators work in an extended present with unprecedented new tools and resources. We are in the midst of this expended present, which stretches fifty years or more back into the past and fifty years or more out into the future. Within this extended present, the spectrum of pedagogical possibility has thus changed.

¶139:142 Digital libraries, multimedia educational resources, and flexible networks augmenting the intelligence and skill of every person: these are related and maturing technologies; with them, educators can make advanced media serve as powerful engines of equity. The libraries of the very richest schools currently represent minor academic resources compared to the aggregate resources of the digital library that become accessible at the desktop in any school, or home, as it connects to the fast-growing network of networks. Educational experiences, activated by multimedia projects address diverse learning styles and engross students of all backgrounds in cooperative, inquiry-based educational work. Wide-area networks suffused with sophisticated supports, enabling desktop video conferencing and group work in a responsive context rich with cultural content and intellectual tools, augment human capacities for the work of culture. With these new forms of educative communication, educators can overcome the traditional isolation of the classroom, bringing youthful minds actively into the laboratory, the archive, the field station, the theater, and the office. Long-standing pedagogical limitations now cease to have effect and educators must create and discover which potentialities they can make feasible for all.

¶140:142 At all levels, educators must bring the digital technologies to bear on the social construction of a new educational system. Ultimately this effort requires mobilization of great historical energies. Such energies do not arise by relying solely on incremental adjustments to established procedures in stable institutions. Educators must raise hope, expectations, their sense of urgency and efficacy. They must build reform to an ever-more evident turning point. Educators must persevere through the extended present, so that one by one people see plainly in their daily circumstances unexpected results that evoke strong conviction – a new educational system is feasible and brings a spectrum of possibilities far more preferable than the old. Educators must tackle tough challenges. We must take ones on that people hold to be intractable, to be imperative, to be inspiring. These must be challenges from which people can generate unifying aspirations and moving commitments. Educators must address these challenges fully, stinting neither effort nor expense, in a sustained, dramatic disclosure of new possibilities. Such a path leads to the social construction of a better future.

¶141:142 Rising as a new class, educators have the capacity to renew the progressive bond with posterity. Under the hegemony of production, educators were not a cohesive class and they proved unable to exert decisive, historic leadership. Circumstances have changed. In saying we have a better future to make, educators are saying that we now have the power to act on the level of historic leadership. Those, whose social roots

leave them content to construct a consumer society, or an information society, encompass too few of the real powers that are now enabling construction of a global, knowledge society. Educators – as an open, inclusive class, as the sum of all those acting as educators – are the natural leaders in a knowledge society. Educators create, communicate, and apply knowledge, values, and skills in the flux of life. Educators knead ideas into experience. The emergent global habitat depends on the work of knowledge, the work of education. Bacon's great observation, "knowledge is power," takes on new meaning. Once other social groups controlled education and harnessed its power of knowledge to purposes less than fully educational. Circumstances have changed. Knowledge – that is educators – we are power – that is the emergent class challenged to carry the standard of historic leadership forward, to make a better future, to advance enlightenment, to forge strong bonds with the posterity of all.

¶142:142 With power, responsibilities come. Educators must address life in the large. We cannot confine our agenda to bounded particulars. Educators work across a spectrum of thinking, from purely disinterested reflection to systematic professional application. Educators act in the world through diverse means – through guiding theories, through controlling policies, through organized practices. Thinking and acting as educators, the work of educational innovation spreads before us sweeping challenges – challenges to which we can rise, not in word, but through deed. Educators must

- Renew the progressive bond with posterity, pushing the work of enlightenment to a new plane –
  - Achieving the fulfillment of basic human rights;
  - Securing for all both physical well-being and active participation in a culture of meaning;
  - Making a sustainable habitat for humanity in all parts of the globe;
  - Eliminating prejudice, poverty, despair, and disease.
- Advance principles of regulative justice as a standard by which people can exercise wise educational choice –
  - Shifting the central concern in cultural policy from limited access to full participation;
  - Replacing the long-standing politics of exclusion with a vibrant, many-sided politics of inclusion.
- Affirm the educator's faith that no one knowingly does harm; that evil is ignorance; that it is despair, fear, resentment; and that these are remediable, not in eternity, but in achievements of progressive educational work –
  - Recognizing as the engine of education the capacity of students to pursue independent inquiry and to study autonomously;
  - De-emphasizing the traditional dominance of instruction;

    - Rekindling teaching as the work of putting productive questions, of modeling strategies of inquiry, of suggesting alternatives, of criticizing results;
    - Making the curriculum an unconstrained set of tools and resources to sustain each person's self-directed, unbounded development.
- Unify the educational domains, bridging the distinction between research and teaching –
    - Redesigning the relation between elementary and secondary schooling and higher education with an integrated intellectual environment active at all levels;
    - Engaging all people as creative participants in the cultural enterprise.
- Adapt the structuring policies of educational institutions to enable educators to use digital tools to full pedagogical effect –
    - Managing time to promote sustained work on group projects and making space, physical and virtual, conducive to flexible intercommunication between diverse persons;
    - Shifting from motivation through competition, enforced through pervasive testing, to motivation through cooperation, guided by frequent feedback;
    - Deploying a comprehensive curriculum, comprising meaningful questions, tools of analysis and navigation, and complete presentation of cultural substance;
    - Recruiting a mesh of people engaged in educational support, prepared to give effective assistance to all students as they pursue inquiries that lead them through the resources of the culture, gripping each as a participant in the work of its creation;
    - Imparting a rationale for education that makes it the core, intrinsic purpose of the polity, a polity of democratic, cultural participation.
- Break the cycles of educational reproduction that have perpetuated debilitating distinctions among people, and create a new milieu of practice, encompassing digital learning communities, where people of many ages, interests, and achievements mix and work together in the effort of learning, sharing and helping each other, supported by complete digital libraries, by open wide-area networks, and by good tools for intellectual navigation, analysis, synthesis, and simulation, engaged in advancing the culture, in adding to truth, in upholding value, in applying skill to the work of the world.

As educators rise to these challenges, we renew the progressive bond with posterity. We make a better future. Educators have much to do.