Dewey, Mitra, and the "Technological Proletariat:" Democratizing the Information Revolution

John Hartmann, Southern Illinois University
hartmajr@yahoo.com

Pragmatism and Technological Practice Conference
Rochester Institute of Technology
February 14th, 2003

Introduction

In his 1939 essay, "Creative Democracy – The Task Before Us," John Dewey described democracy as "a way of personal life controlled not merely by faith in human nature in general but by faith in the capacity of human beings for intelligent judgment and action if proper conditions are furnished."[1] While this may seem an odd definition, it is emblematic of the reconstructive tendency in Dewey's philosophy. If we are to achieve a truly democratic society, we must reconstruct democracy itself – our personal lives must become more democratic if we are to have hopes for our political institutions. And central to this reconstruction, as Dewey points out in this essay, is a recognition of the roles of communication and education in the interest of democratzing ends.

It seems hardly worth mentioning the role played by information technology in our contemporary modes of communication and education, given the centrality of the personal computer and the Internet in our everyday lives. For most of us in this room, and especially for those under the age of 25, it is difficult to remember a time before the home computer, before e-mail and instant messaging. But it is vitally important to bear in mind that the technological advantages of Western life are not universal – large

[1] ED 1.342, LW 14:226/7. "Creative Democracy – The Task Before Us."

segments of the globe do not have nearly the access to the information technology we so take for granted, nor the ability to make effective use of it. The 'technological have-nots' are not merely foreign, faceless Others, but are our neighbors, our friends, even – dare I say? – our parents. (Or just think of the trouble you have programming your VCR!)

The goal of this paper is to investigate the possibilities for a remedy of this situation through a broadly Deweyian lens. Through the illustrative work of Sugata Mitra, an Indian computer scientist, we will turn to Dewey's understanding of both inquiry and education – how we think and how we should learn – with an eye towards their potential for the 'furnishing of proper conditions' that Dewey speaks of in our first quotation. More strongly, this paper shows that Dewey's philosophy of inquiry and education can provide the model for a mass computer-literacy initiative along the lines of those already devised by Sugata Mitra. Given the enormous amount of tools and information available on the Internet [MIT OpenCourseWare, the Perseus Project, OpenOffice, Linux, etc.], the possibilities today for communication and learning as self-education are fantastic. It becomes our job, then, to explain precisely how we might allow this 'technological proletariat' to gain access to the democratizing possibilities of the 'Information Revolution.'

Mitra's Experiment

Consider this 'thought experiment:' imagine an alley in New Delhi which serves as a kind of playground for the slum children of the city. These children have little (if any) education, and many are illiterate. English is truly a foreign language. Virtually none of the children have ever seen a computer. Imagine that someone cuts a hole in the alley wall and places an internet connected computer in a kiosk within the wall. And

imagine that, in the span of a few months, these children teach themselves – with almost no adult intervention – to use the computer, access the Internet, and build rudimentary webpages with Microsoft's Frontpage package. Does this seem fanciful? How could such a thing be possible?

What is most striking about this thought experiement is that it has already happened. Sugata Mitra, an Indian computer scientist, has (beginning in 1999) placed computer kiosks in locations across India, and in each case (although admittedly with varying degrees of success), the local children attained basic computer literacy.[2] In other words, without any computer training as it is traditionally understood – a teacher leading students through a pre-defined syllabus of instruction – a level of competence was achieved where the children were able to access the Internet, search for the kinds of information they were interested in, and use the computer to achieve their own ends.

Our elucidation of Mitra's work begins with a discussion of the first 'hole in the wall' kiosk. Because the headquarters of NIIT (Mitra's employers) are separated from the alley by a wall, a hole was cut in the wall[3] through which a computer screen and touchpad were placed for access from the alley, freely available to any passerby. When confronted with the placement of the computer in the alley wall,[4] the children initially believed that they were being presented with a video game. Within four hours time, however, the children had begun to surf the Internet, and the most popular sites included Disney.com, various Hindi news sites and Bollywood sites, etc. They soon discovered

[2] Mitra defines basic computer literacy as the ability to fulfill these five requirements: 1. Turn a PC on. 2. Use MS Paint to create a designated picture. 3. Move objects using folders, shortcuts, cut-and-paste, drag-and-drop, copy and delete methods. 4. Move from one web page to another. 5. Send and receive e-mail through a PC that is pre-configured to do so. (Mitra, 4)

[3] This is also the source of the experiment's being referred to as the 'Hole in the Wall experiment.'

[4] Here, I summarize freely from Mitra's summary of findings for the Kalkaji experiment. (Mitra, 7-14)

how to use the MS Paint program, which became quite popular, and was used for drawing pictures and names. Winamp, a program for playing music in MP3 format on the computer, was used as a means of playing songs in the background while other activities went on. In time, the children discovered the (somewhat hidden) character map application,[5] which they used to insert textual characters into their MS Paint creations, in renaming and creating icons on the desktop, and most importantly, for writing their names. A number of techniques were discovered, utilized, and disseminated by the children for the operation of the computer, including drag-and-drop and cut-and-paste, the various items accessible through right-clicking on an icon, the character map as the means for the insertion of text, and the saving of files for later use. In short, the children came to develop a thorough and tested method for the utilization of the computer, access of the Internet, and they did so with little adult intervention.

Mitra has repeated this experiment, varying somewhat with the material configuration of the system according to local constraints, in at least five or six other locations across India, and currently there are some 48 kiosks in operation.[6] Although conditions were not identical in all cases, due to varying economic and educational contexts, Mitra noted similar results across the board. In only one instance was the experiment prematurely terminated due to vandalism.

The Learning Process and Dewey's Method of Inquiry

In broad strokes, and following Mitra's descriptions, we can describe how these children would come to discover and incorporate some specific technique or bit of

[5] In one interview, Mitra expressed his surprise and delight at the children's discovery of the character map, saying that he himself had been unaware of the existence of this particular application. (see this interview at http://www.greenstar.org/butterflies/Hole-in-the-Wall.htm)

information regarding computer use.[7] Through trial and error, one child discovers a bit of information or a new technique that was previously unknown. This discovery is repeated by multiple users, through which adjustments and refinements of the technique are found. As the technique is disseminated through the group, it enters into the vocabulary of the group such that the technique can be described to others. The symbolization of the new bit of information or technique leads to the drawing out of generalizations regarding the technique. The children then memorize the procedures for accomplishing various tasks, incorporating the symbolized knowledge of numerous techniques, leading to generalized, transmittable schemas for the accomplishment of tasks while simultaneously streamlining their procedures through continued experimentation. The knowledge is passed from the 'knows' to the 'know nots' according to an interpersonal economy in which knowledge becomes a commodity in its own right, and something to be acquired through various means of exchange not predicated upon violence or coercion. Finally, the children reach

---

[6] see http://www.niitholeinthewall.com for up-to-date information regarding the experiment.

[7] Mitra's summary runs as follows:

> "1. One child explores randomly in the GUI (Graphical User Interface) environment, others watch until an accidental discovery is made. For example, when they find that the cursor changes to a hand shape at certain places on the screen.
> 2. Several children repeat the discovery for themselves by requesting the first child to let them do so.
> 3. While in step 2, one of more children make more accidental or incidental discoveries.
> 4. All the children repeat all the discoveries made and, in the process, make more discoveries and start to create a vocabulary to describe their experience.
> 5. The vocabulary encourages them to perceive generalizations ("when you right click on a hand shaped cursor, it changes to the hourglass shape for a while and a new page comes up").
> 6. They memorize entire procedures for doing something, for example, how to open a painting program and retrieve a saved picture. They teach each other shorter procedures for doing the same thing, whenever one of them finds a new, shorter, procedure.
> 7. The group divides itself into the "knows" and the "know nots", much as they did into "haves" and "have nots" in the past. However, they realize that a child that knows will part with that knowledge in return for friendship and exchange as opposed to ownership of physical things where they could use force to get what they did not have.
> 8. A stage is reached when no further discoveries are made and the children occupy themselves with practicing what they have already learned. At this point intervention is required to introduce a new "seed" discovery ("did you know that computers can play

a plateau in their discoveries, leading to a kind of stasis in which known techniques and tasks are practiced until such time as an external (adult) intervention sends the children off into another cycle of self-instruction and inquiry.

The model of learning observed by Mitra in his experiment bears numerous resemblances to the model of inquiry theorized by John Dewey. In Dewey's analysis of reflective thought, he traces out the general mechanisms by which a learner comes to adequately navigate an problematic situation through the positing and testing of a hypothesis by means of the synthesis of data and ideas via reason. A useful comparison can thus be drawn between Mitra's observations about the mechanisms of children's learning in his experiment and Dewey's explanation of the method of inquiry in reflective thought. While the general contours of this method are discussed throughout the Deweyian corpus, two of the clearest examples of the mature model of inquiry occur in the 1933 work How We Think, and the 1938 book Logic: The Theory of Inquiry. For the purposes of this comparison, however, and in light of the fact that Dewey was writing with educators in mind, I will focus upon the 1933 account.

According to Dewey, the two end-points of reflection involve a problematic situation and the resolution of that situation. "The first of these situations may be called *pre*-reflective. It sets the problem to be solved; out of it grows the question that reflection has to answer. In the final situation the doubt has been dispelled; the situation is *post*-reflective; there results a direct experience of mastery, satisfaction, enjoyment."[8] Implied in this passage is the role of doubt in precipitating reflection: for Dewey, only in

---

music? Here let me play a song for you"). Usually, a spiral of discoveries follow and another self instructional cycle begins." (Mitra, 15)

[8] ED 2.139.

instances of doubt or controversy is the need for reflection manifested.[9] Using the example of Mitra's experiment, the primacy of doubt in the precipitation of reflection might be understood as the experience of the children when facing the computer for the first time – what is this? why is this here? what is it for?

The first stage of Dewey's model of reflective thought involves the positing of various suggestions for action on the part of the inquirer, and as suggestions for the solution of the situation and the doing-away with doubt. These suggestions come almost immediately to the inquirer, just as a multitude of explanations must have come to the children. 'Perhaps this is a video game, or a new kind of television. Or perhaps it is here by mistake.' The ideas for action in the situation come almost immediately, and suggest themselves with some degree of urgency; on Dewey's account, however, there must be an inhibition of these suggestions, these proposed solutions, if thinking truly is to occur. "Some inhibition of *direct* action is necessary to the condition of hesitation and delay that is essential to thinking."[10] Put differently, the call to action presented by these various suggested solutions must be inhibited so as to allow for a thoughtful, reflective process of engaging the situation and coming to a coherent conclusion. Simply 'playing' with the computer, and experimenting with various elements of the device as these tasks suggest themselves, does not lend itself to an effective utilization of it, nor a satisfactory solution.

Dewey calls his second stage of inquiry intellectualization. It involves the concentrated consideration of the situation, in light of the various suggestions that are suggested by it. This is the stage in which the problem first appears. On Dewey's account, problems are tasks; that is to say, they do not appear *ex nihilo*, nor are they

[9] cf. ED 2.146.
[10] ED 2.139.

artificially constructed problems without reference to any situation, but "there is a troubled, perplexing, trying situation, where the difficulty is, as it were, spread throughout the entire situation, infecting it as a whole."[11] For the children in Mitra's experiment, then, this stage can be understood as the point in the engagement with the computer in which a specific task emerges as an appropriate solution to the situation – 'Perhaps if I try this thing next to the screen, something will happen.' This example also helps to make clear another aspect of this stage in Dewey's theory: the co-emergence of the problem and the solution. "We know what the problem *exactly* is simultaneously with finding a way out and getting it resolved. Problem and solution stand out *completely* at the same time. Up to that point, our grasp of the problem has been more or less vague and tentative."[12] In other words, the solution to the problem appears insofar as the problem becomes defined. The solution is a specific response to, and is suggested by, the clearly defined problem.

But with the emergence of the problem and the suggested solution, according to Dewey, inquiry does not end. Rather, the suggested solution functions as a hypothesis to be tested in light of the observed data and with the aim of justifying or undercutting the hypothesis. This is the third stage of the Deweyian model of inquiry. Thinking does not cease with the emergence of a hypothetical solution; instead, according to Dewey, the hypothesis is "a guiding idea, a working hypothesis, and [the learner] is led by it to make more observations, to collect more facts, so as to see if the new material is what the hypothesis calls for."[13] The hypothesis, then, prompts the inquirer to test it, to collect more observational data in the interest of discerning whether the hypothesis works,

[11] ED 2.140.
[12] ibid.

whether the new data justifies the original hypothesis. The child in Mitra's experiment touches the touch-pad and observes what happens, notes the movement of the cursor on the screen. Something does happen when the touch-pad is used – the new data justifies the hypothesis.

Only through reasoning, however, do the observed facts and the idea of the suggestion become synthesized into a useful bit of information. For Dewey, this is the fourth stage of thinking. Reasoning takes into account the previous knowledge of the learner, the specifically situated, perspectival knowledges of the encultured learner, so that the connections drawn between data and ideas, or between various ideas, is contextualized and comprehensible to the learner. Ideas become refined and streamlined, so that, as Dewey has it, "[g]iven a fertile suggestion occurring in an experienced, well-informed mind, that mind is capable of elaborating it until there results an idea that is quite different from the one with which the mind started."[14] The child in Mitra's experiment links up the connection between the use of the touch pad and the movement of the cursor with previous knowledge, and contextualizes his or her hypothesis within what is already known about the general situation. Or, from a different perspective, procedures for using the computer are refined and reworked according to the idea of the task or desired end. Procedures for inserting text into pictures via the character map are transposed into the design of rudimentary webpages.

Solutions for the achievement of problematic tasks or situations must be tested; that is to say, they must be investigated in terms of their potentiality to do real work. When the touch-pad is touched, does the cursor always move, or is this a one-type event?

---

[13] ED 2.141.
[14] ibid.

Does cut-and-paste work in every situation, or is it limited in its usefulness? For Dewey, the hypothesis must be tested experimentally, must be subjected to the test of its utility in terms of its actions. This is the fifth and final stage of reflective thought or inquiry. If the hypothesis is found to hold throughout experimentation and testing, the learner has reason to believe in the hypothesis as the solution to the problem. Alternatively, should the hypothesis fail the tests put to it, it is denied belief and acceptance. Importantly, the failure of hypothesis is not simply a negative outcome of experimentation; rather it is educational or instructive. "The person who really thinks learns quite as much from his failures as from his successes. For a failure indicates to the person whose thinking has been involved in it, and who has not come to it by mere blind chance, what further observations should be made."[15] The failure of the hypothesis to pass the tribunal of experimental verification points the learner towards the conditions which could lead to the positing of a successful hypothesis, or towards a set of modifications of the hypothesis which could allow it to function successfully, to do real work. If the child finds that the new technique does not successfully function in the pursuit of some task, it may well point the child towards the kinds of techniques required for the accomplishment of that task. Cutting-and-pasting may not work in this situation, but dragging-and-dropping might. In this sense, we can also see how the failure of the hypothesis to solve the problem can lead towards a renewed instance of inquiry and thought.

While the presentation of these five stages of inquiry might lead us to believe that Dewey saw them as immutable and static features of any thinking, this is not the case. Rather, as Dewey himself had it, "the five phases of reflection that have been described

[15] ED 2.142.

represent only in outline the indispensable traits of reflective thinking."[16] Two phases might be conflated in a specific instance, or one phase might be extended in scope and importance. The method is a general schema for the operation of reflective thought, but is subject to the local specificities of the situation in which it occurs. The outcomes of the process of thought are also relative to the cultural situation in which they are located.[17] There is no universal, hard and fast method which governs the 'proper' selection of relevant facts, the generation of applicable ideas, or the potency of solutions. For example, the interests of the child in Mitra's experiment are certainly different from the academic's or the person interested in online gaming. We should expect, then, that the results of each respective method of inquiry will lead to differing outcomes. For the child in Mitra's experiment, the computer is primarily a site for entertainment, as a tool for diversion and games at disney.com. For the academic, the computer is a writing implement, a means of communication and research. For the online gamer, the computer is a portal into another world, one in which fantastic and powerful personas can be donned. The tasks are different, relative to local concerns and norms, and so the methods of inquiry and the solutions derived from thought will differ dramatically.

---

[16] ED 2.143.

[17] [For example, the children in Mitra's experiment came to describe various facets of the computer interface in terms derived from their own cultural heritage. The upshot of this example is to underscore the relativity of the method of inquiry as it involves specifically situated, perspectival knowledges. This does not merely entail a kind of linguistic relativity, where the meanings of supposedly synonymous terms would be different in different languages. While Dewey does highlight the role of language in the process of generalization of possibilities that is so important to reflective thought, I take him to be making a much stronger point when he says that

"No hard and fast rules for this operation of selecting and rejecting, or fixing upon significant evidential facts, can be given. It all comes back, as we say, to good judgment, the good sense, of the one judging. To be a good judge is to have a sense of the relative indicative or signifying values of the various features of the perplexing situation; to know what to let go of as of no account; what to eliminate as irrelevant, what to retain as conductive to the outcome; what to emphasize as a clew to the difficulty. … In part it [good judgment] is instinctive or inborn, but it also represents the funded outcome of long familiarity with like operations in the past." ED 2.147]

Nevertheless, as this section should make clear, what Dewey's model of reflective thought offers is a model for the effective location of solutions to problematic situations, regardless of background norms and concerns. Mitra's reported observations of the means by which his children came to achieve various tasks, and to learn to accomplish various ends, maps quite well onto the Deweyian schema of reflective thought as described in How We Think. Perhaps more importantly, the homology between the Deweyian method of inquiry and Mitra's learning process has ramifications for our understanding of Mitra's educational project. Mitra's proposed pedagogy, based in part upon his observations of the self-instruction of the children in his experiment, is surprisingly like that of Dewey. [note that Mitra does not cite Dewey] A comparison and elaboration of Dewey's and Mitra's educational projects is our subject in the next section.

MIE and Dewey's Model of Education

In order to facilitate the comparison between Mitra and Dewey on education, it is important to understand precisely the model of learning proposed by Mitra. Mitra describes his position as one in which

> one of the foundational premises is that children actively construct their knowledge rather than simply absorbing ideas… they assimilate new information to simple, pre-existing notions, and modify their understanding in light of new data. In the process, their ideas gain in complexity and power, and with appropriate support they develop critical insight into how they think and what they know about the world.[18]

Borrowing heavily from developmental models of learning, Mitra takes play and experimentation to be highly useful and valuable types of learning. Both play and

[18] Mitra, 15-16.

experimentation are understood as self-structured learning endeavours, predicated upon self-motivated processes of learning.[19] In terms of the application of this model of learning, Mitra suggests that the challenge of taking seriously the self-structured, self-motivated learner consists in "creating curricula that matches and also challenges children's understanding, fostering further growth and development of the mind."[20] He calls his educational method 'MIE,' or 'minimally invasive education' – it is minimally invasive because of the emphasis upon the learner and his or her own ability to self-educate.

John Dewey's model of education is strikingly like Mitra's. Larry Hickman sums up Dewey's view of a productive educational scheme when he says that "it… involves cooperation between teacher and learner – between expert and non-expert, if you will – in ways that alter and enrich the experience of both. It is this feature of education – not just in the schools but in a lifelong curriculum – that makes it potentially revolutionary."[21] Hickman is right to point towards the 'revolutionary' possibilities of a brand of education in which the end is the maximum development of the specific capacities of the individual, and where "a teacher enters into a transaction with a learner with the aim of developing the learner's talents and interests and enhancing transaction between the learner and the institutional features of his or her society."[22] Instead of the imposition of a set curriculum upon an individual learner, the Deweyian pedagogic model involves the individual incubation of talents and interests, with the aim of producing an engaged, involved citizen.

[19] ibid.
[20] ibid.
[21] Hickman, 183.
[22] ibid., 63.

One of Dewey's clearest discussions of a proper pedagogy occurs in his 1897 essay, "My Pedagogic Creed." In this essay, Dewey delineates the two fundamental poles of his theory of education: the psychological and the sociological. The psychological pole demands that process of learning discussed in Dewey's writings on reflective thinking be incorporated into the pedagogical model. Accordingly, as he says in "My Pedagogic Creed," "[t]he child's own instincts and powers furnish the material and give the starting point for all education."[23] In order to encourage the learning process in children, education must proceed in terms of the native processes by which learning transpires. A strictly syllabus-driven model of education, with the imposition of facts to be memorized and set standards for what and how learning should proceed, is completely foreign to the type of effective learning theorized by Dewey, and described by Mitra in his experimental findings.

The second pedagogical pole, the sociological, is an equally misunderstood and underappreciated element of education. Learning does not proceed blindly; rather, it is always directed towards an end, a task. The role of the educator, and the school, is to provide a kind of 'meta-end' towards which education should aim – the utmost attainment of a learner's specific talents and interests with the goal of the production of a socially responsible, engaged citizen. The aim of education should be to "train [the learner] that he will have the full and ready use of all his capacities… [these powers, interests and habits] must be translated into terms of their social equivalents – into terms of what they are capable of in the way of social service."[24] In this way, education serves the goal of Dewey's 'social reconstruction,' such that, as Dewey says, "education is the

[23] ED 1.229.
[24] ED 1.230.

fundamental method of social progress and reform."[25] In terms of the discussion in this paper, education which proceeds according to the ideas of Dewey or Mitra provides the conditions for the kind of democratization of information technology, and for free access of information, that has been called for here. Through the cultivation of the innate tendencies and powers of the specific individual, a citizen who is able to critically analyze and sift data is produced. Such a citizen, provided the material conditions required for the free accessing of information, is precisely the kind of citizen that contemporary 'pluriculture' (Ihde's term) demands.[26]

One of the most important aspects of Dewey's pedagogic model is the role of the teacher as the facilitator of learning on the part of the child. A teacher is not the keeper of a vessel of knowledge, waiting to transmit information to open-eyed pupils. Rather, as Dewey says in his 1902 essay, "The Child and the Curriculum," the teacher is a kind of guide, someone who helps to lead learners to unknown and unmapped sites of thought, so that "[g]uidance is not external imposition. *It is freeing the life-process for its own most adequate fulfillment*."[27] An example from Mitra's experiment can help us to understand precisely the kind of intervention and guidance required on the part of the teacher.

---

[25] ED 1.234.

[26] A possible concern, however, arises in this model, in terms of the end results of the educational process discussed by Dewey and Mitra. Put bluntly, it might well appear that the level of thinking attained by pupils of a constructivist pedagogy might tend towards facile, surface analyses of problems and situations, such that the erudite scholar or learned person would become a rare bird indeed. In a sense, this is one of the outcomes of the Deweyian model, insofar as all learners should gain the ability to undertake a critical, if limited in depth, analysis of information and situations. However, given the idea that a Deweyian education would foster and cultivate the specific strengths and intuitional tendencies of each learner, it is certainly conceivable that some students might well tend towards a scientific career. More simply, the general production of a public trained to engage in critical thought does not imply the end of specialized knowledge, or specialized knowing. There will be scientists, just as there will be philosophers and teachers. Especially in light of the exponential growth of knowledge even in the last century, such specialization is a necessary, if unfortunate, by-product of life in the Information Age.

[27] ED 1.240.

Recall that in Mitra's experiment, untrained children acquired a level of basic computer literacy through patterns of reflective thought consisting in self-initiated and self-motivated inquiry. Very little adult intervention was required for this learning process to occur. However, as Mitra notes, situations arose in which adult intervention was necessary – for example, with the reaching of a plateau in the children's learning, such that they were content to use only the tools and techniques they had acquired in their interaction with the computer. In this instance, according to Mitra, one of the roles of the educator is to intervene and introduce new ideas or 'seeds' into the situation, i.e. "did you know that computers can play music? Here, let me play a song for you."[28] The educator does not offer a set of instructions by which the task can be achieved; rather, he or she simply plays the song, makes manifest a latent possibility of the situation, and lets the children work the possibility out on their own. Of course, the educator also monitors the learning process, so as to prevent completely wrong interpretations of data or doomed instances of hypothesis and testing, but on the whole, the learners are left to their own devices for discovering and streamlining the methods and techniques for accomplishing tasks.

This model of a 'constructivist' or 'minimally invasive' education described by Mitra is not only analogous to Dewey's; more importantly, Mitra's observations and results suggest a kind of 'empirical evidence' for the validity of Dewey's pedagogical theories. Learning need not, and indeed, often does not, occur in pre-defined situations. Instead, it functions best and most fully when the methods and tasks involved in inquiry and learning are discovered by the learners, in light of their natural instincts, powers, and habits of thought. When applied to the program of the widespread democratization of

[28] Mitra, 15.

information and information technology, the pedagogical programs espoused by Dewey and Mitra can function as a kind of model for the inculcation of basic computer literacy among various publics in various cultures and situations. Because the learning process is tailored to the specific needs and interests of a group or individual, the educational process creates a situation in which the specific aims and desired goals of the learner are taken into account. The solutions to tasks central to basic computer use and access of information via the Internet can be taught in many different ways, and in many different contexts. Using the pedagogical model of Dewey and Mitra, learning can be structured to most effectively allow learners to reach their own specific goals and fulfill their required tasks.

Conclusions

If we take seriously the Deweyian definition of democracy as the "belief in the ability of human experience to generate the aims and methods by which further experience will grow in ordered richness,"[29] then, as Larry Hickman notes, democracy ultimately consists in a method of education.[30] Taking Sugata Mitra's experiment as a model of a possible democratization of information technology, such that the 'technological proletariat' is provided access to computer technology and, more importantly, given the ability to self-educate via the Internet, the Deweyian ideal of democracy comes closer to fruition. As we have seen, Mitra's findings, read through the lens of a Deweyian understanding of reflective thinking and proper pedagogy, lend themselves to a situation in which publics traditionally restricted in access are able to

[29] LW. 14.229; op. cit. Hickman, 182.
[30] Hickman, 182.

make use of information available online. But what, precisely, does a pragmatic or Deweyian view of education and inquiry show us?[31] If the democratization of the

[31] This, of course, brackets two important issues: economics and infrastructure. How are we going to get all these computers, and how are we going to provide internet access? Although I have no time to do so in the main text of the paper, let me offer two preliminary answers to these questions here. (1) As discussed above, Mitra's experiment did not utilize the most expensive, cutting-edge technologies available. Even in 1999, a Pentium II processor running at 266mhz was not particularly fast, nor particularly expensive. What is important in this example is the idea that older, less powerful computers can serve the ends of the widespread proliferation of basic computer literacy and access to the Internet quite well. A basic set of applications – here taken to mean an operating system, a basic office suite, e-mail and multimedia capabilities, and an Internet browser – can run on any number of low-end computer (perhaps taking a first generation Pentium chip running at 133mhz with 32mb of RAM as a baseline) and can do so quite nicely. Of course, such systems will be severely handicapped when it comes to accessing streaming media, i.e. Real Audio streams, which often make cultural programming freely available, or video clips, but in terms of basic accessibility, these low-end systems can function as tools for accessing information via the Internet.

Many businesses and educational institutions have vast 'computer graveyards,' where these kinds of outdated, low-end systems are stockpiled as they are superceded by newer, more powerful components. One of the major problems facing technocratic societies is precisely what to do with these systems, especially insofar as they present special and difficult problems in their disposal and recycling. One proposal, then, would be to offer tax credits to corporations for the 'donation' of these surplus systems to governmental and private educational bodies for use in a widespread initiative towards the proliferation of public access sites. Libraries often serve as locuses of public Internet access; on this proposal, library programs could be expanded using donated hardware without putting a significant dent in municipal budgets.

Another problem facing the kind of initiative proposed here is the cost of software and Internet access. The cost of licensing of Microsoft operating systems and software, for example, is considerable, and would present a formidable economic challenge to any widespread implementation of a public accessibility program. There are cost-efficient alternatives available, however; much of the software developed under the Open Source model is free of charge to any who use it. Operating systems such as the variants of Linux, which were formerly quite challenging for the end-user, now are packaged with tidy graphic interfaces much like those of the Windows operating systems. Sun Microsystems, in an effort to combat the hegemony of the Microsoft Office suite in the marketplace, has produced their own office suite which is available for free download. And the Mozilla browser, which provides the engine for Netscape's products, is to be freely distributed in accordance with the principles of Open Source. Put simply, if we understand the requirements of this widespread movement towards public access to involve basic applications like word processing and Internet browsing, there exists low-cost alternatives to Microsoft products which can serve democratizing ends.

(2) The costs of Internet access provide another hurdle for the kind of widespread access envisioned in this paper. One possible solution consists in the partnering of private and public entities in the construction and maintenance of the infrastructure required for access to the Internet. For example, the CEO of Aeire Networks, whose company is planning to restart the failed Ricochet wireless broadband firm in the coming year, has such a model in mind when he describes his partnering with the city of San Diego:

> Our approach is, "Let's build a public-private partnership." We have to rent space on top of light poles to put our antennas on. Most of those poles are either owned by cities or utilities. So we have to lease the space from them. We're trying to get a better lease rate (than what Metricom was paying). In return, we'll build out a network so fire, police and emergency officials in these areas can use it for their daily operations. It's very easy to be a good corporate citizen with this.

Information Revolution is to be possible, how can we use these Deweyian insights to aid us in our project of mass education?

Following Dewey, we can begin to envision the kinds of 'courses' and materials required for training the public. Courses designed with the specific aims and needs of various groups would have to be created. They would have to emphasize a hands-on, learn-by-doing approach to education, and they would have to be affordable to even the most modest household. In India, Sugata Mitra's employer, NIIT, has begun to create just these types of courses (designed, of course, by Mitra) with the introduction of the various (and numerous!) SWIFT programs[32]. While a number of the SWIFT courses focus primarily upon job-skill training, NIIT has also created courses designed specifically to bring non-computer-savvy people to levels of basic computer literacy. The courses are relatively inexpensive – they begin at roughly 750 rupees, or $15 – and involve a minimum of traditional lecturing, emphasize hands-on learning, and cater to the inculcation of individual strengths and conceptions in computer operation. Dewey, the great proponent of education, would be proud.

In this paper we have seen that Deweyian pragmatism is indeed capable of providing the conditions for communication and education so central to Dewey's reconstruction of democracy. The children in Mitra's experiment make this quite clear. Although we have not here dealt with the critical issues of the economics and the infrastructure for this proposed educational initiative, what emerges from this analysis is the idea that the 'technological have-nots' can be granted access to the democratizing

---

The building of an infrastructure capable of dealing with the demand for broadband Internet access depends upon the cooperation of a governmental body for access to land (for laying fiberoptic cable), to lightposts (for placement of transmitters and antennas), etc. Municipalities could 'trade' access to such resources for a share of the bandwidth created through the partnering.

potential of information technology. Moreover, the means for this access are closer at hand than we might initially think. Citizens can become self-educators, both in terms of basic computer skills, and in terms of the ability gained through computer literacy to engage the vast repository of online information. To borrow a famous line, Dewey's reconstruction might well be televised, but more likely, the reconstruction of democracy will be online.

[32] see [http://www.easywithswift.com]

Works Cited:

ED — Dewey, John. The Essential Dewey. 2 volumes. ed. Larry A. Hickman and Thomas M. Alexander. Bloomington: IUP, 1998. Cited in notes as ED volume.page, so that ED 1.100 would refer to volume 1, page 100.

EW, MW, LW — Dewey, John. The Collected Works of John Dewey, 1882-1953. ed. Jo Ann Boydston. Carbondale: Southern Illinois University Press, 1969-1991. Published as The Early Works: 1882-1898 (EW), The Middle Works: 1899-1925 (MW), and The Later Works: 1925-1953 (LW). References are given by series, followed by volume and page number.

Hickman, Larry. — Philosophical Tools for Technological Culture. Bloomington: IUP, 2001.

Ihde, Don. — Postphenomenology: Essays in the Postmodern Context. Evanston: Northwestern University Press, 1993.

Mitra, Sugata. — "Minimally Invasive Education for mass computer literacy." available at: http://www.niitholeinthewall.com/Paper1.htm

See also NIIT's webpage for the Hole in the Wall project:
http://www.niitholeinthewall.com