

Education Automation, Freeing the Scholar to Return to His Studies by Buckminster Fuller

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Section 5

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I have talked to you about solving problems by design competence instead of by political reform. It is possible to get one-to-one correspondence of action and reaction without political revolution, warfare, and reform. I find it possible today with very short electromagnetic waves to make small reflectors by which modulated signals can be beamed. After World War II, we began to beam our TV messages from city to city. One reason television didn't get going before World War II was because of the difficulty in distributing signals over long distances from central sources on long waves or mildly short waves. We were working on coaxial cables between cities, but during the war we found new short ranges of electromagnetic frequencies. We worked practically with very much higher frequencies, very much shorter wave lengths. We found that we could beam these short waves from city to city. Television programs are brought into the small city now by beam from a few big cities and then rebroadcast locally to the home sets. That is the existing TV distribution pattern. My invention finds it is now possible to utilize the local TV masts in any community in a new way.

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Going up to, say, two hundred, three hundred, or four hundred feet and looking down on a community you see the houses individually in the middle of their respective land plots. Therefore, with a few high masts having a number of tiny massers, lassers, or reflectors, each beam aimed accurately at a specific house, the entire community could be directly "hooked up" by beams, instead of being broadcast to. This means a great energy saving, for less than 1 per cent of the omnidirectionally broadcast pattern ever hits a receiving antenna. The beaming makes for very sharp, clear, frequency-modulated signals.

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In the beaming system, you also have a reflector at the house that picks up the signal. It corresponds directly to the one on the mast and is aimed right back to the specific beaming cup on the mast from which it is receiving. This means that with beam casting you are able to send individual messages to each of those houses. There is a direct, fixed, wireless connection, an actual direct linkage to individuals; and it works in both directions. Therefore, the receiving individual can beam back, "I don't like it." He may and can say "yes" or "no." This "yes" or "no" is the basis of a binary mathematical system, and immediately brings in the "language" of the modern electronic computers. With two-way TV, constant referendum of democracy will be manifest, and democracy will become the most practical form of industrial and space-age government by all people, for all people.

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It will be possible not only for an individual to say, "I don't like it," on his two-way TV but he can also beam-dial (without having to know mathematics), "I want number so and so." It is also possible with this kind of two-way TV linkage with individuals' homes to send out many different programs simultaneously; in fact, as many as there are two-way beamed-up receiving sets and programs. It would be possible to have large central storages of documentaries < great libraries. A child

could call for a special program information locally over the TV set.

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With two-way TV we will develop selecting dials for the children which will not be primarily an alphabetical but a visual species and chronological category selecting device with secondary alphabetical subdivisions. The child will be able to call up any kind of information he wants about any subject and get his latest authoritative TV documentary, the production of which I have already described to you. The answers to his questions and probings will be the best information that man has available up to that minute in history.

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All this will bring a profound change in education. We will stop training individuals to be "teachers," when all that most young girl "education" students really want to know is how they are going to earn a living in case they don't get married. Much of the educational system today is aimed at answering: "How am I going to survive? How am I going to get a job? I must earn a living." That is the priority item under which we are working all the time < the idea of having to earn a living. That problem of "how are we going to earn a living?" is going to go out the historical window, forever, in the next decade, and education is going to be disembarassed of the unseen "practical" priority bogeyman. Education will then be concerned primarily with exploring to discover not only more about the universe and its history but about what the universe is trying to do, about why man is part of it, and about how can, and may man best function in universal evolution.

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Automation is with us. There is no question about it. Automation was inevitable to intellect. Intellect was found to differentiate out experience continually and to articulate and develop new tools to do physically repeated tasks. Man is now no longer essential as a worker in the fabulously complex industrial equation. Marx's worker is soon to become utterly obsolete. Automation is coming in Russia just as it is here. The word worker describing man as a muscle-and-reflex machine will not have its current 1961 meaning a decade hence. Therefore, if man is no longer essential as a worker we ask: "How can he live? How does he acquire the money or credits with which to purchase what he needs or what he wants that is available beyond immediate needs?" At the present time we are making all kinds of economic pretenses at covering up this overwhelming automation problem because we don't realize adequately the larger significance of the truly fundamental change that is taking place in respect to man-in-universe. As automation advanced man began to create secondary or nonproductive jobs to make himself look busy so that he could rationalize a necessity for himself by virtue of which he could "earn" his living. Take all of our bankers, for example. They are all fixtures; these men don't have anything to do that a counting machine couldn't do; a punch button box would suffice. They have no basic banking authority whatsoever today. They do not loan you their own wealth. They loan you your own wealth. But man has a sense of vanity and has to invent these things that make him look important.

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I am trying to keep at the realities with you. Approximately total automation is coming. Men will be essential to the industrial equation but not as workers. People are going to be utterly essential as consumers >what I call regenerative consumers, however, not just swill pails.

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The vast industrial complex undertakings and associated capital investments are today so enormous and take so long to inaugurate that they require concomitantly rapid regenerative economics to support them. The enterprise must pay off very rapidly in order to be able to refund itself and obtain the economic advantage to

inaugurate solution of the next task with still higher technical advantage. In that regenerative cycle of events, the more consumers there are the more the costs are divided and the lower the individual prices. The higher the frequency of the consuming the more quickly the capital cost can be refunded, and the sooner the system is ready for the next wave of better technology. So man is essential to the industrial equation as a consumer < as a regenerative consumer, a critical consumer, a man who tasting wants to taste better and who viewing realizes what he views can be accomplished more efficiently and more interestingly. The consumer thus becomes a highly critical regenerative function, requiring an educational system that fosters the consumer's regenerative capacity and capability.

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At present, world economics is such that Russia and China work under an integrated socialist planning in competition with our literally disorganized economic world (for our anti-trust laws will not permit organization on a comprehensive basis). The Communists have high efficiency advantage because of their authoritarianism. We have very little centralized authority, save in "defense." The Communists now have the industrial equation, too, in large scale, and soon complete automation will be with them. They are very much aware of the fact that the more customers there are, the more successful the operation will be, because the unit costs are progressively lower. This is why the Soviets were historically lucky in getting China as customers. They would like also to have, exclusively, India and Africa as customers. If Russia acquires the most customers, we will not be able to compete. They will always have the lower costs on any given level of technology. We are going to have to meet this possibility and meet it vigorously, swiftly, and intelligently. Within the next decade, if we survive at all as an organized set of crossbreeding men on the American continent it will be because we will have suddenly developed a completely new attitude on all these matters. In case you are apprehensive that social and political economics are to be so laggard as to impede your advanced educational programming, it is well to remember that the comprehensive world economics are going to force vast economic reforms of industries and nations, which incidentally will require utter modernization of the educational processes in order to be able to compete and survive.

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Every time we educate a man, we as educators have a regenerative experience, and we ought to learn from that experience how to do it much better the next time. The more educated our population the more effective it becomes as an integral of regenerative consumer individuals. We are going to have to invest in our whole population to accelerate its consumer regeneration. We are going to be completely unemployed as muscle-working machines. We as economic society are going to have to pay our whole population to go to school and pay it to stay at school. That is, we are going to have to put our whole population into the educational process and get everybody realistically literate in many directions. Quite clearly, the new political word is going to be investment. It is not going to be dole, or socialism, or the idea of people hanging around in bread lines. The new popular regenerative investment idea is actually that of making people more familiar with the patterns of the universe, that is, with what man has learned about universe to date, and that of getting everybody inter-communicative at ever higher levels of literacy. People are then going to stay in the education process. They are going to populate ever increasing numbers of research laboratories and universities.

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As we now disemploy men as muscle and reflex machines, the one area where employment is gaining abnormally fast is the research and development area. Research and development are a part of the educational process itself. We are going to have to invest in our people and make available to them participation in the great educational process of research and development in order to learn more. When we learn more, we are able to do more with our given opportunities. We can rate federally paid-for education as a high return, mutual benefit investment. When we

plant a seed and give it the opportunity to grow its fruits pay us back many fold. Man is going to "improve" rapidly in the same way by new federally underwritten educational "seeding" by new tools and processes.

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Our educational processes are in fact the upcoming major world industry. This is it; this is the essence of today's educational facilities meeting. You are caught in that new educational upward draughting process. The cost of education will be funded regeneratively right out of earnings of the technology, the industrial equation, because we can only afford to reinvest continually in humanity's ability to go back and turn out a better job. As a result of the new educational processes our consuming costs will be progressively lower as we also gain ever higher performance per units of invested resources, which means that our wealth actually will be increasing at all times rather than "exhausted by spending." It is the "capability" wealth that really counts. It is very good that there is an international competitive system now operating, otherwise men would tend to stagnate, particularly in large group undertakings. They would otherwise be afraid to venture in this great intellectual integrity regeneration.

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I would say, then? that you are faced with a future in which education is going to be number one amongst the great world industries, within which will flourish an educational machine technology that will provide tools such as the individually selected and articulated two-way TV and an intercontinentally net-worked, documentaries call-up system, operative over any home two-way TV set.

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The new educational technology will probably provide also an invention of mine called the Geoscope < a large two-hundred-foot diameter (or more) lightweight geodesic sphere hung hoveringly at one hundred feet above mid-campus by approximately invisible cables from three remote masts. This giant sphere is a miniature earth. Its entire exterior and interior surfaces will be covered with closely-packed electric bulbs, each with variable intensity controls. The lighting of the bulbs is scanningly controlled through an electric computer. The number of the bulbs and their minimum distance of one hundred feet from viewing eyes, either at the center of the sphere or on the ground outside and below the sphere, will produce the visual effect and resolution of a fine-screen halftone cut or that of an excellent television tube picture. The two-hundred-foot geoscope will cost about fifteen million dollars. It will make possible communication of phenomena that are not at present communicable to man's conceptual understanding. There are many motion patterns such as those of the hands of the clock or of the solar system planets or of the molecules of gas in a pneumatic ball or of atoms or the earth's annual weather that cannot be seen or comprehended by the human eye and brain relay and are therefore inadequately comprehended and dealt with by the human mind.

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The Geoscope may be illuminated to picture the earth and the motion of its complete cloud-cover history for years run off on its surface in minutes so that man may comprehend the cyclic patterning and predict. The complete census-by-census of world population history changes could be run off in minutes, giving a clear picture of the demological patterning and its clear trending. The total history of transportation and of world resource discovery, development, distribution, and redistribution could become comprehensible to the human mind, which would thus be able to forecast and plan in vastly greater magnitude than heretofore. The consequences of various world plans could be computed and projected. All world data would be dynamically viewable and picturable and relayable by radio to all the world, so that common consideration in a most educated manner of all world problems by all world people would become a practical event.

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The universities are going to be wonderful places. Scholars will stay there for a long, long time < the rest of their lives < while they are developing more and more knowledge about the whole experience of man. All men will be going around the world in due process as everyday routine search and exploration, and the world experiencing patterning will be everywhere < all students from everywhere all over the world. That is all part of the new pattern that is rushing upon us. We will accelerate as rapidly into "yesterday" through archaeology as we do into "tomorrow." Archaeology both on land and under the seas will flourish equally with astronautics.

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\*We must recognize (at the least) that the internet is a utility. It is how we are using the technology that makes it "the internet".