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Introducing the Technophobia/Technophilia Debate: Some Comments on the Information Age

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Manuel Castells in his book, "The Information Age: Economy, Society and Culture - The Rise of the Network Society", points to a dialectical interaction between technology and society: "Technology does not determine society: it embodies it. But neither does society determine technological innovation: it uses it"

According to Castells (1996), the present phase of capitalism has become possible because of developments in information technology. The introduction of innovations in the area of microelectronics, telecommunications, digital electronics, and network computing represent the rise of a new technological paradigm which becomes the basis of socio-economic relations. These new technologies effect pervasively all levels of production in different sectors as well as the whole of society.

This paradigm shift requires new practices in production. A new kind of worker and a new style of management is needed in order to adjust production to the dynamism imposed by information technologies. Castells comments on the dynamic characteristic of the new global society caused by the introduction of information technology:

> "The emergence of a new technological paradigm organized around new, more powerful, and more flexible information technologies makes it possible for information itself to become the product of the production process. To be more precise: the products of new information technology industries are information processing devices or information processing itself. New information technologies, by transforming the processes of information processing, act upon all domains of human activity, and make it possible to establish endless connections between different domains, as well as between elements and agents of such activities. A networked, deeply interdependent economy emerges that becomes increasingly able to apply its progress in technology, knowledge, and management to technology, knowledge, and management themselves. Such a virtuous circle should lead to greater productivity and efficiency, given the right conditions of equally dramatic organizational and institutional changes" (Castells 1996, p. 67).

Thus, this new era not only places knowledge at the forefront of economic competitiveness, but also calls for a whole new model of production and management. The possibility of an incredibly dynamic diffusion of new goods and fast delivery of services has reshaped production. Industries compete over quality and product differentiation. It is no longer the era of manufacturing, but of information-processing. Management has focused on user needs, prompting efforts to produce different models in order to match a great diversity of customer tastes. It is no longer the time of standardized goods, generated under a mass production model (Fordism). Instead, the "Information Economy" points to a flexible, customized model of production, introduced by the "just in time" practice of Japanese companies (Toyotism). Another feature of this new era is the shift from vertically- integrated large-scale to vertical disintegration and horizontal networks between units in production (Harvey, 1994).

This new information economy asks for a new kind of worker, one that is more creative, participatory, and capable of making suggestions and reflecting over his or her daily duties. Features like these seem to be what is called "flexible labor", within both mature and high tech sectors. Economies also require a new style of managing and a "new manager". In addition to being able to take decisions in a more dynamic context, this manager has to learn how to deal with "new workers". Thus, a new relationship between management and shop-floor has to be constructed. The flow of ideas has now a different pattern. The "thinking" does not take place exclusively on a top-down basis. Feed-back from the creative and participatory worker has to be incorporated and considered by management. Learning is undertaken in all levels and sectors of the production system. Cooperation, rather than competition, is the key in this new environment. In this context, the acquisition of special skills is a central element determining socio-economic development. Education is, in a sense, placed in a key position.

Schools are asked to prepare students to perform in this new environment which has been highly affected by new advances in information technologies. Computers are devices present in almost all day to day activities. The dynamism of the present phase of capitalism requires computer literacy.

Having examined this broad picture characterized by a reshaping of socio, economic and cultural relationships, the questions I would address are: how should education deal with the "information age's" requirements for creativity, critical skills and participatory capacity? Can computers help the development of these special skills? More specifically, I would like to focus on the debate which polarizes positions regarding the use of computers in educational practices.

Studies dealing with the relationship between technology and society tend to fall into two extreme positions: technophilia or technophobia. The latter sees technology as an evil element which is taking society to a process of dehumanization, not recognizing any benefit that it might bring to human life. The former takes the opposite position, placing on technological advances the solution and the means to improve performance in different kinds of activities.

This paper will discuss both positions. I will concentrate on the use of computers and network systems i.e., Internet, and how the two positions -technophilia and technophobia - see the relationship between technology and society, with special focus on education. Bill Gates' book, "The Road Ahead", will represent the optimistic view of the use of technological developments. In contrast, Clifford Stoll with his "Silicon Snake Oil - Second thoughts on the Information Highway" will bring the other extreme position in which technology is presented as an instrument of disconnection which isolates humans from reality.

Bill Gates and "The Road Ahead" - a Technophilic View

In his book - "The Road Ahead" - Gates stresses that we are living on a revolutionary moment in which information technologies function as the new tools of socio economic and cultural activities. Throughout the book he tends to glorify the role of computers, software and network links in the development of different daily tasks. Despite his position, clearly favoring the use of information technologies, Gates comments that these technologies should be seen as tools for the improvement of quality life, not as substitutes of human activities. He emphasizes the improvement of "quality of life." Machines would offer a more convenient way of life, being present in people's life under people's control.

> "Over time, the new machine finds a place in our everyday lives because it not only offers convenience and saves labor, but it can also inspire us to new creative heights. It assumes a trusted place beside our other tools. A new generation grows up with it, changing and humanizing it - playing with it" (Gates 1995).

Gates believed that the PC would be this new machine. He describes his journey as head of Microsoft, and the way he and Paul Allen established the company. They envisioned a great market expansion. Allen and Gates could see that computers would become "personal tools". This transformation of computers being owned by each person implied individuality, interaction, and extension. Gates and Allen started to turn into reality what McLuhan already had foreseen in 1964: computers as extension of people, as the protagonist of the new phase after the Industrial Revolution.

Gates focus on PC's pointed to the niche which would make of him an important entrepreneur: software. Software is the artifact that gives language to the machine. The interaction between men/women and machine is mediated by the software. To develop a software you need more human reasoning than capital. Software is a deposit of human systematization of different kinds of reasoning to function as a tool to support the user's further reasoning.

Thus, Gates realized that his chances to launch his enterprise were in the high skills required by the software niche. In different parts of "The Road Ahead", he points out the importance of having "smart people" working with him. In reality, most of his competitiveness has been based on the performance of labor, in this case, highly skilled labor. This might be the reason why he puts so much emphasis on the improving quality of education, through the use of technology. Gates clearly sees the role of education in the present context of the Information age. He recognizes the need for a life-time learning. As it was mentioned before, the issue now is "learn how to learn".

> " ... one of the things I like best about my job is that I'm surrounded by other people who love to learn. In a technology business everybody has to acquire knowledge at a prodigious rate. At Microsoft we read, ask questions, explore, go to lectures, compare our notes and findings with each other, consult experts, daydream, brainstorm, formulate and test hypotheses, build models and simulations, communicate what we're learning, and practice new skills" (Gates 1995, p.209).

Gates can be seen as the entrepreneur of the Information Age. His key characteristic is his worry for a constant innovative path. Now, his vision for the future is linked to the establishment of the information highway. In this sense, Gates is the advocate of computer technology, putting it at the center of present and future socio, economic and cultural activities. Again, he argues that computers are tools to improve human life, subordinated to man's and woman's will.

As mentioned previously, the new scenery of global economy asks of education to focus on critical thinking and quality. Can computers help? Gates believes that computers can dramatically enhance the educational process. When he describes Microsoft's favorable environment for learning, he argues that this is possible only because the company combines learning with the use of the "right tools" . Gates would like to see schools doing the same.

> "At Microsoft these learning activities get a boost from the latest computing and communications technologies. Microsoft succeeds because its employees learn efficiently, in part by using information tools" (Gates 1995, p. 209).

Being a businessman who, of course, has a strong belief in the market, Gates sees education as another "business" activity: "the business of learning, of facilitating the right learning". As he states in the title of chapter nine: "Education: the best investment". Before I get into Gate's ideas for education, I must say that it is difficult to not get suspicious of his arguments since his company will be the first to benefit from the use of the technological tool in education. However, on the other hand, I must also recognize that most of his ideas for education are pointing to the desirability of incorporating new tools to aid in the learning process. This is a position that I would like to argue for. Nevertheless, I would have to stress that the use of technological devices has to take place in a complementary way, acting as a suplement for the teacher and the texts. I would argue that the introduction of computer in the classroom has to be implemented together with a serious critical

analysis of the possible negative externalities in order to enhance a better educational environment.

Gates holds an extremely optimistic and uncritical opinion of the use of computers in education. In his view , information technology will empower people, if used as a new tool to overcome difficulties in learning and supporting the thinking process. He mentions that in surveys, "education" and "working at home" are the two main reasons indicated by parents for acquiring a computer. He stresses the concern with the necessity of building up skills to operate in today's professional environment. In this sense, parents expose their children to what they believe will later help them get a better job. To be familiarized with the use of computers is an important skill to achieve a more successful professional career.

Gates also explores the use of computers in the classrooms. He discusses a list of benefits technology can bring to daily life in schools. Teachers will be able to take advantage of different kinds of information available in the Internet and exchange ideas using these with students. He also argues that technology will be able to humanize rather than dehumanize activities in schools. Gates argues that kids will be able to get together around the machine, exchange ideas on how to operate it and on how to develop tasks. In addition to the aforementioned, he points to the innumerable opportunities that network links will bring, i.e., connecting students from different schools, enlarging the chances of socialization as well as of learning from other cultures. Computers would also stimulate learning outside classrooms. Students could explore the web or CD-ROMs to learn at home.

Gates points to differences in learning. According to him, because not everyone learns in the same way, PCs will give a diverse range of choices for an individual to carry out his/her learning activity. In this context, education required by this information age will be based on differentiation, and on the respect to diversified tastes. Thus, mass education will have little space in this context. Software would be designed to attend special requests and interests. "The Road Ahead" also discusses the possibilities of "distant learning" and the way it can help to make a more democratic access to good information. Through video conference more people would be able to listen to a good teacher and a good lecture, resulting in economic and educational quality and efficiency.

Gates points the Internet as an incredible device for teachers to improve their curriculum material through the exchange of ideas with other educators. He also stresses that good teachers are central for education, making a very strong point that they will not be substituted by technology. However, his optimism tends to obscure some important questions, such as the issue of access. Although he spends some time discussing the future expansion of the infrastructure for the network computing, as well as the involvement of business companies in equipping classrooms, Gates clearly takes the position of the extreme optimism. The question he does not exam seriously is: if we accept that technology will deliver all the benefits pointed in "The Road Ahead", will these benefits be felt by different communities located in the inner cities or in developing countries? Who will benefit from Gate's "information revolution" and what are its downsides?

Clifford Stoll and "The Silicon Snake Oil" - a Technophobic View

Stoll's analysis of the relationship between technology and society falls into an extreme pessimistic view. I would say that in the attempt to reinforce his obstinate ideas against the use of computers and other electronic devices, Stoll ends up presenting a weak argument filled with many one-sided examples. Stoll does not see any benefit coming from the incorporating of information technology into people's home or professional activities. Discussing computers, Stoll stresses the danger of being carried away from reality, spending valuable time relating to a machine instead of socializing directly with people. In other words, he argues for the need of real experiences, in order to enjoy and give more value to life. In this sense, Stoll condemns the new option for some professionals to work at home, arguing that this isolates them "turning their homes into a prison" (Stoll 1995, p. 31).

I would like to comment on his insensibility for special cases in which working at home might be the only way some people can carry out a professional experience. A good example would be women who might be able to raise their children, supervise other home tasks and carry professional activities at the same time. Also physical disabilities might prevent some people from travelling daily to the workplace. Working at home with the use of computers might also be a way to bring disable people to the market place. In addition to developing a professional career, people with difficulties to **transport** from one place to the other can easily acquire goods and services from the Internet. Thus, computers have also improved the access of disable to shopping.

Stoll also argues that computers not only prevent people from establishing real relationships, they can destroy social relations that have been already established. He gives an example of a couple that breaks up after the husband starts to spend too much time connected to the network instead of experiencing life together with his wife. This is one of the many questionable and one-sided examples Stoll uses to illustrate his point. I must comment that I personally know a couple that first met on the Internet. Because neither Stoll nor I have any further knowledge about other cases, our conclusions on the effects that computers will have in couples will be based solely in personal beliefs.

Throughout the book, he calls in effect for a return to the past. Stoll positively focuses on the "simple" habits of life before "computers".

Another point he raises relates to the fact that people waste a lot of time trying to connect to the Internet and accessing the information they want. Stoll also mentions the time spent trying to solve a problem when computers do not work properly.

Other points presented by Stoll raise issues such as not being able to lay down with a laptop as one would be with a book (Stoll 1995, p. 41), or computers generating too much paper work (p. 30). He also stresses that the use of computers, specially the Internet, has a strong status connotation. His comments on e-mail are:

> " ... electronic mail is said to give cheap, immediate communications, at once leveling barriers and reaching straight to the desk of the recipient. You don't risk missing a message because of a busy signal or a slow post office. Yet I find e-mail to be often undependable and annoying to access; it's usually impersonal and boring. A handwritten letter is arguably cheaper, more reliable, and far more expressive. In some instances, it can even be faster" (Stoll 1995, p. 17).

Again, I would insist that he tends to exaggerate in such an extent that his arguments lose validity.

> "Today, some kitchens have serious computing power: you can get microprocessor-controlled coffee brewers, microwave ovens, and bread makers. These work perfectly, yet you lose the ritual, the sense of accomplishment, the feeling of being part of the process" (Stoll 1995, p. 29).

What about choice? Don't we have the right to choose between cooking by using traditional practices or taking advantage of modern appliances which might, on the other hand, allow for extra time in professional, educational or even entertaining activities?

When Stoll refers to education, he does not see any benefit of the use of technology to help learning. He criticizes the idea of technology as a tool. Stoll understands technology as an evil device which brings with it inevitable bad consequences. He does not believe in computers helping literacy and argues that all information available in the Internet is bad and mediocre. Stoll also comments that learning is not only about information, it is about experience which technology cannot substitute. Databases can only give simple answers without stimulating future inquiry, and future learning. In this sense, he does not examine the impact of devices such as CD-ROM and other software that are

not only about information, but stimulate thought and activities. He could question the quality of the educational practices presented in these devices, instead, he just ignores them.

Throughout, Stoll claims the need of direct contact. Teachers have to be the central actors and source of teaching. In addition, he discusses the condition of classrooms in American schools and the problems of equipping them with computers. First, Stoll remembers that computers are expensive and the access to them might not be easily achievable. Second, they become quickly obsolete, which would require that schools have a constant cash flow to replace old computers and software. Third, computers would raise the interest of thieves once the have "street value".

Moral values are also a focus of Stoll's discussion. According to him, the Internet is turning issues normally submitted to censorship under regular broadcasting, available for access to children. In this context, parents would not be able to control what their children would be accessing.
Although this is true, this danger is not exclusive to the Internet. As many other issues, this one also should be dealt with constant parental orientation. When the net did not exist, the focus was on "undesirable" books and magazines. Parents never had and still do not have total control over these either. Maybe the nature of the web, with instant connection calls for another kind of parental intervention. However, the situation does not undermine the benefits of the Internet for youth education and entertainment of the youth.

As commented before, Stoll is a good example of an extremist technophobic. Here is another of his conclusions about the destiny of schools if technology "invades" classrooms:

> "Suppose that I accept that students should spend a lot of time behind computers. What's the limit? If computers, online networks, and interactive video are so important to modern classrooms, why not eliminate the classroom entirely? Students of all levels could sit behind their computers at home, and receive quality instruction from the finest teachers. Electronic correspondence courses." (Stoll 1995, p.124)

Would a classroom with good a teacher, good infrastructure, good curriculum, as well as technological advances create a desirable environment? Do we necessarily have to fall into a situation of "either-or", instead of one with an inclusive position?

Concluding Remarks

This paper examined the two antagonic positions regarding the relationship between technology and society: technophilia and technophobia.

The first section discussed the global context that has been shaped through the development of new technologies. Knowledge has appeared as a key issue in the "Information society". There is a need for skilled workers and managers prepared to deal with the dynamism imposed by the pervasive use of information technologies in the line of production as well as in the service sector.

In this context, the issue of what kind of education should be offered to prepare the new worker and the new manager turns to be a central one. My interest was to discuss the role of technology in the agenda for education. Bill Gates represented the optimistic and uncritical view of technological determinism. According to him, education as well as other activities will improve considerably through the use of technology. Despite ignoring some important aspects, such as the issue of accessibility, Gates presents relevant arguments for the use of technological advances in our daily life. It is a book written by an entrepreneur making an apology for his business. Still the ideas are good enough to convince the reader and make him/her forget that his profit is behind his rhetoric.

On the other hand, Stoll's "Silicon Snake Oil" fails to make a better use of a critical view of

technology. His rhetorical and intimate style, together with his unconvincing examples do not present the opposite arguments to Gates's view in a competent way. However, it serves to provoke critical thoughts about computers as tools in the "Information Age."In this dualistic analysis, I believe that a middle range position has to be taken by educators. Like any new device, computers bring controversies and at the same time open doors for new possibilities.

Regarding the issue of access, I would say that neither Gates nor Stoll address the implications of technology for those who cannot afford to make use of it. Based on the argument that technology instead of helping the performance of the less favored populations, will make the gap between the "have" and the "have nots" even larger, some of the technophobics do not recognize that reality is irreversible. Technologies are already central to the "Information Age", therefore, ignoring them is like choosing to be isolated from the rest of the global scenery. I don't believe turning our backs to technological advances is the best option to deal with issues of poverty. Instead. I would say that intellectuals in poor areas of the world will have a great role to play not only as the facilitators for a critical use of the novelties, but also as channels through which technological advances might be able to reach less favored people.

Information technologies constitute a new kind of media. Their message is dynamic and operates in different languages: written, visual and audio. Like the previous media, certain time is needed to consolidate people's relationships to them. I believe there is a need of a time for "gestation" until information technologies will fully become human's extension (following a McLuhan's idea of media as human's extension).

Resistance is a common feature when a new "tool" is introduced. Stoll represents the extreme position of this resistance. He is still totally trapped into the "alphabetical text" paradigm, and to the rationality of the written world. In this sense, he does not recognize learning outside of books. By doing so, he is excluding the different abilities to learn, for instance, one that requires a visual or audio support. Castells (1996) comments on the different value given to different expressions:

> " ... the new alphabetic order, while allowing rational discourse, separated written communication form the audiovisual system of symbols and perceptions, so critical for the full-fledged expression of the human mind. By implicitly and explicitly establishing a social hierarchy between literate culture and audiovisual expression, the price paid for the foundation of human practice in the written discourse was to relegate the world of sounds and images to the backstage of the arts, dealing with the private domain of emotions and with the public world of liturgy" (Castell 1996, p. 327/328).

Information technologies give voice to text and "looks" to meaning. Does that preclude abstraction and possibilities of reasoning? Not necessarily. I believe issues of quality and efficiency will depend on the extent we will be able to critically examine the use of technologies. Educational practices don't need to choose being for or against technology. Rather they will have to learn how to benefit from it, making a clear and critical analysis of what it takes to make them useful tools, and how to best use information technology to enhance the educational process and democratization.

References

Castells, M., *The Information Age: Economy, Society and Culture - The Rise of the Network Society* (volume I), Blackwell, Massachusetts, 1996.

Gates, B., *The Road Ahead*, Penguin Books, New York, 1995.

McLuhan, M., *Understanding Media - The Extension of Man*, MIT Press, Massachusetts, 1964.

Stoll, C., *Silicon Snake Oil: Second Thoughts on the Information Highway*, Anchor Books, New York, 1995.

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