

Technologies and the Devaluation of What is Near

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THE INTRODUCTION

The purpose of this paper is to show that the prevailing discourse on technology is a formidable obstacle to an empowering relation with technologies. It aims to overcome this discursive tendency through an analysis of its implications and through a proposal for a politics of technologies of relevance to collectives. The discourse is exemplified by paradigmatic statements of the following nature: "Technology x makes possible what is otherwise at least difficult to obtain, and what it makes possible is generally good." One of the obvious implications of statements of this nature is that what a technology x makes possible may sometimes be bad. It all seems to depend on the ethical character of that which one actually does with technology x once technology x makes it possible. The ethical question with respect to technology x as such is generally obscured. The discourse tends to put the ethical burden exclusively on the human subject and not on technology x. The human subject may have questionable ends; technology x presumably does not even have ends. Technology x appears to be a medium, a tool, an instrument, a device, a mere means without ends. What concerns us hence is the discourse that takes technologies as mere means.

Conceptually, this form of discourse hangs on to what Martin Heidegger called the instrumental and anthropological definition of technology (1977). My argument, however, is significantly opposed to Heidegger's substantivist claim. Technology is not beyond human control. What is needed is reform. The discursive tendency obstructs significant reform of a number of transportation, communications and production technologies, let alone the transformation of the prevailing technological culture in accordance with valuable human ends.

Although there is nothing one-dimensional and transhistorical about them (Feenberg 1999; Thomson 2000), technologies are not merely means; they are means that generally satisfy some of our ends and have ends of their own ~~too~~ also. Technologies, as entities with cultural significance, have intrinsic ends. The ends are not the same for all of 'technology'. Yet you bring the TELEVISION set home and "it makes itself seen" transforming "the spaces of home and the behaviour of those who share them", as I have argued elsewhere (2001*b*). As they take different forms and uses in particular cultural settings,

material artifacts are effectively enforcing their own ends, and ultimately their own approaches to the good life. A technology's approach to the good life regularly becomes the user's approach to the good life. A politics of technologies is in order, precisely, so that a collective may be able to choose technologies that contribute to its approach to the good life. Yet every minute and every hour around the globe, millions upon millions of arguments of the nature this-makes-that-possible-and-is-hence-good are implicitly raised to the point of obliterating all possible change of course in the future history of our collectives. I shall also argue that the discourse is a dead end street that implies globally continuing to give in to technologies that devalue what is near. The devaluing of the near is one intrinsic end of a good number of contemporary technologies. The politics I will propose aims to reinsert genuine nearness into our deliberations on technologies.

I speak of intrinsic ends because although technologies are not "autonomous" in Jacques Ellul's sense (1954), it is both cogent and ethically useful to describe them as agents in history, not as mere means. One might object to the use of metaphorical language. My short answer is that all language is metaphorical (Nietzsche 1873). What's important is the theoretical and policy outcomes that we might derive of the proposed usage. Moreover, the meaning of the proposed usage has become clear to contemporaries. Everybody who has watched the film *Fight Club* understands Brad Pitt when he puts it thus: "The things you own end up owning you".

One early effort in articulating the intentionality of certain technologies is Karl Marx's analysis of "the instrument of labour" taking "the form of a machine" and "immediately" becoming "a competitor of the workman himself" (Marx 1977). More recently, Bruno Latour and Michel Callon's actor network theory raised a similar point with respect to all artifacts. Latour defined the "transformation of a major effort into a minor one by the words displacement or translation or delegation or shifting". (Bijker and Law 1992, p. 229) Hence, in the case of an automatic door opener, we may say we delegate the imperative 'close the door' to the mechanical domain. The behaviour imposed on a human by a nonhuman automatic door is what Latour calls a "prescription". The person must enter at a certain pace or stay out. The door is an actor in a network that contains both people and devices (p. 236). The result is a "distribution of competences between humans and nonhumans" (p. 232). My thesis is that what is distributed does not always originate in a human delegation, as Marx or Latour's analysis would suggest. Contemporary transportation, communications and production

technologies have an intrinsic end to devalue what is near. They are not regularly designed for such purposes, yet they do have such political prescriptions.

Artifacts inscribe a prescribed sequence of events, what Latour calls a "program," which collectives initiate, undergo, and at times subvert as they insert themselves or take up said artifacts. In the case of a machine, for every program inscribed in it there is "an antiprogram against which the mechanism braces itself" (p. 247). Technologies possess what social construction theories have called "interpretative flexibility". Andrew Feenberg has recently taken up the concept to place emphasis on the fact that technologies can be subverted (1999, pp. 126–128). Yet, unless abandoned, technologies also compete, prescribe and brace themselves as they become prostheses that eventually we cannot do without. Of course, Luddism is not the answer. The point is to design, form and use technologies such that their prescriptions of the good life correspond to a particular collective's sense of the good life. That is the purpose of the politics of technologies I want to outline.

A POLITICS OF TECHNOLOGIES

Social groups and individuals do not precede technologies. Rather, they emerge with particular technologies. Groups and individuals take on particular forms of life (Winner 1986) in the context of their particular technologies. In order to demonstrate the point and to illustrate its importance, I will tell a real-life story. The story is not in itself important. It is simply illustrative of how the discourse of technologies as mere means prevails and of how it must be subverted. Where I live we have a discussion group that meets regularly on Tuesday nights. One night we had assigned Heidegger's "The Question Concerning Technology." That particular evening was special not only because the philosophy professors and students at the University of Puerto Rico – Mayagüez Campus were gathering to initiate a dialogue on a fascinating starting point for raising the issues that contemporary philosophy of technology would take up, but also because we had among us a visitor, a professor who had come from a renowned University to teach epistemology for a semester.

Early on in the conversation the visiting professor said: "Look, this is not my area of expertise, but modern technology can't be that bad. I flew in on an airplane. I am here thanks to technology. I don't think it would have been possible otherwise." The visiting professor's testimony was hard evidence: modern

technology makes possible what is otherwise at least difficult to obtain, and what it makes possible is many a times good. Students and fellow professors listened intently, and for the moment had nothing to object. Those of us who most assuredly arrived in cars, those of us who came into that house through a door, sat in chairs, stools and cushions around a small table, and shared the dialogue, the appetizers and the bottle of wine that night must have been provoked to think of at least a dozen other modern and non-modern examples that confirmed the professor's insight. Moreover, all of us had heard of live news broadcasts that have awakened whole societies to their social problems and cassette players that have helped bring down repressive governments (Ihde 1990).

The visiting professor's observation may appear impossible to refute, however, only from the standpoint of the discourse of technologies as mere means. We have already mentioned the general exclusion of technologies from the ethical domain. A second important implication of this form of discourse is that the human subject seems to pre-exist. Then and only then, the subject makes use of a technology. Yet our visiting professor does not need to see himself first as being unable to come to Puerto Rico, and then, thanks to modernity, being able to take a plane. The individual or subject that comes to constitute Professor So and So does not precede the air plane which makes it possible to come to Puerto Rico. His judgement "good" occurs in the context of already sharing the world with particular nonhumans that are the objects of displacements and the subjects of prescriptions. In other words, no matter where he would be and what he would do with his life, if there were no airplanes, Professor So and So would have been able to raise the same point with respect to whatever technologies happened to be his tools. An outcome of this analysis is that the discourse in discussion will tend to thoughtlessly justify whatever technologies we may have at our disposal. The discourse is of no use if we ever want to ethically and politically evaluate technologies. It only goes to distract us from taking command of our future history.

I disagree at least on one thing with Ivan Illich's recent dictum that "the present is a goodbye to tools" (1999, p. 5). People still think of technologies as tools, though not in Illich's antidotal sense of "tools for conviviality", and certainly not in Heidegger's sense of a provoking setting-up disclosure of nature. In the visiting professor's mind, the airplane is just a tool: a means that satisfies a human end, and a good one at that. And when a technocrat working for an educational or healthcare system answers a citizen's claim by saying, "I cannot help it, I am just part of the system," the thought is probably there that the system

in the long run works, that it is itself a tool in good working order, and he is just helping by responding unfavourably to this particular citizen's claim. The harm that may have been done to the citizen, if conceded, is seen only as a small harm, a minor trade-off or a secondary effect. If the harm were big enough, then some adjustments would have to be made in the system. Yet the system would still be seen as a tool for progress, a 'this' that makes 'that' and 'that' and so on possible, a means in a supposedly developing or advancing society or a means in a society which presumably has already developed or is advanced.

Furthermore, if pressed for judgment, that this-makes-that-possible will be used to overvalue all kinds of new technologies by simply adding up whatever they make possible to what is already possible. Let me illustrate with another real-life example. An engineering student from Colombia once told me that thanks to the Internet she could communicate with her family on a daily basis. Of course, one could add that before the advent of the Internet she could do all sorts of things but she could not communicate with her family on a daily basis. Following the same line of reasoning, more than half of the working people that live in Mayagüez could say that they would not be able to go to work if it were not for automobiles. They would agree that before the advent of the automobile, they would be unable to go to work from where they now live, but they would resist seeing any causal relationship between their distant living quarters and automobiles, or automobiles as nonhuman agents that obscure and out rule what we may call other forms of life (Winner 1986). If you tell the car-driven suburbanites and the Colombian student that we could conceive of other dwelling and communicating options, they would take it as a reduction in options and an absurd conservative argument against progress.

What the discourse prescribes is a simple addition of means and options. When a technology is introduced it, presumably, simply adds options to already existing options. The mere means is added up to the sum total of means. In the suburbanites case, the option of driving is simply added to other options such as walking and biking. Again: the discourse in discussion will tend to thoughtlessly justify whatever technologies we may have at our disposal. The Colombian student's observation, well-intended as it was, overrides any discussion of the substantive ethical and political issues with communications technologies. My thesis is that as what is difficult to obtain becomes repeatedly and easily accessible, other practices and experiences are left out – they do not remain unchanged. In the Colombian student's case, my readers may be tempted to think of these other possibilities as round-trip flights to Colombia, telephone calls

and letters to her family – their minds still fixed on the distant which was difficult to obtain before the Internet. That is not, however, the point. The point is that with communications technologies, as with transportation technologies, ends that are near tend to be devalued with increasing facility.

Allow me to use another metaphor: the ends of other practices and experiences are outshined. Their brightness is no longer noticed. Their brightness disappears in a growing background of obscured and forgotten possibilities. Am I saying it is wrong for the Colombian student to communicate with her family on a daily basis? Of course not. Yet, once connected to email, whatever other ends were close at hand at those times and places of insertion were eventually left aside and forgotten to the point of no longer being experienced as possibilities. Communications technologies indeed multiply options. An increase in options, however, does not imply or even serve an advance in communications. Neither does an increase in information gathering and exchange. For an advance in communications, we would have to ask the question of the good life, the ethical question. The same goes for an advance in transportation.

What we may call the prosthetic dimensions of technologies remain more or less constant. As the blind man gets accustomed to his cane and watchdog, other forms of experiencing and coping with his world get excluded. Communications technologies present real trade-offs: access is not cumulative. These are not minor trade-offs; nor are they the sort of trade-offs that an improvement in the technology would minimize. When you access this, you do not access that. The newer technological forms of access obscure and subtract from other forms of access, generally devaluing what is near. Whenever someone spends close to an hour a day managing email, for that segment of time that person is not doing something else, let alone communicating in some other way. There is hence no advance, development or progress in communications through technologies. The confusion between an increase in options and progress may add up to "continuous partial attention," as Linda Stone, a Microsoft researcher has termed what she fears.¹ The accumulation of means and options gives the illusion of progress. Interpretative flexibility may transform into what Langdon Winner called "technological drift" (Winner 1977). In the modern optimistic context, statements like the one that some technology "makes possible what is otherwise at least difficult to obtain," irrespective of whether that technology is judged good or bad, distract us from carrying out the analysis of what is going on once we take it up.

Something analogous happens with all sorts of contemporary technologies. Warfare technologies for the most part allow us to kill the enemy without seeing him/her face to face. We by-pass the experience of judging the kill on the basis of an up-front encounter. (Huyke 2001; Pacey 1999) The television as device tends to out shine whatever other possibilities are presented by the bedroom, the living room, the dining room, the balcony, the sidewalk, the neighbour, the garden, the streets and the town centre without the television. (Huyke, 2001b; Borgmann, 1987) The television as source of entertainment implies something similar with respect to town theatres and other forms of gathering and play. The same with the television as source of news. (Postman, 1993) Mayagüez as a city may no longer exist. Its people are for the most part elsewhere. There are no local news in television or else they are frowned upon. Local music, live entertainment and publishing never seem to take off, while mayagüezans watch cable television, like most people, an average of four hours a day. Modern suburban streets in most of the u.s. and puerto rico are for the transit of cars, cellular phones, police units and dogs in charge of protecting property. City people are mostly watching television as they dine on their own or talk to one another and over the phone, as they also seem to silently wait for virtual realities as more perfect or powerful sorts of tools. The end result of electronic virtuality may be a radical form of "disburdenment" from whatever actually commands our attention (Borgmann 1999). The ever growing regime of whatever is distant and rapidly comes close has the tendency to win the day; what is near tends to become a distant wasteland. We also have to think of work stations that devalue the creativity of mind, hands and eyes, an old nearness, if I may say so, in the name of increased quantifiable outcomes and results "at the end of the line". Finally, narcotics are increasingly experienced by youth as rapidly delivering the states of mind that are otherwise difficult to obtain in the world as it has become. Meanwhile, the world market in telecommunications is growing twice as fast as the so-called growth of the global economy (Rifkin 2000, p.288).

I may seem to be judging too harsh and fast. Let not that distract whoever may disagree. The starting point in ethics is disagreement. The thesis is that in all cases just mentioned, there are ranges of nearness that are devalued once we access what was difficult to obtain. The process is largely unconscious. Little or no thought is given to what is devalued. The particular challenge of access that the moderns have taken up is a dead end street if we do not look back and forth to compare the forms of life, the structures of the experiences, and the subjects and social groups we exchange. The good life lies not in the past just as it lies not in increasing options through technologies. The past, in fact, may not sometimes

come out ahead, or Mayagüez, for instance, may have been half dead before the onslaught of contemporary transportation, communications and production technologies. As a participant in collectives with diverse ends, I want access to distant places and people through a whole series of ancient technologies like books and also through contemporary technologies. The question is how aware are the participants in a collective of what they give up today as they increase options with facility. The politics that is relevant for the contemporary technologies that skip over what is near rests on:

- the judgments a particular committed collective makes upon comparing the ends it values in experiencing the context without the technology with the ends it values in experiencing the changing setting,
- the concept the collective develops of its approach on the good life on the basis of the comparison of ends,
- the creativity and power the collective may have in concretizing unique technological designs, forms and uses that make possible that good life,
- being able to resist the prevailing discourse wherein whatever a technology makes possible is simply added to whatever was possible already, and being able to withdraw from interfering with valuable alternative ends of other collectives.

Undoubtedly, the judgments of a particular collective depend on its values.² Yet the values will arise only if the collective commits itself to taking up the comparison of ends. Technology assessment and risk–benefit forms of analysis do not take up the values involved in the alternative experiences. Neither do democratic, participatory or consensus building efforts, if the participants merely think in terms of access, choices and adding up the options. In such cases too, the context without the technology is taken from the start as something that lacks what the technology obtains. Hence the tendency is to conclude that the advantages will outweigh what are taken as problems. Second, there are more chances of concretizing unique technological designs, forms and uses that make possible a particular approach to the good life when the contemporary technology is changing the setting than when it has already done so.³ By the end of the process, the original practices and experiences have been forgotten and the collective may already be dead.

THE EXAMPLE

For the purposes of our discussion, we take distance education or learning as a technological frame that presents an alternative to classroom practices and experiences. I would also say that the combinations of artifactual forms and uses that constitute distance education as a power structure have gone past a phase of flexibility and are in a phase of momentum. (Fuglsang 2001; Bijker 2001) That we may be in the middle of a post on-line education frenzy misses the point. Some of our best minds are making sure on-line education takes full advantage of the technical advances that will allow us to conclude that this-makes-that-and-that-and-so-on possible.⁴ I rely on Deborah Johnson's *Computer Ethics*. It posits the technological somnambulist's dream as straightforwardly and compactly as is possible. Chapter 8, "The Social Implications of Computers: Autonomy and Access" begins with the following valuable scenario on distance education:

SCENARIO 8.1: POSITIVE FUTURISTIC VISION

It is the year 2020 and Professor Winder has just come into her office, a room in her house in San Francisco. Winder is a professor at an undergraduate college with administrative offices in New Jersey and students from across the world.

As Professor Winder enters her office, she asks, "what's new?" and an automated voice tells her the messages that were left in her absence. Next, at her request, the voice tells her what she has scheduled for the day and lists any preparation she will have to do for meetings or deadlines in the future.

Professor Winder sits down and begins to work. She checks on her students first and finds a series of video communications from four of them. These communications consist of questions about last week's distribution and presentations they have prepared in response to an assignment. She replies to each. Then she prepares her distribution for this week. This takes some time as she pulls together text and video from her own files. This year she is covering new material so her files are not complete and she must call up various libraries throughout the world to find material to illustrate the points she wants to make. She downloads graphs and texts for the distribution to students (1994, pp.147-148).

Distance education and learning makes possible what would otherwise be difficult to obtain. Yet a whole host of things are being left out from this presentation of nothing but the tool from the perspective of the prevailing discourse. We should search for the values involved, the ends of the competing settings or forms of life. If Professor Winder receives four video communications from her students a day, then she should have twenty students at the most. But if she can download graphs and texts for twenty students, she could download them for a thousand more. The administrators back in New Jersey must be aware of this technical possibility. In that case, Professor Winder would probably need assistants stationed, like her students, "across the world". Distance education tends to introduce additional levels of hierarchy in university education. Moreover, it tends to promote uniformity at the expense of diversity.

Say by the year 2020 professors throughout the world will have been able to finally establish a policy that out rules the possibility of more than thirty students per virtual course and guaranteed access to the professor. We may even imagine them being taken in by an enhanced "participatory design" movement in technology. What would this scenario still imply with respect to struggling universities across the world, say in Mayagüez, Puerto Rico? In order to survive, should these universities move in and compete for students from across the world too? What if they are interested in something else? Perhaps a curriculum – including a science, a technology and a philosophy curriculum – that is autochthonous and divergent in character, both in its content and in its pedagogy? Moreover, they might want to raise the question of the collectives, cities and societies Puerto Ricans want their children to build once interactions through screens and chat rooms come to prevail as their university experience.

If I push the argument any further, I will be accused of trying to monopolize higher education in certain contexts and places. If I and those that may agree with me don't push the argument, centralization, hierarchy in teaching relations, uniformity, intellectual colonization, social fragmentation, and new forms of absenteeism with an enhanced potential for micro-supervision will certainly increase and monopolize through distance education all the way and beyond 2020 and the small island of Puerto Rico.

The scenario in Johnson's book reads as if the presence that my students and I might suffer and enjoy, the richness of live passion, engagement, risk and chance that goes with the encounter, and our being near each other in a classroom for a

whole semester and in the same campus for four or more years, were of less value than the great Professor Winders of the world. Moreover, if I were to become a local assistant to the Professor, my students would understand the point that Puerto Rico is of little value. The on-line technology would make that self-evident. Is this a matter of 'making possible what would otherwise be difficult to obtain'? In a certain sense, yes. Through distance education, Professor Winder and her students make possible what would otherwise be difficult to obtain.

It might be argued that said tendencies could be curbed through the right kinds of national and international policies in higher education. Then we go back to step one: Presumably what we have here is a techno-social system that still has to be improved upon.⁵ Winner called the result "reverse adaptation" (1977). Yet my analysis is based neither on the concept of the tool nor on the concept of the system. It is based on the politics of technologies that I have outlined. There are real trade-offs in this politics, not minor ones. I address primary effects of distance education, not secondary effects.

Let me put it this way: In the educational collectives in which I participate, I will certainly argue for agreement on the technological designs, forms and uses that allow for no reduction of bodily reunions – cellular phones, beepers and chat rooms turned off. What starts out as another powerful system, in this case to address weaknesses of traditional classroom work and needs of particular populations, rapidly transforms into something else. Unless we overcome the discourse of technologies as mere means, there are reasons to conclude that distance education in one or another form may one day be synonymous with education. Let me give two parallel illustrations. Walking became unbearable in many cities once we rebuilt the city to allow for nothing but the extravagant movements of automobiles, not before. While in the not too distant past only medical personnel had pagers and beepers, now cellular phones are just for speaking. If the technologies are taken as mere means, they end up becoming the means, without ever going through the kind of analysis that would clarify the real choices and empower the collective.

THE CONCLUSION

Throughout modern times, the concept of technology comes with a particular kind of discourse and the set of implications I have analysed. Our visiting

professor at Mayagüez is a case in point. The same goes for any reader who may recall a great experience with distance learning. The critique that I am raising does not imply that these experiences are "wrong," just as it can't be wrong that my Colombian student was able to communicate with her family on a daily basis through email. From the perspective of the discourse that still reigns in the modern standpoint, the critique that I am raising becomes worthless.

Yet the perspective can and ought to be changed. In the first place, it practically eliminates the technologies as such from our inventory of ethical concerns. Secondly, it misplaces and overestimates the role of the human subject. The intrinsic ends of technologies compete and make themselves felt as the subjects constitute themselves along with their technologies. In the third place, the prevailing discourse overvalues all kinds of new technologies by simply adding up whatever they make possible to what is already possible, although on closer analysis the newer technological forms of access obscure and subtract from other forms of access generally devaluing what is near. Most important of all, the reigning discourse obstructs the genuine evaluation of technologies. The evaluation of technologies ought to be based on a politics of technologies that ought to empower committed collectives in their approaches to the good life.

End Notes

¹ Cited in "Technology Backlash", Thomas Friedman, *The San Juan Star*, January 31, 2001, p.23.

² This politics is also an economics that requires further development. In their analysis of "how to evolve" what they call "information ecologies" as "systems of people, practices, values, and technologies in particular local environments", Bonnie A. Nardi and Vicki L. O'Day raise some valuable strategic and specific questions. A collective must ask, for instance: "If we decide to invest in technology, what will we *not* have time, energy, space or money to do?" (1999, p.73)

³ A good example is Langdon Winner's account of the UTOPIA project carried out in the early 1980s by unionized typesetters, lithographers and graphic artists with management participation from the Swedish newspaper industry (Winner 1995).

⁴ I derive my conclusion mainly from *The Chronicle of Higher Education*. The Chronicle's section on 'Information Technology' is one good source among others of getting up to date news on drawbacks, failures, triumphs and general tendencies in distance education.

⁵ Although they focus on the planning process in local settings, Nardi and O'Day fall into the trap of techno-social systems that merely need improvement. Large teaching hospitals seem to be turning toward including remote monitoring facilities in neurosurgical operating rooms. The experimental remote systems are being introduced without much previous discussion or without raising the "strategic questions" that Nardi and O'Day recommend for the planning stage. So far, the complex systems include audio, video and instrument data that are useful for neurophysiologists. With these systems, such specialists –being in short supply-- are able to monitor "several operations at once" and "can work on other projects during the trouble-free parts of operations". Problems reported by anesthesiologists, nurses, neurosurgeons and trainees include

"significant" changes in "the nature of communication inside the operating room". Although anesthesiologists seem to want an analogous system, they joined the nurses in pointing out that before the neurophysiologist's system was introduced "both tension and boredom in the operating room" were "relieved by the relaxed talk and joking that often go on" in these kinds of operations. Moreover, "the new technology" as a general tendency that might be taken up by other specialists "might alter the trusting relationship between students and instructors". Towards the end of the discussion, however, Nardi and O'Day are satisfied with the following solution: "showing one kind of 'on-air' light when an operation is being recorded and another kind of light when the remote audio" is "being broadcast". Is this a solution (1999, pp. 174-183)?

References

- Borgmann, A. *Technology and the Character of Contemporary Life: A Philosophical Inquiry*, The University of Chicago Press, Chicago, 1987
- _____. *Crossing the Postmodern Divide*, The University of Chicago Press, Chicago, 1992.
- _____. *Holding On to Reality: The Nature of Information at the Turn of the Millenium*, The University of Chicago Press, Chicago, 1999.
- Ellul, J. *The Technological Society*, J. Wilkinson (trans.), Vintage, Toronto, 1954.
- Feenberg, A. *Critical Theory of Technology*, Oxford University Press, New York, 1991.
- _____. *Questioning Technology*, Routledge, London, 1999.
- Graham, G. *The Internet: A Philosophical Inquiry*, Routledge, London, 1999
- Heidegger, M. 'The Question Concerning Technology', in W. Lovitt (trans.), *The Question Concerning Technology and Other Essays*, Harper & Row, New York, 1977, pp. 3-35.
- Huyke, H. J. *Anti-profesor: Reflexiones contra el profesor y su estudiante con particular atención en la sociedad, el conocimiento y las tecnologías que se promueven en el salón de clases*, Editorial de la Universidad de Puerto Rico, Río Piedras, 2001.
- _____. 'Toward an Ethics of Technologies as Prostheses' in *International Journal of Technology and Design Education* 11, 2001, 53-65.
- Illich, I. *La convivialité*, Du Seuil, Paris, 1973.
- _____. "The End of Science, Technology and Society Programs: Report on a Conversation with Ivan Illich," *Science, Technology and Society*, Nos. 121-122, Fall-Winter 1999, p.5.
- Ihde, D. *Technology and the Lifeworld: From Garden to Earth*, Indiana University Press, Bloomington, 1990.
- Johnson, D. *Computer Ethics*, Prentice Hall, New Jersey, 1994.
- Latour, B. 'Where are the Missing Masses? The Sociology of a Few Mundane Artifacts', in W. E. Bijker & J. Law (eds.), *Shaping Technology / Building Society: Studies in Sociotechnical Change*, The MIT Press, Cambridge, Massachusetts, 1992, 225-258.
- Marx, K. *Capital*, Vol. 1, *A Critical Analysis of Capitalist Production*, S. Moore & E. Aveling (trans.), International Publishers, New York, 1977.
- Nardi, B. A. & O'Day, V. L. *Information Ecologies: Using Technologies with Heart*, The MIT Press, Cambridge, Massachusetts, 1999.
- Nietzsche, F.:1872-1875, *Theoretische Studien*, Kröner, X, 1872-1875, pp.189-215.
- Pacey, A. *Meaning in Technology*, The MIT Press, Cambridge, Massachusetts, 2001.
- Postman, N. *Technopoly: The Surrender of Culture to Technology*, Vintage, New York, 1993.
- Rifkin, J. *La era del acceso: La revolución de la nueva economía*, J. Francisco Álvarez y D. Teira (trans.), Paidós Iberica, Barcelona, 2000.
- Simondon, G. *Du Mode d'existence des Objets Techniques*, Aubier, Paris, 1958.
- Thomson, I. 'What's Wrong with Being a Technological Essentialist? A

Response to Feenberg' in *Inquiry* 43. 2000, pp. 429–444.

Volti, R. *Society and Technological Change*, St. Martin's Press, New York., 1995.

Winner, L. *Autonomous Technology: Technics–out–of Control as a Theme in Political Thought*, The MIT Press, Cambridge, Massachusetts, 1977.

_____. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*, The University of Chicago Press, Chicago, 1986.

_____. 'Citizen Virtues in a Technological Order', in A. Feenberg & A. Hannay (eds.), *Technology and the Politics of Knowledge*. Indiana University Press, Bloomington. 1995, 65–84.