A Critical View of the “One Laptop per Child” Project

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Abstract: This Paper presents a critical view of the One Laptop per Child project (OLPC), whose objective is to provide each public school student with a portable, cheap computer. After briefly describing the project, arguments against its implementation are given considering local problems in Brazil, which may be applied to many developing countries, as well as universal problems, among them the author’s concept that computers and the Internet are damaging to a healthy mental development of children and adolescents. Objective results of various researches are cited, showing that students’ achievements are in general damaged by the use of those technologies, confirming the author’s concerns.

Keywords: OLPC, one laptop per child, computers in education, Internet in education, child and adolescent development, developing countries.

1. Introduction
The “One laptop per child” project (OLPC) aims at providing each elementary and middle school (grades 1-8) student with an inexpensive computer, and is being considered by governments of many developing countries, in particular my own, Brazil, where it is being used in pilot tests in some public schools. This paper has the intention of opening discussions about local and universal problems concerning this project, which is being accepted without deeper considerations.

Section 2 brings an overview of the project. Section 3 presents some of Brazilian educational, social, economical and political problems, which may impair the success of the project. Most of these problems certainly apply to many other developing countries. Section 4 deals with universal problems concerning the use of computers in education, and has a review of some recent statistical research showing that the use of computers is damaging to education; two of them used results of standardized tests applied to Brazilian schools. Section 5 comments articles that appeared in the Veja Brazilian illustrated magazine concerning a
OLPC pilot study, and in *The New York Times* about American schools dropping the use of laptops. Section 6 presents some final considerations.

This paper had a size restriction of 10 small pages, so many topics and subsections titles had to be deleted. Please refer to the whole original at http://www.ime.usp.br/~vwsetzer/OLPC.html.

2. The Project

The OLPC originated at M.I.T.’s Media Lab. Nicholas Negroponte, the project’s founder and great propagator, visited many countries, including Brazil, trying to sell the idea by means of convincing federal governments to buy a large number of these computers and having them distributed, free of charge, to public school students. Examining its site at http://www.laptop.org, one reads (as of 3/13/09):

“The mission of One Laptop per Child is to empower the children of developing countries to learn by providing one connected laptop to every school-age child. … It's an education project, not a laptop project.” Nevertheless, the only educational consideration which exists in the OLPC is the principle that, giving connected computers to children and adolescents, they will automatically make an educational progress.

3. Local Considerations

In the case of Brazil, the original news was that the federal government was going to buy 1 million of these machines to distribute them to public school students. Later, the news was that every public school student would receive a laptop – this would make a total of about 30 million units. Some local problems:

- An educational project of this magnitude should at first be examined from the point of view of priorities. It is hard to imagine worse conditions in public schools in Brazil. For instance, recent news have shown that 70% of grade 4 students in the State of São Paulo (by far the most developed in the country) “don’t have the basic competences in Math, such as adding, subtracting, multiplying and dividing”. In general, even physical conditions are extremely bad.
- Criminality in Brazil is extremely high. About 50,000 people are killed each year in the country (population of about 180 million), not counting road accidents. It is absolutely sure that the laptops of the OLPC will be stolen from the students, producing intense frustration in the children that received them as gifts.
- I want to suggest the reader making a test: finding just one Brazilian who, knowing the amount of money involved (US$100 million to 3 billion, calculating for a US$100 price per laptop), will guarantee that the OLPC will not be subjected to corruption. Corruption in Brazil is absolutely epidemic, including Congress, all
levels of federal, state and county governments, and even the police. Almost everyday one reads in newspapers news about corruption.

- There exists a popular belief that computers and the Internet help education and are essential to it. A government which gives students computers as gifts gives the impression that it is doing a big educational good and will receive more votes.
- Due to their generally more favorable economic status, private school students have computers at home and in their schools, and this situation purportedly gives them an unjust advantage over public school students. Mark Warschauer described experiments done in India [16]: digital inclusion only works effectively with people with very little schooling when there is a computer room with an instructor available, assisting those who want to use the computer or the Internet. Kiosks without anyone helping the users simply don’t bring any benefit.
- One of the biggest educational problems in Brazil is that in many districts parents have practically no schooling and almost no culture. They don’t know what they should require from schools, cannot check what their children are learning and cannot help them with their homework. Such parents will not control the use their children will be making of the computers they will get under the OLPC. By the way, the use of TV and video games is in general not controlled by parents; how should it be expected that the use of computers will be?

4. Universal Considerations

In this section I will briefly cover my arguments for being absolutely against the use of computers by children and adolescents, at least up to the beginning of high school. I have already written extensively about this subject; see e.g. [10, 11] and various papers on my web site. My arguments are based upon what a computer is, the physical, mental and emotional state of its users, and the developmental concepts of children and adolescents which constitutes one of the basis of Waldorf Education, successfully applied since 1919, now in about 1,000 schools around the world, not including thousands of isolated Waldorf kindergartens.

Computers are mathematical machines. Every program is a mathematical formalism, a sequence of activations of symbol manipulating functions. Therefore, when using a computer a person has to exercise a mathematical thinking. The user has to think in such a way that his thinking may be expressed by a command accepted by the machine, be it by activating an icon or typing a command. I call “machine-thinking” this kind of symbolic thinking.

Children don’t think and don’t express themselves in a formal way; this may be noted through grammar errors. Up to age 8 a healthy child doesn’t even distinguish fantasy from reality. In fact, the younger a child is, the more she lives in an animist inner world, full of fantasy. This happens as long as she has not lost a great part or her capacity of imagination; this loss is in general produced by the use of screens, in TV, video games and computers. Images come ready on screens,
usually in a rapid sequence, and in this case nothing more can be imagined. Their negative effects led German neurologist Manfred Spitzer to give his extraordinary book the title which can be literally translated as “Attention, Screen!” [14].

Forcing a child to think and express herself in a formal way goes totally against her nature. When a child uses a computer, she is forced to think and act as an adult, e.g. sitting and typing for a long time. In other words, in this case one is stealing her childhood. This is a tragedy, because in education and in individual development there can be no jumping of steps: a baby does not learn how to walk without being able to stand up, algebra is not learned before arithmetic. A child who has not fully passed through the phase of childhood has a big chance of becoming a maladjusted adolescent or adult.

With adolescents, the situation is not as bad. Nevertheless, in the concepts and practice of Waldorf Education, an adolescent should exercise a purely logical thinking only after puberty, in high school. It is in this phase that thinking becomes free and individualized and the capacity for abstraction may be directed to formalisms which have nothing to do with reality – as theorem proving in Mathematics. Before then, this type of thinking, typical of the excessively abstract ways of teaching being practiced in general, is damaging to a balanced development of a child or adolescent. Thus, the recommendation is very clear: children and young people should not use a computer before high school age.

One may consider that this recommendation is radical and utopian. It happens that, if something is damaging to children, it has to be avoided, and there is no middle way. In this sense, parents are constantly being radical, e.g. when forbidding their children of playing in streets with heavy traffic, preventing them from drinking alcoholic beverages, driving a car, reading pornography, etc. The problem here is that, according to my concepts and experience, computers are damaging to children; unfortunately, very few people recognize this fact.

Another point is that education, at home and at school, is always highly contextual. For instance, a teacher teaches some subject obviously taking into consideration what she has been teaching to that class. Education with a computer, and especially through the Internet, totally lacks context in relation to their user. Educational software is certainly not produced for a specific child, but for a mass of users. However, every education that does not respect the particular individual in his context and maturity is in fact a miseducation – and that is precisely what is produced by a computer. The same applies for TV and video games.

Many people consider that it is beneficial for children and adolescents having the freedom of access to the Internet, because this way they learn to discern and to criticize. But if a child or adolescent learns to distinguish what is good or bad for them, and to be critical, they do not behave as infants or juveniles anymore – they have accelerated their maturation, which is terrible from an educational point of view. In education, there is a proper timing for everything. In former times, there was an intuitive knowledge about this, but it has been lost.

The use of the Internet in education, especially when there is no control over the visited sites, chats, etc. configures a libertarian education. I am completely
against this type of education: children and adolescents feel that they need constant orientation and are dependent on adults. A lack of this orientation, very common in our days, produces many psychological disturbances, such as lack of security and respect, ignoring limits, behavior and attention problems, etc. It is obvious that some freedom has to be given to every child, and even more to an adolescent, but this should depend on their maturity and cultural context.

There is absolutely no need for a child or adolescent to use the Internet. But if a parent erroneously finds it essential for her/his children, my recommendation is that s/he should be constantly at their side while they are using the Internet, controlling the sites they access and explaining their contents. Gregory Smith, who expounds the enormous dangers presented by the Internet to children and adolescents, whom he considers to be always naïve, recommends the use of software for monitoring and limiting the access to the Internet [13]; I don’t thing this is enough. The same considerations apply to computers. Early learning of how to use them (“computer literacy”) is also not necessary – certainly almost all present adults above age 30 or 40 did not learn how to use a computer when they were children, and have easily learned it as adults.

The OLPC has as one of its goals giving a computer for each child, who may take it everywhere and use it without any control whatsoever. I am sure that those computers will mostly be used for playing electronic games, mainly violent, because these are the most appreciated ones. Krähé and Möller did a research in Germany with 231 12 to 14-year old adolescents [7]. Besides having corroborated that violent video games increase aggressiveness (they were careful to separate innate aggressive children), they found in a very high correlation that those that frequently played games, played violent ones. Furthermore, they discovered that the mostly recommended games by boys to their friends are violent.

In the OLPC web site (www.laptop.org/vision/mission/) one reads “A computer uniquely fosters learning by allowing children to ‘think about thinking’, in ways that are otherwise impossible.” This looks like Papert and his LOGO system [8, 9], mentioned in the story of the OLPC origin. For a whole chapter of one of my books on computers in education criticizing Papert, see [10]. Briefly, LOGO, being a programming language, forces the child or adolescent to do programming. This is one of the most abstract and formal activities, because it is equivalent to proving mathematical theorems – with the difference that LOGO, an interesting language for simple graphic processing, permits the programmer to see graphic results of the execution of his programs displayed on the computer screen. It has been demonstrated that children learn by heart how to use some LOGO commands without understanding what they mean. Moreover, programming with LOGO or any other language provides for an open algorithmic, intellectual space – just compare it with the limited space of arithmetic calculations, which use always the same few algorithms. Therefore, programming with LOGO introduces a kind of libertarian education quite different from traditional education. As I mentioned, I find libertarian education highly damaging to the necessarily slow intellectual development, especially of formal abstractions.
In an unconscious way, children develop very well by themselves and intuitively, doing what they should in order to learn what they need, for instance by playing, moving, speaking, etc. On the contrary, using a computer requires consciousness and attention – the same degree of attention necessary for doing correct Math. Thus, the consciousness required in a general use of a computer and, in particular, programming in LOGO, is totally inappropriate before high school, because it accelerates the development of self-awareness and self-control in an inappropriate age and, even worse, using a formal, logical-symbolic system.

Due to their lack of knowledge as well as restricted mental capacity, children and adolescents do not have the discernment power and the self-control necessary for not being attracted by visual cosmetics or inadequate content, as well as for controlling the time they spend with computers or the Internet. Years ago, when PCs were not so common, I had the experience of bringing to my Faculty senior high school students for a workshop which I called “Computer Day”. It covered theoretical and practical notions of what a computer is, what it is useful for, and its impact upon its users. It became absolutely clear to me and my collaborators that only about age 17 the young person begins to have the capacity of facing the computer in a serious way, as a useful instrument and not as a play toy, confirming my conceptual conclusions.

Let us now examine some results of statistical research. Armstrong and Casement present serious restrictions to the use of computers in teaching how to read [2]. They cite IBM’s WTR (Writing to Read), designed to help pre-school and grade 1 students to develop the abilities of reading and writing. They indicate that “A number of studies have found that WTR has little or no effect on children’s reading and writing”.

Angrist and Lavy analyzed the outcome of a huge program in Israel, called Tomorrow-98, of installing computers in schools [1]. The project began in 1994 and had as its objective reaching a rate of 10 students per computer in the participating schools by 1998. The authors write that “The results reported here do not support the view that CAI [Computer Aided Instruction] improves learning, at least as measured by pupil test scores. Using a variety of estimation strategies, we find a consistently negative and marginally significant relationship between the program-induced use of computers in 4th grade Math classes. For other grades and subjects, the estimates are not significant, though also mostly negative. [...] [The research detected] a negative effect of CAI on 8th grade math scores in models with town effects. A possible explanation for our findings is that CAI is no better and may even be less effective than other teaching methods.”

Fuchs and Woessman [5] analyzed the results of the PISA (Programme for International Student Assessment) assessment of 2000 for 15-year old students of 31 countries. They correlated the results of Mathematics (96,855 students) and reading (174,227), with the use of computers. They wrote: “While the bivariate correlation between the availability of computers at school and student performance is strongly and statistically significantly positive, the correlation becomes small and statistically indistinguishable from zero once other school
characteristics are held constant. [...] The mere availability of computers at home seems to distract students from learning, presumably mainly serving as devices for playing computer games. [...] the relationship between student achievement and the use of computers and the internet at school shows an inverted U-shape. That is, students who never use computers or the Internet at school show lower performance than students who sometimes use computers or the Internet at school. But students who use them several times a week perform even lower.”

Maresma Sprietma, a researcher at the Centre for European Economic Research in Mannheim, Germany, analyzed the data of the Brazilian SAEB (Sistema de Avaliação do Ensino Básico – System for Assessment of Elementary and Middle Schools), for 1999, 2001 and 2003 of classes 4 and 8 [15]. In a personal talk, she told me that the SAEB data are excellent. She detected that “The use of computers as a pedagogical resource has a small but significant positive impact on test scores of 3.1 percent of a standard deviation in test scores in both disciplines. Moreover, the proportion of pupils that have a computer lab in the school significantly affects Math test scores downwards by 33.5 versus 12.7 percent of a standard deviation in test scores for Portuguese.” She found a positive correlation between the use of the Internet by teachers and students achievements. Maybe the OLPC should be a much less expensive “One laptop per teacher project” and not “per child”...

Tom Dwyer, Jacques Wainer and collaborators, of the University of Campinas (one of the main public universities in Brazil), have also used the same SAEB 2001 results, involving 287,719 students, analyzing those of grades 4 and 8, subdivided by social-economic classes and by subject (Math and Portuguese), and the information they provided regarding their computer usage [3]. Students answered the question “Do you use a computer to do the homework assigned by the Mathematics teacher?” In their words, “The first result is that students who always use a computer, independently of the social-economic class, obtained worse performance than those who never use a computer. [...] Speaking in another way, independently of their social-economic class, 4-grade students which always use a computer have achieved a smaller result in the Math test, in comparison to those that don’t use it. [...] poorer students have a bigger chance that the use of a computer, even if rare, be associated to a reduced performance in Math tests. [...] For both subjects [Math and Portuguese] using a computer is always associated to a worse result in the tests, comparing to the group that never uses a computer. [...] The richer classes have a benefit from a moderate use, but the students of poorer classes perform worse in the tests even with a moderate use.” They finish their paper with: “Our research shows that the creation of a ‘digital equality’ could lead not just to a simple reproduction of social inequalities by the educational system [...] but to a more perverse effect: the increase of inequalities. It would be a sad irony, resulting from ill-thought policies, and also from the frailness of scientific investigations criticizing this area.”

Thus, one sees that statistical studies are corroborating my conceptual conclusions on the damaging effect of using computers in education.
There are many negative influences of computers, some of them having a direct impact on academic achievement. Here is a partial list, with brief comments.

- Induction of impulses for doing everything rapidly and many things at the same time.
- Damaging the capacities for mental concentration, contemplation and patience. (Direct consequence of the previous item.)
- Damaging creativity. (Creativity must be developed in ill-defined spaces, such as social relations and arts, but computers present a well-defined mathematical space; this has a negative impact on problem-solving.)
- Damaging memory. (There is no more need for memorizing information which may be classified and rapidly obtained in a computer.)
- Induction of the view that learning is the same as playing. (To become attractive, software must be presented as a video game.)
- Damaging sociability. (In general, computers are used in an isolated way; social contacts through computer nets are virtual and not physically personal; computers induce a deterministic view of the world and the idea that everything may be foreseen, which are not human characteristics.)
- Induction of admiration for machines. (Computers surpass human beings in some thinking functions and their functioning is not understandable by children and adolescents.)
- Induction of the idea that machines are more perfect than humans. (There has never been such a strong metaphor as the computer for – wrongly – considering humans as machines; see my paper “AI - Artificial Intelligence or Automated Imbecility? Can machines think and feel?”)
- Induction of a reductionist view of the world. (One of the techniques for solving problems with a computer is “divide and conquer”, that is, subdividing a problem into small parts and solving each one of them separately.)
- Induction of a materialist view of the world. (See my paper “Science, religion and spirituality”.)

5. Two Popular Publications

The article “Seeing No Progress, Some schools Drop Laptops” appeared in the New York Times of May 5, 2007. It shows that the project of giving (or requiring) a laptop per child has not produced any educational improvement, on the contrary, it presented many problems. It mentions 5 concrete cases of schools in various parts of the USA, which abandoned the project. All of them did not observe any improvement of students’ academic achievements and verified exaggerated increases in costs.

On May 16, 2007, an article in Veja (“See”), the main illustrated magazine in Brazil, mentions the case of a public school in the important southernmost capital city, Porto Alegre, which received 100 laptops from the OLPC, “as a pilot study
for an experience sponsored by the federal government, whose (still far away) objective is to give as a gift a laptop to each one of the 30 million children in the public school system.” The article shows how I fully hit the target on my section 3 above (written before the article appeared): “In the Luciana de Abreu high school in Porto Alegre, one has a more concrete view of the [theft] problem. As most of the classes do not have door handles, the 100 new laptops being tested by the school stay locked in the principal’s office overnight.” A direct confirmation of my arguments of priorities in that section is that grade 6 students “used to attend classes with open doors due to the lack of door handles and to step on floors that for years has lacked some covering, […] took a [virtual] trip to the 5 continents. … One detail: part of these computers should be taken home by the students, as planned in the project. But parents resist the idea. As their children take [public] buses [there is no school-bus system in Brazil], they fear that the laptops (produced in a phosphorescent green color) will call the attention of robbers.”

6. Final Considerations

In the whole world it is imperative and urgent that the school system be improved. But the most essential change is that it becomes more humane, and not more technological. Introducing more technology into education turns it more inhumane. It is symptomatic that Waldorf Education, with its strong emphasis on humanistic and artistic education (besides its strong scientific education, mainly in high school), trying to treat students with the highest love, humanity and respect is such that no real Waldorf school use computers before high school. For a high school curriculum introducing computers in the Waldorf spirit, see [11].

It is very important and urgent to recognize that the environmental and economical problems we are suffering now are a consequence of the way technology is cherished and admired, and its use for the sake of selfishness and greed. A typical technological way of seeing the future is Bill Gates’ book [6]. It seems to me that this worship of technology is the fundamental reason behind the OLPC: the more technology in education, the better. The improvement, and probably survival of humanity goes necessarily through a change in the view of the world. Machines have to be put in their right place, and we should free ourselves from the slavery we have made them impinge on us (see my essay “The mission of technology”). A break should be put in the will, emotional and mental disasters caused by the use of computers by children and adolescents; but for this we must develop a consciousness of the problems they cause.

We are now conscious of the terrible destruction of nature presently going on. In my opinion, its surreptitious intention is the destruction of humanity, and it is obvious that some direct attacks to the latter were going to occur. There is nothing more efficient along this line than to attack children and adolescents through TV, video games, computers and the Internet, impairing their harmonic and healthy
physical and mental development. This way, anti-social adults will be developed, without compassion and creativity, passive, with fixed ideas and fanaticism. We are already encountering more and more people of this kind. The OLPC will worsen this situation.

References