

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

Valdemar W. Setzer

Dept. of Computer Science, University of São Paulo, Brazil – [www.ime.usp.br/~vwsetzer](http://www.ime.usp.br/~vwsetzer)

## ABSTRACT

This Paper presents a critical view of the “One Laptop per Child” project, 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. The latter includes the author’s concepts, published for the first time in 1976, that computers and the Internet are damaging to a healthy mental development of children and adolescents and also citing objective results of various pieces of research showing that students’ achievements are in general damaged by the use of those technologies.

**Keywords:** “One laptop per child”, computers in education, Internet in education, child an adolescent development.

## 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 this project. Section 3 presents some of the Brazilian educational, social, economical and political problems, which may impair the success of this 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, valid for any country or community. In particular, section 4.7 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 describes and comments an article concerning a pilot study of the OLPC that appeared in the *Veja* Brazilian illustrated magazine, and an article which appeared in *The New York Times* about American schools dropping the use of laptops; both confirm my objections to the OLPC. Section 6 presents some final considerations and conclusions.

This paper had a size restriction of 6 pages, so many topics had to be deleted. Please refer to the whole original at <http://www.ime.usp.br/~vwsetzer/OLPC.html>, twice as big, a translation of [12].

## 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 the 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 immediately sees a phrase by

Negroponte, stating that this is an educational project: “It’s an education project, not a laptop Project – Our goal: To provide children around the world with new opportunities to explore, experiment and express themselves.” Nevertheless, the only educational consideration which exists in the OLPC is the principle that, giving computers to children and adolescents, they will automatically make an educational progress. As we will see in section 4, this premise is false, both from the point of view of my conceptual analysis of the use of computers in education, as well as from the results of various scientific research. The use of computers by children and adolescents is harmful for their education and general development.

## 3. LOCAL CONSIDERATIONS

### 3.1 Objectives

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

### 3.2 Priorities

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”. What is by far the most urgent educational investment that should be made in Brazil in public education? In my opinion, three measures should be taken in parallel: 1. Drastically raising teacher’s salaries; 2. Improving the schools’ administration; 3. Introducing independent students’ assessments to evaluate teachers’ and schools’ efficacy.

### 3.3 Theft

Criminality in Brazil is extremely high. About 40,000 people are killed each year in the country (population of about 180 million). It is absolutely sure that the laptops of the OLPC will be stolen from the students, producing intense frustration.

### 3.4 Corruption

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 project will not be subjected to corruption. If the cost of physical facilities, network connection, and maintenance are considered, the total will be much higher. Corruption in Brazil is absolutely epidemic, starting with the Congress and going through all levels of federal, state and county governments, and even the police, as recent news have extensively shown.

### 3.5 Political Advantages

There exists a popular belief that computers help education and are eventually essential to it. Thus, a government which gives students computers as gifts gives the impression that it is doing a big educational good, therefore it will receive more votes.

### 3.6 Digital Inclusion

One of the arguments used for justifying the OLPC is based on the fact that in developing countries public school students belong in general to less favored economic classes than those of private schools. Due to their more favorable economic status, the latter have computers at home and in their schools, and this situation gives them an unjust advantage.

Suppose that digital inclusion is something very important, which I agree with as far as adults are concerned. How should it be done? Mark Warschauer described experiments done in India [16]. Digital inclusion only works effectively with people with very little schooling when there is a kiosk manager available: a person who assists those who want to use the computer or the Internet. Kiosks without anyone helping the users simply don't bring any benefit. In this case, children and adolescents, and even adults, end up using the equipment to do worthless tasks, such as playing video games, chatting, visiting pornographic sites, etc. Warschauer tells a story of a parent saying: "My son used to be doing very well in school, but now he spends all his free time playing computer games in the kiosk, and his schoolwork is suffering." [p. 37.]

Thus, digital inclusion should be made in appropriate rooms, with instructors who assist and control the proper use, also doing simple maintenance to the net and to the equipment. Many of these rooms could be implemented with the OLPC budget.

### **3.7 Cultural Level of Parents**

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 the schools, they cannot check what their children are learning and cannot help them with their homework, if it exists: in general, students receive very little homework, because this would mean a big effort from their teachers to correct and grade them. This also means that parents will not control the use their children will be making of the computers they will get under the OLPC. Instead of improving their education, those computers will be used for futile objectives and will deviate students' attention from their learning activities, without any control from their parents. By the way, the use of TV and video games is in general not controlled by parents; how come one should expect 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 will be brief, because I have already written extensively about this (see e.g. [10, 11] and various papers on my web site, such as [A review of arguments for the use of computers in education](#) and [Electronic media and education: TV, video game and computer](#)). 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, which has been successfully applied since 1919, now in about 1,000 schools around the world, not including thousands of isolated Waldorf kindergartens.

### **4.1 The Computer and its User**

Computers are mathematical machines. Every program is a mathematical formalism, a sequence of activation of functions which manipulate symbols. Any command issued to a computer, be it in the form of text (e.g., those that are used in the prompt window of Windows operating systems, or parameters such as margin specifications for printers), or under the form of

activation of icons or choosing an alternative from a list of a menu, produce the execution of a sequence of actions in the computer. These actions consist of executing mathematical functions for symbol processing. Therefore, when using a computer a person has to exercise a mathematical thinking, fitting the functions presented by the software being used. This means that 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 text. I call "machine-thinking" this kind of symbolic thinking, exercised and formulated in such a way as to be possible to introduce it into a computer, and to be correctly interpreted by it.

### **4.2 The Development of Children and Adolescents**

Anyone may observe that 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, and there is nothing more to be imagined. Their effects led Neurologist Manfred Spitzer, head of the psychiatric clinic the University of Ulm, Germany, 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 from her. 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, or physiology before anatomy. A child who has not fully passed through the phase of childhood has a big chance of becoming a maladjusted young person or an adult.

With adolescents, the situation is not as bad. Nevertheless, in the concepts and practice of Waldorf Education, a young person should only exercise a purely logical thinking 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 which is 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, not giving them alcoholic beverages, not permitting them to drive a car, etc. The problem here is that, according to my concepts and experience, computers are damaging to children; unfortunately, very few people recognize this fact.

### **4.3 Out-of-context Education**

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. If she is a good teacher, she will teach the same subject in different ways to different classes, certainly in a different manner to each grade.

Thus, all education is traditionally contextual. But education made with a computer, and specially through the Internet, totally lacks context in relation to the child or adolescent who uses them. In fact, even if a certain educational software is installed (for instance, for teaching how to read or to do arithmetic), it is certainly not produced for a specific child, but for a mass of them. 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, but these are other subjects; see my web site for papers covering them.

#### **4.4 Libertarian Learning with the Internet**

Besides the problem of lack of contextualization regarding children and adolescents, the Internet presents a grave problem: the fact that they don't have the discernment to choose what is appropriate for their context and maturity. A parent may eventually choose a program to load into the family's computer, e.g. to teach how to read and to do arithmetic, but if a child or adolescent accesses the Internet without the constant presence and control of an adult, they will have a whole virtual world at their disposal.

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, and that is terrible from an educational point of view. In education, there is a proper timing for everything; unfortunately, the old intuition that this timing should be respected has in general been lost.

The use of the Internet in education, specially when there is no control over the visited sites, configures a libertarian education. I am completely against this type of education: children and adolescents know, at least in their unconscious, 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, ignoring limits, behavior and attention problems, etc. It is obvious that some freedom has to be given to any child, and even more to an adolescent. This could be the case, for instance, when one lets the child choose a toy to play, among those available and previously selected by her parents or teachers according to its educational relevance and the child's context.

I consider that there is absolutely no need for a child or adolescent to use the Internet, on the contrary, it is detrimental to their harmonic development. But if a parent erroneously finds it essential for 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 recommends the use of software for monitoring and limiting the access to the Internet [13].

The same considerations apply to computers. Early learning of how to use them ("computer literacy") is also not necessary – certainly almost all the adults above age 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 (while it will not be stolen, cf. 3.2 above), and use it without any control whatsoever. I can imagine no worse lack of educational knowledge. Particularly, I am sure that those computers will be mostly used for electronic games, mainly violent, because these are the most appreciated ones. As I am writing, I am examining the June 2005 of the Brazilian magazine on video games EGM (which boasts to be

the #1 video game magazine in the country); in its pages 66-79 it contains a section reviewing 11 games; 10 are explicitly violent, and the other one is a car race game. Krahé 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 recommend games by boys to their friends are violent.

#### **4.5 Learning to Learn**

In the OLPC web site ([www.laptop.org/vision/mission/](http://www.laptop.org/vision/mission/)) one reads "A computer uniquely fosters learning 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 (see [www.laptop.org/vision/progress/](http://www.laptop.org/vision/progress/)). For a whole chapter of one of my books on computers in education criticizing Paper, see [SET 89]. Briefly, LOGO, being a programming language, forces the child or adolescent to do programming. The fact is that computer programming 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. Papert advocates the use of LOGO from age 4 on. But at what age do children begin to understand what angles are and how they are measured, and that the 90 in the *right 90* command stands for a 90° angle, producing a corresponding rotation of the cursor displayed on the screen (euphemistically called "turtle")? 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. Even in the solution of problems in elementary Math the space of possible solutions for a given problem is quite limited. Therefore, programming with LOGO introduces a kind of libertarian education quite different from traditional education. As I mentioned in section 4.4, I find libertarian education highly damaging to the necessarily slow intellectual development, specially of formal abstractions.

In an unconscious way, children do very well by themselves and intuitively 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 they accelerate the development of self-awareness and self-control in an inappropriate age and, even worse, using a formal, logical-symbolic system.

#### **4.6 The Maturity Required when Using Computers**

The question of self-control leads to the problem of maturity. Someone using a computer has an enormous freedom of action, limited only by what the software being executed permits one to do. Being a virtual machine, there are no dangers of causing physical disasters, as it would be the case, for example, by using a hammer. Disasters will be related to the influence on will, emotions and thinking. As these are not apparent, one believes that computers are harmless. We have already examined the kind of symbolic, algorithmic thinking required to use a computer – exercising such a thinking for hours obviously has

an influence upon it; thinking may become rigid, requiring always full logic connections and relations of cause-and-effect. But life in general, and specially social life, do not follow this pattern. In terms of feelings, ill effects can be the excitement that an attractive program may produce, or the excitement due to the fact that one does not succeed in doing something one is sure of being able to do (e.g. remembering a command that was used some time ago, or finding a certain web site which one is sure that exists, etc.). These are some of the factors which make people use a computer or the Internet without stopping, which diminishes their strength of will.

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 the visual cosmetics, or content inadequate to their maturity, as well as for limiting the time they spend with computers or the Internet.

One of the consequences of children and adolescents using computers is that they end up losing an enormous amount of time playing with the machine, instead of dedicating themselves to studying and doing school work, as well as doing something more constructive. 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". The workshop covered theoretical and practical notions of what a computer is, what it is useful for, and its impact upon its users (see my papers "[The Paper Computer: a pedagogical activity for the introduction of basic concepts of computers](#)", "[The HIPO computer: a tool for teaching basic computer principles through machine language](#)", and "[Algorithms and their analysis – a pedagogical introduction](#)"). 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.

#### 4.7 Research Results

A book by Armstrong and Casement brings a full chapter with serious restrictions to the use of computers to teach how to read [2]. They cite various studies about one of the then most popular of these projects, 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" [p. 91]. The description they make of the project is absolutely astonishing: it is a true conditioning program, with 5 steps, called "stations"; a tone is rang every 15 minutes advising the children that they should change "station". Curiously, only 2 of these "stations" use a computer [p. 211]. In the last one, "children use various materials – sticks, clay, wires and paper cutouts – to form words, letters and sentences" [p. 212]. Maybe just in the "stations" which don't use a computer children learn something...

Angrist and Lavy analyzed the outcome of a huge program in Israel, called Tomorrow-98, of installing computers in schools [1]. The project began on 1994 and had as its objective reaching a rate of 10 students per computer in the participating schools by 1998. The research examined results of 200 schools in 1996. Math and Hebrew tests were given to grades 4 and 8. In their conclusions, 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 4<sup>th</sup> 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 8<sup>th</sup> 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." They call the attention to the high cost of installation of computers in schools: "Program schools received an average of about 40 computers, for a cost of \$120,000 per school. In Israel, this amount would pay the wages of up to 4 teachers. Assuming a depreciation rate of 25% on hardware and software and ignoring any training costs, the flow cost of the computers is about [an additional] one teacher per year per school". The final conclusion is that "On balance, it seems, money spent on CAI in Israel would have been better spent in other inputs."

Fuchs and Woessman [5] published a study that made quite an impact: they analyzed the results of the PISA (Programme for International Student Assessment) assessment of 2000 for 15-year old students of 31 countries. They compared the results of Mathematics (96.855 students) and reading (174.227), with the use of computers. They were careful in making a multivariate statistical analysis, that is, keeping certain variables constant, thus eliminating their influence in the result of other variables. 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 multivariate results illustrate how careless bivariate interpretations can lead to patently false conclusions. [...] At home, the negative relationship of student performance with computer availability contrasts with positive relationships with the use of computers for e-mailing, webpage access and the use of educational software. Thus, 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." (Their emphasis.)

Maresma Sprietma, a researcher at the Centre for European Economic Research in Mannheim, Germany, did a statistical study which is quite relevant to this paper, because she 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 Maths test scores downwards by 33.5 versus 12.7 percent of a standard deviation in test scores for Portuguese." This means that the more the students use computers in school labs, the less time they dedicate to the school work at home. She found a positive correlation between the use of the Internet by teachers and students achievements. This suggests to me that the project should be a much less expensive "One computer per teacher" and not "per student"...

Tom Dwyer, Jacques Wainer and collaborators, of the University of Campinas (one of the main public universities in Brazil), have also used the 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 provide regarding their computer usage [3]. Students answered the question “Do you use a computer to do the homework assigned by the Mathematics teacher?” The possible answers were “always”, “almost always”, “rarely” and “never”. The researchers present various graphics showing the gain or loss in points obtained in the tests, according to the students’ social-economic class and computer usage. 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. The second conclusion is that, for classes A2, B1, B2 and C [the highest class is A1, and the lowest are D and E], students that rarely use a computer do better in the tests than those that never use it. For classes D and E, the result for those that rarely use it is worse than the result for those that never use it. For class A1, the difference among the groups was not significant [...] 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. Secondly, 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. [...] [T]he 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. Let it be noted that the first time I published a [paper \(in Portuguese\)](#) (at the annual meeting of the São Paulo State Academy of Sciences, of which I am a member), calling the attention to this fact was in 1976.

The problem of the negative influence of computers in academic achievement is not just a consequence of the time students spend using them. Let us mention some of them.

#### 4.8 Degrading the Human Being

There are many negative influences of computers on children, adolescents and adults. In the first two cases, they are much worse, because one may suppose that an adult has completed his basic mental development; a child or adolescent still in development are much more subjected to bad influences upon their mind – which is precisely where computers mostly act upon, for instance forcing a logical-symbolic thinking (see sections 4.1 and 4.2). I am not going to elaborate this topic further; I will just cite the factors that I consider the most important ones for this section, with brief comments.

– Induction of an admiration for machines. (Computers surpass human beings in many 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 materialist view of the world. (See my paper [Science, religion and spirituality](#).)

– 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 characteristics of humans.)

– Induction of impulses of doing everything rapidly and many things at the same time. (This leads to the following item.)

– Damaging the capacities for mental concentration, contemplation and patience.

– Induction of a reductionistic 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; but this does not fully apply to living beings, which constitute a totality, as was pointed out two centuries ago by Goethe – a modern example would be examining a cell out of an organism; obviously it does not have the same functions as it had in its original place.)

– Damaging creativity. (Creativity must be exercised in ill-defined spaces, such as social relations and arts; computers present a well-defined mathematical space; by the way, artistic activities are the antidote which I recommend for those that have to use computers intensively – see my paper [“An antidote to computer thinking”](#).)

– Damaging memory. (Unilateral exercising of memory using logical-symbolic entities, as well as distorting the capacity for thinking; 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.)

## 5. TWO RECENT PUBLICATIONS

All the rest of the original paper, inclusive the next section, was ready in its original Portuguese version, and available on my web site in its version of April 24, 2007, when there appeared two articles, the first in the electronic version of *The New York Times* of May 5, 2007, which I inserted into my web site at <http://www.ime.usp.br/~vwsetzer/NYT-OLPC.html>, and the other in the main illustrated magazine in Brazil, *Veja* (“See”), Vol. 40, No. 19, May 16, 2007, pp. 86-93. For a detailed description and comparison of both, please refer to the complete version of this paper (see Introduction above).

The title of the *NYT* article is “Seeing No Progress, Some schools Drop Laptops”. The emphasis is in showing 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.

One sees in the article the realization of some of my conceptual forecasts. I hit the target because I know very well what a computer is, the inner state of its users and, in a wide scope, what does the development of children and adolescents means.

The *Veja* article shows, again, that I was correct. Just at its beginning, it 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.” This is the source of my statement in section 3.1 above, and the considerations in sections 3.4 and 3.5. This gives even more emphasis to the problem of the laptops being stolen from the

students (3.3). On this subject, the article shows on p. 90 how I fully hit the target: “Another barrier which is worth mentioning in the Brazilian case is the lack of security of computers in public schools, frequent targets of robberies. In the Luciana de Abreu high school in Porto Alegre, one has a more concrete view of the 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.” (The lack of door handles confirm my statement in section 3.2 of the original paper, about the poor physical conditions of public schools). The following phrase is a direct confirmation of my arguments in that section: 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.”

Going back to the problem of theft, notice this phrase [p.90]: “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, that is, in rich and poor countries, 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. On the contrary, 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), which tries to treat students with the highest love, humanity and respect (see, for instance, how a class teacher shakes hands with every student at the beginning of a class day, from grade 1 on), is such that no real Waldorf school use computers before high school. They are used for teaching what they are and how they may be employed in useful ways. For a high school curriculum proposal for introducing computers in the Waldorf spirit, see my paper with Lowell Monke [SET 01].

It is very important and urgent to recognize that the environmental problems we are suffering now are a consequence of the way technology is cherished and admired, and its use for the sake of egotism 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, already mentioned in section 2: 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 upon 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.

## REFERENCES

- [1] J. Angrist and V. Lavy, “New Evidence on Classroom Computers in Pupil Learning”. **Economic Journal**, Oct. 2002, 112 (482), 735-765 and **Discussion Paper No. 362**, Bonn: Institute for the Study of Labor (IZA), 2001. Available at <http://ftp.iza.org/dp362.pdf>.
- [2] A. Armstrong and C. Casement, **The Child and the Machine: How Computers Put Our Children’s Education at Risk**, Beltsville: Robind Lane, 2000.
- [3] T. Dwyer, J. Wainer et al. “Desvendando mitos: os computadores e o desempenho no sistema escolar” (“Unveiling myths: computers and school performance”), **Educação & Sociedade** (8) 101, Sept./Dec. 2007, pp. 1303-28. Available at [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0101-73302007000400003&lng=en&nrm=iso](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0101-73302007000400003&lng=en&nrm=iso) (there is a version in English, available directly from the authors).
- [5] T. Fuchs and L. Woessman, **Computers and Student Learning: Bivariate and Multivariate Evidence on the Availability and Use of Computers at Home and at School**, Ifo Working Paper No. 8. München: Institute for Economic Research, Univ. of Munich, 2005. Available at [http://www.cesifo.de/pls/guest/download/Ifo%20Working%20apers%20\(seit%202005\)/IfoWorkingPaper-8.pdf](http://www.cesifo.de/pls/guest/download/Ifo%20Working%20apers%20(seit%202005)/IfoWorkingPaper-8.pdf).
- [6] B. Gates, **The Road Ahead**, New York: Viking, 1995.
- [7] B. Krahé and I. Möller, “Playing violent electronic games, hostile attributional style, and aggression-related norms in German adolescents”, **Journal of Adolescence**, 27, 2004, pp. 53-69. [www.lionlamb.org/research\\_articles/study4.pdf](http://www.lionlamb.org/research_articles/study4.pdf).
- [8] S. Papert, **Mindstorms: Children, Computers and Powerful Ideas**, New York: Basic Books, 1980.
- [9] S. Papert, **The Children’s Machine: Rethinking School in the Age of the Computer**, New York: Basic Books, 1993.
- [10] V.W. Setzer, **Computers in Education**, Edinburgh: Floris Books, 1989.
- [11] V.W. Setzer and L. Monke, “Challenging the Applications: An alternative view on why, when and how computers should be used in education”. In R. Mufolletto, **Education and Technology: Critical and Reflective Practices**, Cresskill: Hampton Press, 2001, pp. 141-172. Also available at <http://www.ime.usp.br/~vwsetzer/comp-in-educ.html>.
- [12] V.W. Setzer, “Considerações sobre o projeto ‘Um laptop por criança’” (“Considerations about the ‘One laptop per child’ project”). **Proceedings of the 4<sup>th</sup> International Conference on Information Systems and Technology Management**, São Paulo 2007, pp. 4,060-4,083. Available in a new version at <http://www.ime.usp.br/~vwsetzer/um-laptop-por-crianca.html>.
- [13] G. Smith, **How to Protect Your Children on the Internet – a Road Map for Parents and Teachers**, Westport: Praeger, 2007.
- [14] M. Spitzer, **Vorsicht, Bildschirm! Elektronischen Medien, Gehirnentwicklung, Gesundheit und Gesellschaft** („Attention, Screen! Electronic Media, Brain Development, Health and Society”), Stuttgart: Klett, 2005.
- [15] M. Sprietsma, **Computers as pedagogical tools in Brazil: a pseudo-panel analysis**. Discussion Paper 07-040, Center for European Economic Research (ZEW), April 2007. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=997234](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=997234).
- [16] M. Warschauer, “Demystifying the digital divide” **Scientific American**, Vol. 289, No. 2, August 2003, pp. 42-47.