ELECTRONIC MEDIA AND WALDORF EDUCATION

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1. Introduction

The original of this text, in Portuguese, was written in early 2016 as a new appendix for the new, 12th edition of the book by Rudolf Lanz, *Waldorf Education: a path for a more humane education* (Lanz, 2016, in Portuguese). My two old appendices on TV and video games, of the book's previous editions, did not consider the impact of the Internet, which has become perhaps the biggest current educational problem. Also, when I wrote them there were very few scientific papers investigating the effects of electronic media on children and adolescents; some of them are cited here.

Initially, an objective description of each device and its impacts on the user are presented. Then, specific problems they may cause are addressed, starting with two which I consider irrefutable and definitive, that is, taking them into account, one should come to the conclusion that electronic media should not be used by children and adolescents. Some other problems are then addressed, and a special section deals with the use of electronic media by children and adolescents from the point of view of Waldorf education. This section is directed to parents and teachers of Waldorf students, but also to the general public interested in knowing that distinct point of view – from my own understanding, that is, this text is by no means an official statement of Waldorf education about the questions covered here.

This text does not contain an introduction to Waldorf education. Some of its characteristics are described in various sections in the discussion of certain subjects regarding electronic media.

In quotations, my comments are in brackets [...]. 'Electronic media' stands for TV, video games, computers and the Internet.

2. Electronic media

2.1 What they have in common

TV, video games and computers use a common device: a screen. This has always been the case with TV sets, but computers started using video monitors only in the 1960s, initially just for character display. In the 1970s, monitors were connected to large computers (main frames), and in general many people used terminals connected to the same computer. It was only with the advent of personal computers in 1977 that screen monitors became popular. Interestingly, in traditional movies that used rolls of film, images were projected on successive full frames (24 per second) with high granularity. In the current TV screens or computer monitors (including the screens of mobile phones), there is never a complete picture on the screen: images are formed through 'points' (pixels) that are being activated successively (in a process called raster scanning), i.e., the image is never entirely on the screen. In a film, a movement is an illusion produced by our optical system; in devices with screens the image itself is an illusion. In both cases, the images blink. On a TV set half the image (odd or even lines) is displayed every 1/60 of a second (1/50 in Europe), so that a complete image is formed

every 1/30 second (1/25). There is an illusion continuous motion due to the retention of images on our retina, which remain for about 1/10 of a second.

The screen can display a text, a still image or a sequence of moving images, possibly with a few texts, such as captions, ads, etc. We will see that the effects on users are very different and each case.

Compared to our optical system, screens display coarse images. The HDTV standard has improved somewhat this situation, with 4 times more points being displayed on the screen in relation to the previous standard. However, it can be seen that even in HDTV one cannot see the details that we see with our eyes. For example, displaying a whole tree on the screen, one does not see the leaves, while we can see them even when we are fairly far from the tree. Displaying a whole person, one does not see well her facial expressions, unless for smiles or laughs, due to the appearance of the teeth; this is why in films for TV in general faces of actors are displayed, and not complete bodies. Our field of vision slightly exceeds 180°. If an image of this magnitude would be displayed on a screen, there would be almost no details. It is true that we see a sharp image only in a cone of 6° with vertex in the eye, corresponding to the projection of the image on the retina's fovea. However, in a 180° image in a screen no details can be seen.

2.2 The devices

For its users, a TV set is just a screen, which can be relatively large. There is usually a separate device, the control, but it has very limited functions, such as to change channels, volume, etc.

Beyond the screen a video game has a computer that runs the game program. In addition, there are devices such as a keyboard, sticks, or a gun imitation that detects a small light portion of the image being emitted by the screen (and so the computer can calculate where the "weapon" is being pointed to), a joy stick, console, etc. These gadgets allow interaction of players with the game through the computer. An action on one of these gadgets is detected by the computer, which modifies the program state producing changes in the images being displayed on the screen.

A computer is a strictly mathematical machine, that is, its operation can be fully described mathematically. This math is not general, it is quite restricted: it is discrete (that is, the machine status, all programs and the data that they use can be associated to integer numbers), and its functions consist of manipulating formal symbols. Technically, one says that the computer is a logical-symbolic, algorithmic machine. For example, a computer does not add: it combines the symbols so that the result is what is expected. Furthermore, in a normal operation, it is a deterministic machine. The sum of 3+5 always gives 8, and it would be a disaster if it were otherwise.

When a command is given to a computer, this command triggers the execution of an internal mathematical function of symbol manipulation.

Considering that information must necessarily be understood by the recipient, it can be said that a computer does not process information, but data. For example, a text in an unknown language is a data stream, because one does not understand what it describes. However, one can format the text, change the place of align paragraphs, etc. All these functions process data with the user receiving no information, because she or he does not understand the described contents (Setzer, j).

Computers rigorously follow mathematical rules intrinsic to the machine circuits, and the instructions of the programs designed by developers. These programs have been

fully thought out. When a program executes a program (strictly speaking, a program is in fact interpreted by the machine), what the computer does is simulating the thoughts that the programmer formulated using the possibilities of a programming language, introduced into the machine in the form of a program, using a strictly formal programming language.

The Internet is a network that connects computers using a standard protocol (IP, Internet Protocol) for communications between them. Thus, data may be represented internally with different symbols in different computers, but the IP causes them to be transmitted always in the same symbolic representation. The latter is transformed by the receiving computer in the internal code it uses for the symbols with which it works. Data sequences are transmitted in data packets. For instance, a large text can be subdivided into many packets sequentially transmitted by a computer, but not necessarily received in the same sequence by a receiving computer. Each packet can follow a different path in the network. Through a header indicating data about the transmitter and the receiver, e.g. their 'addresses' (URL, Uniform Resource Allocation), the packet number, etc., the receiver can be located and assemble the packets in the correct order remaking the large transmitted text. Thus the path of each package is unpredictable, random, depending on the availability of network channels (which in general involve various computers), but both the sender and receiver see a deterministic system. If a packet is lost on the way, breaking the sequence of all packets, the receiver can request it again; this may be one of the causes of a slow Internet.

3. The state of the users

Let's start with the impact of screens on devices' users. If the display shows a static text, there is no essential difference with respect to a printed text. Of course, the reader can relate to a book in a very different way than to a text displayed on a screen. For example, if one spills coffee on a book, it will spot it, but certainly the text will still be readable. But try to pour coffee into a computer such as a laptop – whose circuits are under the keyboard – or on an isolated keyboard to see what happens. Also, the physical constitution of the book produces a very different effect on the reader who 'feels' having something concrete in hand, a different feeling from book to book. In addition, the reader can make notes on the book, highlight passages, mark with colored markers, etc. (I usually make in the first blank pages an index of phrases or most relevant issues.) Some virtual book devices (the e-book readers) allow one to make notes on them, but it's not the same thing as scribbling on a book – which, incidentally, does not rely on electricity or charged batteries.

Real books for children and youth should contain beautiful, artistic illustrations, and be shown to children as soon as they can recognize the figures, which generally occurs at the end of the first year of life. They love when the reader makes the noises of represented animals, and like a lot being able to flip through the pages – there are some special books for small children, with thicker, resistant pages. Oral repetition for children is essential because it is by listening that a child learns how to speak (therefore one should always use an adult language, and never imitate the children's babble).

The same essential similarity between a printed text and one displayed on a screen occurs when the latter statically shows an image, picture or photo. The big difference is when the screen displays moving images or a sequence of several images. This is due to the fact that one cannot concentrate on each image, because soon comes a change in it, or another image is displayed. When there is a static text displayed on the screen, the

reader has control of when to display the next portion and thus can calmly read the full text in one's own pace.

In my lectures on electronic media and education, I use to give an example. Initially I stand still and ask people to look at my face and imagine some other person's face (perhaps with glasses, bald, old like me). Participants report having some difficulty but in general being able to imagine someone else despite looking at me. Then I start to move between left and right, always looking to the public, and ask again to look at my face and imagine someone else. Everyone reports that this is impossible. This shows that when images are observed in movement or in rapid succession on a screen, it is no longer possible to imagine anything (in the exercise, only the background changes). The screen images will be absorbed in the subconscious without the viewer being consciously able to think about them. Thus, in this situation one has necessarily to stifle conscious thinking, the imagination. I refer to 'conscious thinking' due to the fact that one continues having an intuitive, semiconscious thought. In fact, if a car appears on the screen, the object is recognized as a car, but it is not possible to reflect calmly on its details, for example its color, model, if one likes it or not, etc., because soon another image appears. The same for a tree, a street or any object in movement or which stays just very briefly on the screen. I recommend the reader trying to consciously think on each image while watching a normal program on a TV: in general, in about one minute one notices a mental exhaustion and the tendency of entering a state of drowsiness.

It happens that imagination is an essential mental capacity. When we consciously perform an action, usually we imagine its consequences – one of the crucial distinctions between adults and children, and between humans and animals. Moreover, as we shall see in section 12.2, imagination, fantasy, which are essential parts of our thinking, are related to new ideas and creativity. Thus, it is worth already calling here the attention to a major negative effect caused by devices with a screen, when the latter display moving images or in rapid succession: they damage the ability to imagine and therefore to think.

The effects produced by screens prompted Manfred Spitzer to write an extraordinary book with the main title *Vorsicht, Bildschirm!*, that is, "Attention, screen!" (Spitzer 2005). He brings references to many scientific papers showing the ill effects of screens on children, adolescents and adults. Because of this book, he became famous in Germany, being frequently invited to give public talks about the consequences of using electronic media. Later on he published another excellent book, *Digitale Demenz* (2012), "Digital dementia". In regard to this title, it is interesting to note that Spitzer is a neuroscientist, professor for psychiatry at the University of Ulm, and director of its Psychiatry Clinic and the Center for Transference, Neuroscience and Learning.

Let us now briefly examine the influence of each device on its user, in addition to the described effect produced by screens on thinking. With the exception of gyms, in general a TV set is used with the viewers sitting in comfortable armchairs, without moving. This means that these devices force physical inactivity, which has tragic consequences on health, as we shall see in section 7. In the past it was necessary to rise from the chair to change the volume or the channel of a TV set; with remote controls, this is no longer necessary. We are heading for all TV sets having voice commands, that is, it will not even be necessary to press a button to control them. This is already the case of mobile phones with voice recognition input. This lack of action means the absence of exercising the will, which in turn increases the inactivity of thinking – because when we usually have a willing impulse we think about it and on the consequences of the resulting acts. Inaction of the viewer means that a circuit is formed in which something flows in one direction only: the TV set just sends images and

sounds, and the viewer just absorbs them, recording everything mostly in the sub- or unconscious.

The dulling of consciousness was first detected by H.E. Krugman (1971), in experiments with electroencephalograms (EEG) and eye movements. With about one minute of TV viewing, brainwaves fall to 1/5 to 1/10 of their amplitude in relation to reading (Emery & Emery, 1976, p. 88, using Krugman's data). The distribution of EEG waves in relation to their frequencies show that during reading faster waves prevail, while during watching TV slow waves predominate, indicating a state of inattentiveness. The eyes, which usually do not stop, and continuously scan the objects that are seen, become almost static, also indicating that state, which can also be considered a somnolence, semi-hypnotic state. This has a direct impact on programs: if one of them is calm, with almost no changes in the images, the tendency is that viewers find them dull and either change to another channel, or even fall asleep. I counted usually 15 to 25 screen changes per minute, including zoom effects, background change, appearance of subtitles, etc. In advertisements the speed of change increases significantly. In video clips, I have measured 60 changes per minute, an absolutely psychedelic situation. The important thing is that these image changes mean a flood of visual stimuli that the mind and brain cannot absorb, therefore their activity is dulled.

In terms of the senses, just vision and hearing are being activated, albeit in extremely partial situations. For example, the distance to the screen is always constant, so that there is no accommodation of the crystalline lens nor the muscle action for changing the convergence and sight direction. The sound comes from fixed points, the speakers, and it is always somewhat distorted and metallic.

Therefore, there is a dulling of conscious thinking, and the will is inactive. Considering the triad of mental activities thinking, feeling and willing (detailed considerations about them are covered in section 12.2), only feelings are highly active, and this is where TV strongly acts. According to Centerwall (1992), there is no more effective formula to turn the feelings on than violence, so it is impossible to expect it to be banned from TV. According to Jerry Mander (1978), TV transmits violence not because viewers like it especially, but because it is what it transmits better (see my article 'TV and violence, a perfect marriage' (Setzer, c) . In fact, for broadcasters there is a huge danger – the viewer passing from the state of drowsiness to deep sleep. There are people who are born with a natural protection against TV: shortly after turning it on, they fall asleep. Since thoughts and will are almost inoperative, it is necessary to appeal to feelings to keep viewers awake. This is why scenes are transmitted with excessive feelings such as personal conflicts in novels or soap operas, and violence. For example, note how much violence is contained in local or national news, or in cartoons – supposedly for kids! In fact, a study of American cartoons found that everyone, absolutely everyone produced in the US between 1937 and 1999 contained violence (Goldman, 2012). By the way, in this paper there is a reference about a study from the University of Michigan noting that at that time an eighteen-year-old American had seen on average sixteen thousand murders on TV, and children's programs usually contain more violence than adult programs. This has certainly increased dramatically due to the extensive use of violent video games.

In addition to violence, there is another formula for hitting the strong feelings of the viewers in order to keep them awake and watching: eroticism, also ubiquitous on TV. Another ingredient that works is the form of a show, the grand spectacle, with lots of movement and color exaggerations and, in general, a lot of shouting. Neil Postman, in the book I consider his best, draws attention to the fact that TV turned everything into a

show (Postman, 1987). In fact, observe an educational program such as for example Beeckman's World, showing very interesting simple physics experiments which could almost be repeated in a kitchen. To turn everything into a show, there was a person in a costume of a big rat who, in the midst of the experiments – in an environment mimicking a laboratory, but with hundreds of objects – threw pies everywhere. And it was not only education: politics, religion and sports were also transformed into shows, as Postman shows very well. The glory to the viewers is when, in a monotonous car race, there is a major disaster, with cars spinning and turning over, tires being thrown into the air, cars hitting a wall, and the full glory of an explosion with fire, etc. What happens then? The TV begins to repeat the glorious scene countless of times. Sports attract through the excitement of the play, many quite violent, and of competition.

The dulling of the viewer awareness makes TV essentially a conditioning medium, and not an informative one. Therefore there was a second perfect marriage, now between TV and advertising, which I characterize as the technique, science and art of influencing people to do something they would not do without this influence. In fact, in Brazil TV advertising amounts to roughly 2/3 of the total advertise spending in all media outlets (including newspapers, magazines, outdoors, etc.). One could consider it to be the ideal vehicle for advertising, because it is the most widespread means of communication (98% of households in Brazil have at least one set). But just this fact would not be enough: it is also the ideal vehicle for advertising because it works in this sense. I will quote here a case that proves it, given by Susan Linn in her excellent book (Linn, 2004, p. 132 of the 2006 Brazilian edition). Just in 2002, just on TV, just in the US, McDonald's spent US$ 510.5 million in advertising. Question: A huge company like this would through out this mountain of money into the garbage? No, it made this investment because it obviously resulted in much larger profits. In particular, observe the struggle of political parties in Brazil joining in coalitions to get an additional minute of obligatory political advertising on TV (which is subsidized by the government; the time allotted to each party is proportional to the number of its representatives in Congress). Political parties know that with just an additional minute on TV they can influence the votes of millions of people. With this condition they expect more voters to vote for their candidates – regardless of what the latter have done and their programs, and the fact that many electoral advertisements are truly lies. See my article about this, showing that this type of advertising should be banned (Setzer, d, in Portuguese).

I would like to propose to the reader three experiments. 1. Watch a TV program and try to pay attention, to reason on every image that appears on the screen. Notice how after a brief time one gets mentally exhausted, as described above. 2. Count how many image changes occur per minute, as also described above. Notice how fast these changes occur, and that there are more changes in advertising shows than in normal programs, pointing out to the conditioning effect. 3. Let someone watch the national news, but don't tell the person about the experiment. Count how many different news were shown. After the news program is over, ask the other person what news were transmitted. You will be surprised with how few are remembered, demonstrating that there was almost no informative effect.

As we have seen, video games produce a closed loop involving the player. They can be of various categories, strategy and action-reaction being the two main types. In the first case, the user is forced to think logically, and for this there can be no hurry. In the second, involving by far the most frequently played games, especially violent ones, a key feature is the reaction speed. In them, the player cannot stop to think, having to react quickly, intuitively, otherwise the game is lost. In this case the dulling of thinking

is much higher than on TV. Feelings are enormously stimulated in exciting situations, and eagerness of winning the challenge. In terms of the will, actions must be mechanical, automatic. It's a real mechanization, automation of the will. I think this is the worst effect of video games.

Being mathematical machines, computers always force the user to exercise a mathematical reasoning, although not with the traditional expressions and algebraic equations that are always associated with this subject. When using a keyboard, the user is forced to perform a mechanical movement of the fingers and hands. Interestingly, in old mechanical typewriters the intensity of the printed letter depended on the force with which the keys were pressed. With computer keyboards, it does not matter how a key is pressed; the effect is always the same, which further automates the typing activity. In addition, old typewriters forced a certain discipline on the user, who had to mind the typing because correcting errors was laborious and made the work quite ugly. To vertically align the text to the right, it was necessary to count the characters of the last words and leave appropriate blanks. Today, text editors do this alignment automatically, allowing corrections to be done at will, including changing the place or deleting paragraphs and large portions of the text. It is not necessary to pay attention to the spelling, because correctors point out the typos and suggest the correct spelling. Therefore, the discipline required to write a definitive text by hand or typewriter has been eliminated. Worst of all, this example shows that the computer induces lack of discipline, because while editing a text errors are of no consequence, and can always be corrected. It happens that few people like to be disciplined. The tendency is the user typing a text without much attention, correcting it later on. But the worst indiscipline induced by computers takes place in programming. There is a Setzer's 'law' that says, "Computers are the only machines with which it is possible to produce badly made things (programs, systems) which work" (Setzer, e). (Compare with the results of using a power lathe without care and paying full attention.) It is possible to program an application without discipline, without documentation, and then correct the errors by trial and error, without much thinking, until it works. This is generally done without changing the initial documentation, if it existed, which becomes obsolete. There is a paradox here: the computer is a machine that simulates our mathematical thoughts, and therefore requires clear and disciplined thinking; however, it leads to a lack of discipline precisely in thinking, that is, it induces a mental indiscipline, perhaps the worst lack of discipline. Advancing an educational aspect, this is very bad for adults, but tragic for children and adolescents, who should be precisely developing mental discipline.

An essential aspect is that nowadays the computer can be used anywhere, anytime. In fact, in the past, both in the early days of large computers (main frames) and after the advent of personal computers (desktops) it was necessary to go to a computer center, and then to go home or to the workplace to use one of these machines. With the advent of laptops, smartphones and tablets, computers became small enough and running on batteries, so as to allow them to be taken everywhere, even in the pocket or purse.

The Internet has added to the problems caused by computers the fact that it makes available to anyone, very quickly and easily, a huge amount of text information – both honest, true, as dishonest, false. It also features images, sounds and movies. It introduced a universal libertarian system, without any control. In fact, once one had to buy a newspaper, a magazine or a book, or listen to the radio or watch TV to get information. But these communication media were supervised by those responsible for them – for example, by imposing certain ethical, presentation and content standards. These persons were subject to legal sanctions if they infringed certain laws, such as

performing plagiarism in the case of books and records or making false accusations against people. Today, as rightly pointed out by Andrew Keen, there is a culture of banality: anyone can write, record and make publicly available anything without any control (Keen, 2007).

As we have seen, computers and therefore the Internet can now be used anytime, anywhere. This produced the phenomenon of what I call 'being permanently connected'. We shall examine the impact this has on children, adolescents and adults. But here we can already point out something general: this caused profound changes in society, particularly in individual attitudes and social relationships. We will see that the damages caused by the Internet, and also by the other media are, in my subjective evaluation, much greater than the benefits.

The advent of the Internet led researchers to believe that it would reduce the time of watching TV. This did not occur, as documented by Nicholas Carr (2010; see also Setzer, f). What has decreased is the average reading time. In the US people saw on average 4.7 hours of TV per day in 2014; in Brazil, 3.7 hours per day, the eighth largest consumer per capita (Statista, 2015). In my opinion TV has been in extent the greatest tragedy committed against humanity: billions of people are attacked, turned passive and semiconscious by it. I estimate that this tragedy occurs daily with about half of humankind.

On my paper 'The mission of technology' (Setzer, i) I stated that technology has a mission: freeing the human being from internal and external forces of nature. For example, I cannot go by myself from Brazil to Europe; machines give me this freedom. Unfortunately, technology is doing exactly the opposite: it is impairing our freedom, inducing undue memories, ways of thinking and actions.

Before leaving this section, let us summarize the three main influences of the different media on the mind. TV acts mainly upon the feeling capacity, video games upon the will and computers upon the thinking. Thus, each medium acts mainly upon one of the three mind activities.

From the next section on some negative effects of electronic media will be addressed, beginning with two that I consider indisputable in terms of showing that the Internet is not for children and adolescents.

4. The problem of addiction

It has already been scientifically proven that all electronic media have a high risk of producing dependence, i.e. of being addictive. On the problem of TV addiction, an article has become a reference – the one by Kubey and Csikszentmihalyi (2002), in which the authors describe numerous research in this direction. They write:

> To some researchers, the most convincing parallel between TV and addictive drugs is that people experience withdrawal symptoms when they cut back on viewing. Nearly 40 years ago Gary A. Steiner of the University of Chicago collected fascinating individual accounts of families whose set had broken – this back in the days when households generally had only one set: 'The family walked around like a chicken without a head.' 'It was terrible. We did nothing – my husband and I talked.' 'Screamed constantly. Children bothered me, and my nerves were on edge. Tried to interest them in games, but impossible. TV is part of them' (p. 79).

One of the most common symptoms of TV addiction is the difficulty that people feel to turn it off, even when they think it is already time to do it. If a program ends, the viewer seeks immediately another one. One does not have to make any effort to keep the TV set on, but to turn it off. Thus, it can be said that TV undermines the strength of will.

People who watch soap operas or films every day, or regularly watch TV are probably dependent on it. They have probably gotten used to the excitement and suspense produced by these programs which, as we have seen, affect mainly the feelings. Dependent people have also become accustomed to stay in the state of drowsiness, that as we have seen, is usually induced by images moving on the screen or appearing in rapid succession. With this the viewer temporarily forgets her/his personal problems – even hunger. That is why in slums or poor households there is often a TV set and no refrigerator.

Regarding children, it is worth quoting the paper by Christakis and Zimmerman (2006). They examined data from 1,331 children who watched TV an average of 2.64 hours per day before four years of age and 3.62 hours at age six. As a result, they concluded:

> [...] An early exposure to TV was associated with an increased probability of resisting turning off the TV at age 6. This finding was present even while controlling for a number of potential confounding factors, including the number of hours of TV watched at age 6 and behavioral characteristics, at both ages 4 and 6 that might predispose children to protest [to the order to stop watching TV].

They conjecture that this result may be due to the creation of habit or addiction to watching TV:

> [...] However, it seems plausible that exposure to TV during critical periods of brain development could induce an increased need for it. Second, our findings suggest that preventive action can be taken with respect to interest on TV school-aged children. Limiting young children's exposure to TV as a medium during the first 4 years of life may decrease their interest in it during subsequent time periods.

Interestingly, if limiting is good, eliminating is not even better? This same observation applies to a recommendation of the American Academy of Pediatrics (AAP 2011, p. 204):

> Pediatricians should continue to counsel parents to limit total noneducational screen time to no more than 2 hours/day, to avoid putting TV sets and Internet connections in children's bedrooms, to coview with their children, to limit nighttime screen media use to improve children's sleep, and to try strongly to avoid screen exposure for infants under the age of 2 years.

The addiction produced by action video games – which includes the violent ones, the most played ones – is notorious. For example, a survey cited by Faiola (2006) showed that 2.4% of South Koreans between 9 and 39 years of age suffered from addiction of these games, with 10.2% other at risk of becoming dependent. Note that this refers to the total population of the country, and today this should be much worse. The same paper reports that at that time clinics for treatment of people dependent on these games had already been opened in South Korea, China, the Netherlands, Canada and the United States, which in itself highlights the fact that dependence has become a problem.

The situation worsened with the increased capacity and speed of computers and the resolution of images, allowing for the exhibition of many more details, such as human organs and blood that appear when the body of a person is 'ripped'. This development made possible the advent of 'first person shooters', in which the player identifies himself with a protagonist, a small character depicted at the screen commonly called the 'avatar', and sees the game through its eyes. Note the trivialization of spirituality: in Hinduism, an avatar is the incarnation of a high divine being in a human person. By taking a virtual identity while playing, identifying himself with the 'avatar', the player can 'escape' of his own identity and problems.

Video games are designed to attract the player. For example, some games like the extremely violent World of Warcraft, can never be won – there is always something more to play and a new level of complexity to be achieved. Many games let the player win sometimes, giving the impression that he could win more and more often, so holding him to the game.

The American Academy of Pediatrics (AAP) established a list of 9 points that characterize a person dependent on video games (Petry, 2014), using the Diagnostic and Statistical Manual of Mental Disorders, DSM-5 (APA, 2013), which clearly indicates a concern with this problem.

The use of computers can also cause dependence. Playing video games means using a computer, but we will treat briefly its use out of the games. It seems to me that the computer is addictive because, being a deterministic machine, it always does what the user commands it to do – unless in case of a failure, which usually rarely happens. The user has thus a sense of power of mastering the machine. But there is another situation that can lead to excitement: failing to do something that one is sure of being able to do – for example, giving a command to execute some function that has been previously performed successfully, but the user does not remember anymore how to activate that function. This is the case of software settings; if the user does not remember how to get to a screen where it is possible to specify a certain parameter she tends not to rest until the path or the correct parameter is found. This is a purely intellectual challenge. The following phrase is well known: "When nothing works and all possibilities have been tested to exhaustion, read the manual." In the case of software, read the help file (which in is general very poor). It is curious that a mathematical machine such as the computer – which should require purely intellectual actions – induces people not to think and keep trying alternatives until the correct one is reached. This happens very often with programmers: if a program does not work, they are absolutely sure – a purely intellectual challenge – of being able to find its errors and correct them; until they have indeed been found and corrected, programmers in general keep trying, even without stopping to go to the restroom (which may cause bladder infection). Generally they do not think much on what should be changed in the program, entering an exhaustive sequence of trials and errors.

But the increased dependence on computers comes with the Internet, in the so-called 'Internet addiction'. A scientific book published simultaneously in the US and in Brazil which deals just with this problem, contains fifteen articles of researchers of this disorder: *Internet Addiction: A Handbook and Guide to Evaluation and Treatment.* (Young and Abreu, 2010). It is worth quoting passages that show the high proportion of dependents. A study by a team from Stanford University Medical Center

> [...] found that one in eight Americans [12,5%] had one or more symptoms of Internet addiction. Studies in university populations revealed prevalence rates

slightly higher than those found in the general population of Internet users. At the University of Texas, using multiple versions of DSM [the International Index of psychiatric illness – see above], Scherer discovered in 1997 that 13% of campus students examined showed signs of Internet addiction. Morahan-Martin and Schumacher found in 1999 that 14% of Bryan College students in Rhode Island met the criteria, and Yang estimated in 2001 that 10% of students met the criteria at the University of Taiwan. The findings suggest that universities had easier access to the Internet and that access was more encouraged, contributing to the higher prevalence of addict use on campuses. In Finland a study investigated the prevalence of addiction in adolescents twelve to eighteen. The findings suggest that 4.7% of girls met the Internet addiction definition as assessed by YDQ; among boys, 4.6% met the definition [p. 20, my translation from the Brazilian edition, also in the next citation of this book].

YDQ is the abbreviation for Young's Diagnostic Questionnaire for Internet Addiction, prepared on the basis of gambling addiction of the DSM-IV (Young, 1996; see the questionnaire in the IAT reference).

> In general, we can say that it appears that the prevalence of Internet addiction is lowest among teenagers, ranging from 4.6 to 4.7%. This number increases in the general population of Internet users at intervals of 6% to 15% of the population showing signs of dependency, and reaches 13% to 18.4% among college students, who seem to run the greatest risk. These figures estimate the extent of the problem and suggest that a significant proportion of users connected to the Internet may suffer from one or more Internet addiction signs (Young and Abreu, 2011, p. 22).

As noted above, several countries settled clinics for treatment of Internet addiction. This also occurred in Brazil: Cristiano Nabuco de Abreu, the book coeditor, "[...] heads the Internet Addiction Program at the Integrated Clinic for Impulse Disorders (PRO-Amiti), Institute of Psychiatry, Faculty of Medicine of the University of São Paulo." With a pioneering work methodology in Brazil and Latin America, the unit offers "therapy sessions and counseling for adults, adolescents and their families since 2005" (p. v). For details of this program, see the Dependência (2015) reference (in Portuguese), where there is a list of symptoms to detect this addiction; for a list in English see PsychGuides (2016). In his article in the book, Abreu describes a "structured model in cognitive psychotherapy for treatment of Internet addiction" that lasts eighteen weeks with patient groups (p. 203). Note that with the popularity of smartphones and tablets and their mobility, today the situation should be much worse, that is, many more people are certainly dependent on the Internet. This can be seen everywhere, such as in restaurants, waiting rooms, public transportation, etc. The number of people typing something, obviously to the Internet, is huge. Instead of reading a newspaper or a book, instead of talking to each other, people are staying connected to the Internet, anywhere, anytime, at any age. The US National Council on Alcoholism and Drug Dependency states that "17.6 million people, or one in twelve adults [8.3%] suffer [in the US] abuse or dependence on alcohol" (NCADD, 2016). This means that addiction, and therefore the risk by using the Internet is greater than alcohol!

Psychiatrist M. Spitzer (2012) wrote: "Through the diminishing of self-control, the consumption of electronic media produces not just addiction to them, but causes general processes of dependence – also those connected to substances." (P. 271, my translation.)

Therefore, all electronic media may cause dependence, and currently the use of the Internet causes the greatest danger, representing a high risk of creating addiction. Now, any substance, object or activity that offers a high risk of causing dependence should not be used by children and teenagers. That's why it is forbidden (at least in Brazil) to give cigarettes and alcohol to minors. Therefore, one may conclude that electronic media should not be used by children and adolescents, especially without an adult at their side. In his book, Gregory Smith cited the following sentence in relation to the Internet, which he copied from the Netsmartz website: "Allowing a child unmonitored access to the Internet is the same as putting him or her out on a street corner and not watching what happens" (Smith, 2009 p. 76). An extensive work by A. Lenhart and others states that in the US 95% of teens use the Internet (2011, p. 15). Probably this use is almost entirely without face parental monitoring. This brings us to the next topic, specific of the Internet.

5. The danger to children and adolescents

The Internet offers anyone a world of data, and puts its user in contact with a world of people, without any control. In particular, it presents a huge danger to children and adolescents. Gregory Smith, in his book cited above, draws attention to the fact that "Most adolescents simply don't understand the risks of accessing the Internet and can be harmed greatly as a result of their naiveté" (p. xii). In my opinion, all adolescents are naïve to some extent, because they do not have yet the life experience that a normal adult has: they have not worked, did not constitute a family, did not have to manage their finances, face bureaucracies, etc. They do not have enough malice to distrust texts and people. Obviously, this naiveté is much greater in children. Every child is born with an absolute confidence in the world. Rudolf Steiner, the founder of Waldorf education, said once that children come into the world because they expect a good world. Gradually they will increasingly incorporate and take contact with the reality of the world, gaining the ability to be critical and suspicious of things and people. In fact, this phase should be delayed as much as possible; critical children can not obviously find that the world is good. The correct time to wake up to be critical is in high school, when a harmonious developed thinking should start having purely abstract capabilities. Only the contact in childhood and adolescence with what is good, beautiful and true produces a strong young adult with the possibility to distinguish what is bad, ugly and false. For example, a child playing with dinosaur figures will not find later that they are ugly, monstrous and aggressive. We will return to this topic in section 12.1.

In terms of the Internet, it is a fact that many adults have no suspicion that some link may be dangerous. If there was this suspicion, they would not be prey to spam and virus attacks, which would then not exist. What can then be expected from children and adolescents who do not have the malice and experience of an adult?

The great danger for children and adolescents, so well exposed by Gregory Smith, are what he calls "predators", people who come into contact with young people, many pretending to be of their same age, and slowly gaining confidence in order to get family data and even to make an encounter. I am going to invent a story here. Johnny is eight-years old and comes into contact with a predator, through a chat system. The latter pretends also to having eight years, sending up photos of a child of that age as being of himself. After a few weeks, the intimacy already established, Johnny tells that he took $2.00 of his mom's purse to buy candies at the school cafeteria (which should not sell them for health reasons). The predator then says he wants to meet Johnny, otherwise he is going to tell his mother that he stole the money. That's it: Johnny panics because he knows he did something improper. If the mother would get to know what happened, she

would give him some small punishment (not allowing him to play with his friends for a few days, for example), but she obviously would not consider the fact as being too serious. But for little Johnny his fault is horrible, and he meets with the predator, which can be a pedophile or even a kidnapper.

Another danger is the child or adolescent having access to inappropriate things for their age. One immediately thinks of porn sites, which are bad because they cause an early development of feelings and sexuality. But it can also be something serious, but not appropriate to the age. I was told during a lecture the case of a boy who read at the Internet an article about global warming and was so frightened that he did not want to leave home anymore.

The fact is that the Internet presents a totally liberal space, that is, without access restrictions, and it takes lots of maturity to use it well. Children do not have this maturity, they are developing it until they reach adulthood and have life experience. I believe that any technology, especially the Internet, to be well used requires four key capacities: 1) Great knowledge; 2) High discernment – only with both it is possible to distinguish what is good from what is bad, the beautiful from the ugly, the true from the false –, and in terms of the Internet, discernment to know if what one is doing with it is something useful, useless or even pernicious; 3) A lot of self-awareness to know, for example, if the computer is being used for too long, if one needs to get up and do some exercising (e.g. walking for some minutes; it has already been scientifically proven that this helps preventing the ill effects of sitting for too long), if a dependence on the Internet is starting to develop as stated in the previous section, etc.; 4) High self-control – It doesn't suffice to know that one should take a break, or that a dependence on any electronic medium is developing and if what one is doing is not useful, if there is no self-control to stop using it or not to use it continuously or frequently, anywhere, at anytime.

Children and adolescents do not have those capacities because they are slowly developing them. This puts them at high risk. For example, there are statistics showing that the number of them who received unwanted e-mails is huge (Smith, 2009). Many cases are known of girls who take naked pictures of themselves, send them to some friend and the photos end up circulating on the Internet. The worst thing is that nowadays an innocent picture with a properly dressed young person can, by using an image processor, turn into a naked photo or in indecent poses. This brings us to another problem: harassment or bullying. There has always been this problem among young people because they have not developed unrestricted compassion for all human beings and do not measure the consequences of speaking badly about or harassing someone, which my happen also collectively. Bullying turned epidemic due to the Internet, which gives immense possibilities to attack young people by talking badly about them, posting falsified photos, etc. An adult would not care too much for silly offenses, but they deeply affect the young, especially around puberty.

Thus, one can say with certainty that the Internet is *extremely* dangerous for children and adolescents.

An important advice to parents and guardians. Never let children and adolescents use the Internet alone without an adult at their side. This would avoid the two problems discussed so far: development of dependence and danger. A trivial solution is not to give them a cell phone with Internet access – but this does not prevent the exchange of instant messages through SMS, unless the contracted package is exclusively for use as a telephone. In no way one should install TV, computers and video games in the bedroom

of young people, because there would be no control of their use; this is an explicit recommendation of the American Academy of Pediatrics (AAP, 2001, p. 424, AAP, 2011, p. 204, see citation on section 4). J. Falbe et al. (2015) have drawn the following conclusion:

> Sleeping near a small screen, sleeping with a TV in the room, and more screen time were associated with shorter sleep durations. Presence of a small screen, but not a TV, in the sleep environment and screen time were associated with perceived insufficient rest or sleep. These findings caution against unrestricted screen access in children's bedrooms (p. 1).

In particular, one should not give children and adolescents computer and router passwords. There is no problem to do this in relation to children, but regarding adolescents the situation has been increasingly critical because of the pressure they exert, especially if their colleagues have free access to the Internet and teachers, through ignorance, ask for homework that requires Internet searches. In this sense, an absolutely decisive recommendation is to delay as much as possible the use of smartphones, tablets and computers by children and adolescents. If children start using them too soon, it will be very difficult to hold them back later. I feel terribly sorry when I see small children, even toddlers, using their parents' or their own cell phones or 'children tablets', passing the fingers across the screen, activating by themselves movies or music. Another point is that starting too early they will not have the necessary mental distance from these devices, and will be much more subjected to the harm they cause.

In his aforementioned book, Gregory Smith recommends installing two types of programs on computers: one type prevents access to undesirable sites – he cites websites that have lists of addresses of such sites, used by such programs; the other type produces the recording of all accesses made to the Internet, including exchanged messages, so that those responsible can examine how children and adolescents use the network (Smith, 2009). It happens that the first type does not prevent all accesses, as the Internet is constantly and rapidly changing, and the detection of content to characterize a site as undesirable does not solve all cases. As for the second type, such a control creates an extremely negative distrust among family members.

Smith also proposes something very interesting: making a written contract, to be signed by the young person and the persons responsible for him or her, describing in detail what the former can and cannot do when using the Internet and what penalties will apply if any of the contract statements is not fulfilled. He even presents a model contract, which he calls "Internet Safety Agreement" (p. 163), which could be the basis for a more extensive one, adapted to the particular family context. However, he does not specify the appropriate age to start using such a document; it seems to me that this only makes sense after and including age 12.

6. Two irrefutable arguments

We have just examined two arguments against the use of Internet by children and adolescents: the danger it presents and the very high risk of causing addiction. But anything that is dangerous for children or adolescents and may cause dependence should not be used by them. Thus, both arguments seem to me to be two compelling reasons to conclude that the Internet is not suitable for children and adolescents – on the contrary, it should not be used by them. Note that the second argument, addiction, also applies to the other electronic media, i.e. TV and video games.

It is unfortunate that many teachers prescribe homework for students which require consulting the Internet. They do not know that they are putting their students at high risk and, moreover, encouraging its use, just the opposite of what they should do in the classroom. Even the use of the Internet at school by students is not recommended as it is an incentive to use it, instead of advising adolescents about its dangers.

However, besides these two arguments there are numerous others against the use of these devices by children and adolescents. Let's examine some of them.

7. Overweight and obesity

Electronic media require the user to be physically inactive and, in the case of TV and action video games, also mentally – because, as we saw (section 3), they smother conscious thinking and impair the ability to imagine, which affects creativity. Only feelings are intensively activated, in unreal and exaggerated situations.

Klesges, Shelton and Klesges (1993) conducted a research finding that a person watching TV uses less energy than a person lying sleepless in bed This is easily understood: the brain consumes 20% of all our energy. Watching TV, its activity decreases dramatically; as we saw in section 3, the brain waves measured by electroencephalograms are reduced to 1/5 to 1/10 of the amplitude corresponding to that of reading texts. Other conditions are the same because there is no physical activity when a person is watching TV or lying in bed. Add to this the fact that TV broadcasts tons of advertising, leading the viewer to consume highly caloric soft drinks, sweets and snacks with almost no nutritional value.

Therefore, a vicious circle is established: physical inactivity and drastic reduction in brain activity, and consumption of high-caloric foods because of the conditioning of advertisements produce weight gain, which leads to less physical exercise that requires higher effort. The result is shown by the research: in the US, more than 1/3 of the adult population (age 20 and above) is obese (body mass index equal or greater than 30), 1/3 are overweight (BMI between 25 and 29.9), and less than 1/3 is normal (see the NIDDK reference). The BMI is calculated by dividing a person's weight in kilograms by the square of the height in meters. In that country, excess weight has become a major epidemic, and my country, Brazil, is tending to the same situation:

It happens that excess weight and, worse still, obesity, increase the risk of numerous health problems in adults, such as hypertension, hyperlipidemia (high levels of LDL-cholesterol and triglycerides and low HDL), type 2 diabetes (formerly only afflicting the elderly, now occurring even in children), coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, spinal epidural lipomatosis (increased fat tissue) and at least ten cases of cancer, including endometrial (the lining of the uterus), breasts and colon (NHLBI, 1998; Bhaskaran, 2014; Wiki-BMI).

Concerning overweight and obesity, surely TV is the great villain. But one should not rule out the influence of video games and computers, which are almost always used in a sitting, almost static position. During one of my lectures, a person reported seeing a young lady walking down the street and typing on her smartphone, or watching something in it that held her attention; in order not to hit light poles and bumps in the sidewalk, she hold a blind stick which she swung in front of her.

8. Other health problems

In addition to the problems dealt with in the previous section, there are numerous other scientifically proven health problems caused by electronic media, not directly linked to

overweight and obesity. It was found that the use of electronic media increases the risk of the following disorders, not associated with excess weight: atherosclerosis, type 2 diabetes, hypertension and cardiovascular diseases, epileptic seizures, etc. For references and extensive quotes from articles about these problems, see my article on the negative effects of electronic media (Setzer, a, in Portuguese).

A very interesting article was published by Stamatakis, Hamer and Dunstan (2011) showing the effect of using devices with screens for leisure, on mortality from all causes and cardiovascular diseases. Details can be found in my article cited, but it is worth quoting here an excerpt of their paper:

> Our results suggest that there is an independent, deleterious relationship of screen-based recreational sitting time [i.e., use of any device with a screen] with CVD [cardiovascular disease] events and all-cause mortality. Compared with those spending <2 h/day [less than 2 hours per day] on screen-based entertainment, there was a 48% increased risk of all-cause mortality in those spending >=4 h/day and an approximately 125% increase in risk of CVD events in those spending >=2 h/day. These associations were independent of traditional risk factors such as smoking, hypertension, BMI [body mass index], social class as well as physical activity (p. 296).

It is interesting that the authors have used only the leisure time spent with electronic media, not the time spent in professional avities. Certainly the latter would greatly increase the risks.

A disastrous health consequence is that TV and movies induce people to smoke, with all the ensuing problems. Hancox, Milne and Poulton (2004) made in New Zealand an interesting longitudinal study (i.e., from childhood to young adulthood), discovering that TV consumption during childhood increases by 17% the chance of smoking at age 26. It is noteworthy the fact that the study begun in 1963, when cigarette advertising on TV had already been banned. They conjectured that induction to smoke was simply due to the appearance on the screen of people smoking in news, interviews, movies, etc. This study is further evidence of the tremendous conditioning effect caused by TV, as we saw in section 3. Many countries forbade the tobacco advertising on TV, such as USA in 1971, Germany in 1974, and only in 2000 in Brazil but with the effect that from 1989 to 2010 1/3 of Brazilians quit smoking (Agência Brasil, 2013); in fact in this country it is now quite uncommon to see someone smoking on the streets.

Another important factor affecting health is the fact that electronic media have a harmful effect on healthy sleep, as has been scientifically proven by several studies (Dworak, 2007). In fact, one can well imagine the consequence of children and adolescents, and even adults, watching movies or playing video games with violent or exciting scenes before bedtime. All these images are stored in one's mind, mostly in the subconscious, and obviously end up producing some effect. Besides healthy sleep, the devices harm the number of hours of sleep because, by their tremendous attraction, including the use of social networks and video games on the Internet, they make people use them without being able to stop, instead of going to sleep – especially children and adolescents, who do not have yet developed full self-awareness and self-control. A good number of hours of sleep is essential for the healthy and harmonious development of children and adolescents, and absolutely essential for school and college performance. Garrison, Liekweg and Christakis (2011) did a research with 617 families, with the result that

We confirmed the association of media use with sleep problems in preschool aged children […]. We found that evening media use and daytime violent media use were both associated with increased sleep problems […]. These effects were not mitigated by adult co-use.As with previous research, children with a bedroom television tended to consume more media and were also more likely to have sleep problems (p. 34).

Pediatricians can advise parents to focus on reducing violent content and evening media use, which may be both more acceptable and feasible for families living in the digital age than focusing on a global reduction or elimination of media use (pp. 34-35).

Due to the circadian (day) cycle, the best sleep occurs in the evening and night, and not during the day. So children should go to bed early, something rare nowadays due to convenience of parents and because of the loss of a wise tradition of our ancestors. It hurts me deeply to see children at night in restaurants, shopping malls, etc. or imagining that a huge number of them are watching TV, playing video games or using the Internet late into the night. The result is pale children with less vitality and certainly affecting their healthy and harmonious development.

9. Social desensitization and aggression

Several scientific studies have proven that violence in films and especially in video games produces a desensitization of feelings, i.e., decreased empathy and compassion, and increased aggression.

For example, Carnagey, Anderson and Bushman (2007) made the first physiological study on this desensitization, measuring heart rate and skin electrical conductivity of people who played twenty minutes of violent and non-violent video games, and then watched violent movies. The results clearly indicated that the first group responded less to violent scenes of TV shows and films containing angry outbursts during trials, confrontations with the police, shootings and fights in prisons, that is, they had less social sensitivity.

A worthy research on desensitization of feelings caused by video games and violent films was done by Bushman and Anderson (2009). They made two different studies. In the first, 320 college students (160 men and 160 women) were tested individually, playing a violent video game randomly assigned to each player (the authors purposely used the same games of the Carnagey, Anderson and Bushman study referred to in the previous paragraph – or a non-violent game (they used Austin Powers in place of 3D Munch Man, p. 274). The experimenter told the subjects to play for twenty minutes, controlled by a timer, and then they should answer for forty minutes a long questionnaire, with some of the questions about the game they played; the experimenter left the room before the person started playing. Three minutes after the game was over the experimenter, who was in the next room with the door open, switched on a CD player with the recording of a violent argument between two actors, lasting six minutes. They used male actors for men players and female actors for women. The actors pretended to be waiting to do the experiment, and discussed the fact that one of them had stolen the girl – or boyfriend of the other gender; the paper brings some of the phrases exchanged by the actors (p. 275). In the hottest part of the discussion, the experimenter "knocked over the chair and pounded on the floor" (p. 275), and one of the recorded actors kept moaning in pain, claiming to have been harmed in his ankle by the other and asking him to help him to stand up, because he was not able to do it by himself. The other actor despised the request, cursed the former and pretended to leave

the room; the experimenter then slammed the exit door violently. At that time, the experimenter began to measure how long it would take until the video game player would get up and come to help the 'wounded' person, who kept moaning for a minute and a half. If in three minutes the player would not come to give assistance, the experimenter entered the game room and claimed to have seen someone limping in the corridor. A pilot test with 25 men and 25 women served to adjust the recording and the noise produced by the chair, so 100% of the players felt that the fight was real. As a result, in the item 'help' there was almost no difference between the violent and non-violent game players, that is, almost all of them went to try to help the 'injured' person. On the contrary, in the category 'help time', "when people who played a violent game decided to help, it took significantly longer (on average $M = 73.3$ sec.) to help the victim than those who played a not violent game ($M = 16.2$ sec.)" (p. 276). Interesting is also this:

> *Heard fight*. The first step to helping is to notice the emergency. As expected, people who played a violent game were less likely to report that they heard the fight than those who played a nonviolent game, 94% and 99%, respectively.

> *Severity of fight*. The second step to helping is to judge the event as an emergency. As expected, people who played a violent game thought the fight was less serious ($M = 5.91$ [on a scale of 1 to 10]) than did those who played a nonviolent game ($M = 6.44$) (p. 276).

As a result, the authors state that

> […] participants who played a violent game took significantly longer to help, over 450% longer, than participants who played a nonviolent game. Furthermore, compared to those who played a nonviolent game, those who played a violent game were less likely to notice the fight and rated it as less serious, which are two obstacles to helping (ibid).

The second study of these authors involved the simulation of an emergency with 162 people who were going to watch a movie in a theater, or had just seen it. An actress who had a cast on her ankle, needing to walk on crutches, stood in front of two theaters, one carrying a violent movie (*The Ruins*, 2008) and other with a non-violent movie (*Nim's Island*, 2008). She pretended to drop the crutches and was trying, with difficulty, to raise them. She was instructed to lift the crutches if no one offered help after 2 minutes, but was assisted in all experiments in less than 11 seconds. The experiment was done 36 times – 9 times before each movie was exhibited and 9 when the spectators were leaving each film. According to researchers, "As predicted, participants who had just viewed a violent movie took 26% longer to help ($M = 6.89$ sec.) than participants in the other three conditions ($M = 5.46$ s)." (p. 276). The researchers conclude that

> These two studies support the desensitization hypothesis linking media violence to decreased helping behavior. In Study 1, violent video games known to desensitize people caused decreases in helping-related behavior, perceptions, and cognitions. In Study 2, violent movies delayed helping in a wholly naturalistic setting. The person in need of help had an injured ankle in both studies. In Study 1, the injury resulted from interpersonal violence, whereas in Study 2, the cause of injury was unknown. The similar results across very different studies suggest that desensitization caused by media violence generalizes beyond failure to help victims of violence. Theoretically, we expect such generalization; one factor influencing helping behavior is judged severity of injury, and that judgment is influenced by one's own

emotional and physiological reaction to the injury. In sum, the present studies clearly demonstrate that violent media exposure can reduce helping behavior in precisely the way predicted by major models of helping and desensitization theory. People exposed to media violence become ''comfortably numb'' to the pain and suffering of others and are consequently less helpful (p. 277).

These last two studies examined the immediate consequences of violent games or movies in adult desensitization. It seems to me that the situation of children and adolescents is much more tragic, because they should be educated precisely for social sensitivity, cooperation and compassion. Watching violent movies, including cartoons, which usually contain beatings from beginning to end (see section 3), and playing violent video games, they probably do not get to develop these basic social capacities, essential to having in the future a more cooperative, tolerant and peaceful humankind.

In the chapter 'Social desensitization' of my article on negative effects of electronic media (Setzer a, unfortunately only in Portuguese) I describe how the former US Army colonel Dave Grossman accounts, from his own experience, that the origin of violent video games were computer simulators of fights, battles and shootings, used by the US military to desensitize soldiers (Grossman, 1999). Subsequently, those simulators were commercially sold in the form of violent video games. Grossman draws attention to the fact that desensitized soldiers and police hit 90% of their shots, and non-desensitized hit just 20%. Obviously there is in general a natural repulsion to injure or kill other people, which is diminished or eliminated by the use of those games.

It is important to note that the desensitization of feelings goes against what humankind should be developing in our times: fraternity. In my article "Liberty, equality, fraternity: past, present, future" (Setzer, b) I showed that humanity intuitively developed the notions of universal freedom (free will) and equality. The latter is just being developed at present, as demonstrated by the wonderful current human rights movement: people with a certain culture today feel that what is important of a person's intellectual, artistic and social accomplishments. His or her gender, nationality, religion, skin color, eye shape, community, etc. have no importance anymore. What is missing from that triad turned famous in the French Revolution is the development of fraternity, solidarity. If someone restricts the freedom of a healthy person or interferes with her rights, or acts in a discriminatory manner due to questions of ethnicity, religion, nationality, physical hindrances, etc., this is considered an immoral action or even a crime. But if someone fails to help another person in need, a demonstration of lack of fraternity, this is not considered evil or a crime. If someone consumes something too much, some other person will necessarily lack it, because resources are finite, but this is not considered yet as a bad attitude. Ditto for the accumulation of wealth and property. In such cases, there is clearly a lack of brotherhood and solidarity. When humankind should be developing certain characteristics and skills, forces contrary to progress try to avoid this development: it is precisely what is happening with electronic media (besides other negative effects) which, as we have seen, affect social sensitivity, essential for the development of brotherhood. The loss of this sensitivity is very bad in adults, but catastrophic in children and adolescents.

Several scientific studies have shown that aggressive acts displayed on devices with screens or played on video games lead to increased aggression. The latter has a very wide range, from verbal abuse to murder. The outcome could not be different, because the human being incorporates, mainly in the subconscious and unconscious, all his experiences. And everything he incorporates ultimately influences him, sometimes more, sometimes less. As an example, consider that obviously the reader of this text will

not be exactly the same as before having read it.

Violent video games teach how to be aggressive. In fact, Anderson and Dill (2000) did research at the laboratory and in real life, and put this as follows:

> In a sense, violent video games provide a complete learning environment for aggression, with simultaneous exposure to modeling, reinforcement, and rehearsal of behaviors. This combination of learning strategies has been shown to be more powerful than any of these methods used singly [providing various references]. [...] The effect of violent video games appears to be cognitive in nature. In the short term, playing a violent video game appears to affect aggression by priming aggressive thoughts. Longer-term effects are likely to be longer lasting as well, as the player learns and practices new aggression-related scripts that become more and more accessible for use when real-life conflict situations arise. If repeated exposure to violent video games does indeed lead to the creation and heightened accessibility of a variety of aggressive knowledge structures, thus effectively altering the person's basic personality structure, the consequent changes in everyday social interactions may also lead to consistent increases in aggressive affect. The active nature of the learning environment of the video game suggests that this medium is potentially more dangerous than the more heavily investigated TV and movie media. With the recent trend toward greater realism and more graphic violence in video games and the rising popularity of these games, consumers of violent video games (and parents of consumers) should be aware of these potential risks (pp. 788-9).

As another sample of scientific research, it is worth quoting the paper by Huesmann and colleagues (2003). Initially they did a review of 32 scientific papers, and conclude:

> As the above review indicates, over the past several decades, the correlation between TV-violence viewing and childhood or adolescent aggression has been unambiguously demonstrated. It has also been clearly confirmed that in the short run, exposure to violence causes an increase in immediate aggressive behavior. These effects have been obtained repeatedly for both boys and girls. The few completed longitudinal studies have also suggested that there is a long-term effect of early childhood exposure on aggression later in childhood, in the teen years, and, less strongly, into adulthood (p. 203).

As a result of their own research, they present a table in which

> One can see that both for male and female participants, childhood TV-violence viewing correlates significantly with the composite measure of adult aggression 15 years later. In addition, childhood perceptions that TV violence reflects real life and childhood identification with same-sex aggressive TV characters significantly correlate with adult aggression 15 years later. [...] One can conclude from these figures that the correlations between childhood TV-violence viewing and adult aggression to a great extent result from the higher aggressive behavior of the adults who were the highest violence viewers as children (pp.209-10).

> In this 15-year longitudinal study of 329 youth, we found that children's TV-violence viewing between ages 6 and 9, children's identification with aggressive same-sex TV characters, and children's perceptions that TV violence is realistic were significantly correlated with their adult aggression. This was true for both male and female participants. It was true for physical

aggression for both genders and for indirect aggression for women (p. 215).

Interestingly, Centerwall (1992) had already concluded that in a region where TV was introduced, the number of homicides increased over time in a parallel curve to the increase of the number of TV sets installed 15 years before.

The studies of Huesmann and others concluded that TV viewing produces an increase in aggressive behavior. It is absolutely guaranteed that violent video games increase it even more because, as we have seen, TV conditions the viewer through the displayed image and the games do it much deeper, primarily by actions, in general to kill, kill, kill. Anderson and Dill (2000), already cited above, put this question as follows, giving lots of literature corroborating their statements:

> The present data indicate that concern about the potentially deleterious consequences of playing violent video games is not misplaced. Further consideration of some key characteristics of violent video games suggests that their dangers may well be greater than the dangers of violent television or violent movies. There are at least three reasons for this. The first concerns identification with the aggressor [see section 4 on first person shooters and the next paragraph]. […] The second reason for concern involves the active participation involved in video games. Research on the catharsis hypothesis reveals that aggressive behavior usually increases later aggressive behavior. […] A third reason to expect video games to have a bigger impact than TV or movies involves their addictive nature. The reinforcement characteristics of violent video games may also enhance the learning and performance of aggressive scripts (p. 788).

The situation worsened when, due to the increased speed and capacity of computers that control the games, as well as the screen resolution, the first person shooter appeared, as mentioned in section 4. The character with which the player identifies himself shoots at others and eventually is 'killed'. If this is the case, in the extremely violent game *World of Warcraft* there appears an 'angel' who 'resurrects' the 'avatar' for another round – again a trivialization of spirituality, and passing the idea that death is not something 'final' in real life. By the way, here we have a serious educational problem: the player commits virtual murders and is not punished for it, just having to start all over again. On the contrary, the player receives awards for killing 'enemy' characters.

The general lack of compassion and aggressive attitudes can be perfectly seen in the acts of violence that are taking place here in Brazil and around the world. In Brazil, with a population estimated at 203 million in 2014, a record of 58,559 registered homicides were committed in that year, according to data from the 9th Brazilian Yearbook of Public Security (Notícias UOL, 2015), putting to shame the death toll in the Middle East conflicts or terrorist attacks, and corresponding to an increase of 4.8% over the previous year. Centerwall (1992), examining the increase in homicides in regions where TV was introduced, calculated that if violence were excluded from TV shows homicides would decrease by 15% – but this was long before the introduction of violent video games. In that same year, 2014, there were in Brazil 43,075 deaths and more than 200,000 people were injured in traffic accidents, according to the DATASUS data from the Ministry of Health (Vias Seguras, 2016). How many of those homicides and deaths in traffic accidents were not due to aggressive attitudes as a result of increasing aggressiveness and decrease of compassion caused by electronic media?

A person in a state of decreased consciousness due to stress, lack of sleep, hunger, excessive fatigue, anger, fear, etc., tends to act unconsciously, and then follows the

conditioning suffered by TV and video games in violent scenes and actions. This is why very often research done with questionnaires do not show the correlation between aggressive attitudes and thoughts, and consumption of TV and video games: when responding to questionnaires, the person is conscious. As we have seen, conditioning caused by video games is much greater than by TV, because in the latter it is due to images and in the former it is also and primarily due to the actions of the player who, in action games, and violent ones in particular, has his conscious thinking completely stifled because of the speed of succeeding images, and actions which have to be taken. Therefore, recording of images and actions in the subconscious is very deep – and stays there! All this is bad for adults but catastrophic for children and adolescents. For them, violence and lack of compassion becomes a banality. As adults they will tend to act as beastly animals or as cold machines.

I'll clearly state here the conclusions of my studies and reflections on this subject: parents who leave their children watch aggression scenes or violence on TV and in cinemas, or let them play violent video games, are putting their children at high risk of becoming criminals later. If this is not their fate, surely they will have more difficulties to relate socially, especially with a partner to form a family, and with co-workers. Who wants someone without social sensitivity and aggressive as a partner or co-worker? Parents, read the research and think about what you are doing to your children!

10. Decreasing school performance

It has already been scientifically proved that, on average, the more a child or adolescent uses a computer, the worse his school performance. Two of the studies that reached the same conclusion were made by M. Sprietsma (2007) and T. Dwyer et al (2007). Both used the same data from the SAEB, Sistema de Avaliação do Ensino Básico (Basic Education Evaluation System), here in Brazil. Sprietsma told me during a lecture I delivered at the Centre for European Economic Research in Mannheim, Germany, where she worked, that the SAEB data were excellent. She made a much more elaborate statistical analysis, but Dwyer also took into account the socioeconomic status of respondents. It is worth quoting some of their results. Sprietsma says:

> Our main finding is that the proportion of teachers who use the Internet as a pedagogical resource has a significant positive impact on test scores in both disciplines of 18.37 (Portuguese) and 8.9 (Maths) percent of a standard deviation in test scores. 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 (p. 10 of the pdf version).

> Possible alternative explanations could be that the computer lab facilities are acquired instead of other school materials that are more favorable to learning. The schools with a lot of labs would have made the wrong investment choices. In addition, pupils in schools with a computer lab could spend a lot of time there chatting or playing instead of doing other more constructive activities. The proportion of schools that have a computer lab is significantly negatively correlated with the average number of hours of homework done per week (p. 11).

The following is from Dwyer (my translation):

> [...] regardless of socioeconomic class, 4th grade students who always use a computer have a lower performance in Math tests, compared to those who do not use it. Secondly, the poorer the student, the greater the chance that computer usage, even though rare, be associated with a reduced performance on math tests. [...] For the two subjects [Mathematics and Portuguese], computer use is always associated with a worsening in the tests compared to the group of those that never use a computer.

They end the article with:

> Our results indicate that creating more 'digital equality' can lead not to the simple reproduction of social inequality by the school system [...], but an even more perverse effect: the widening of inequalities! It would be a sad irony, the result of poorly thought out policies and also the fragility of critical scientific research in the area.

I do not agree with the last statement. In my paper on negative effects of electronic media (Setzer, a), there are multiple quotes from other research showing the deleterious effect of the use of computers, both at school and home, on school performance.

What does a child or adolescent do with a computer, tablet or mobile phone connected to the Internet? She naturally plays or has fun with them, and it would be unusual if it were not so. Normally she will not use them for personal study or having access to useful materials. In fact, children and adolescents do not have yet enough maturity to distinguish what is useful or not, what is beneficial or harmful. Suppose a school that considers itself to be 'modern' requires each student to bring a smartphone or tablet with Internet access for use in the classroom, and during a class the teacher asks all students to access a certain supposedly educational website. Surely what will happen is that, while the teacher is there in front of the class, students will be accessing other sites more interesting for them – except if the wireless system (wi-fi) restricts access only to web sites that the teacher will use, and if the devices do not have an installed data packet (which would allow the access to any site). Another possibility is that the students will do chatting among themselves. Suppose further that the teacher goes through the desks to see whether students are actually using the websites or programs that he recommended. At that point, students will quickly exchange the program or site they are using, displaying on their screens what the teacher wanted.

One of the arguments used to justify this negative correlation between the use of computers or Internet and school performance is the obvious fact that there will be a huge waste of time for the students, who will use the devices for futile and useless things, or even harmful to them. I have yet another conjecture. As we saw in section 2.2, the computer is a mathematical machine, and its use – any use – forces a logical-symbolic thinking and a strictly formal language for communicating with the machine. Also, everything on a computer is exact, deterministic (except for relatively rare crashes). It turns out that this kind of thinking and language, accuracy and determinism are not appropriate for children and adolescents before puberty or normal high school age. For example, it is abnormal for a child to speak and write correctly. She will only learn this with many years of education and reading which, incidentally, is undermined by the use of electronic media. What these media do, for sure, is to induce physical and mental attitudes that are not appropriate for children and adolescents before high school. This has a negative influence on their mental development, which is reflected in school performance. For example, as shown by Nicholas Carr in his excellent book (2010, chapters 6 and 7), the Internet affects mental concentration and what he calls "deep

reading". Without this concentration, it is impossible to study or even to pay attention to a class. Moreover, as we saw in section 3, the flood of images in videos, TV and video games affects negatively the capacity for imagining, and therefore creativity, which includes the ability to solve problems, harming the performance in school tests (which, by the way, are bad educational tools in themselves). In fact, to perform well in a test a high concentration capacity is needed, and its lack may reflect negatively on the evaluation of school performance.

TV sets have never worked as educational tools, because teachers ignore the effect of inattention and drowsiness, as examined in section 3. I am in favor of using these screens for illustrations, for example a film about whales. But considering the problems caused by screens when displaying moving images or in rapid succession, it is necessary to exhibit a very brief part of the film, at most about three to five minutes. Then one should turn off the display, and describe and discuss with the students what was watched. After this, one should go back and exhibit the film from the beginning of that part, so that students can pay attention to the discussed details. Then, one should again turn off the screen and make a new description and discussion with more details, and only thereafter move to the next part of three to five minutes, repeating the process. This way the images are recorded on the conscious level, and not in the unconscious, and become real information. But here comes an absolutely fundamental question: from what age this type of illustration should be used? I believe that only from the 7th or 8th grade on. Before then, it is much more important to incentive imaginations and having contact with reality (because children are acquiring concepts about it) than to see virtual images.

11. Accelerated development

A conjecture of mine that could be verified scientifically is the acceleration of child and adolescent development caused by the use electronic media. Unfortunately many people find that this acceleration is desirable, when in fact it is highly harmful.

The acceleration of development in children caused by TV was the object of the book *The Disappearance of Childhood*, by the well-known researcher, the late Neil Postman (1994). In this book, he traces of the history of the concept of childhood showing that it is relatively recent (for instance, in Renaissance paintings children were portrayed as miniature adults), and was due to schooling: before then, in general children helped parents with household chores, in the plantations or in the workshop, that is, they already helped as soon as this aid could be effective. However, he acknowledges that the media, especially TV, transmit to the children pictures of the adult world – even in the so called 'programs for children' – producing, in his expression, "the disappearance of childhood". In this regard, Brown and co-workers (2006) showed the effect of TV on early sexual intercourse. The authors examined 1,017 adolescents, primarily from twelve to fourteen years and then two years later. Using a self-assessment with computer audio, the examined young reported exposure to TV, music, movies and magazines for a month. Then the researchers analyzed the sexual content of the media and created a composite index for each exposure level:

> White adolescents who were in the top quintile [i.e., 20%] of sexual media diet [SMD] when 12 to 14 years old were 2.2 times as likely to have had sexual intercourse when 14 to 16 years old than those who were in the lowest SMD quintile, even after a number of other relevant factors, including baseline [time of start of the research] sexual behavior, were introduced (p. 1018).

> Among white adolescents, perceived parent disapproval of teen sex and having good grades [at school] predicted reduced risk of sexual intercourse (p. 1024)

Collins et al. (2004) drew attention to the following:

> […] early sexual initiation is an important health issue. This raises the question of why individuals become sexually involved at younger ages. There is good scientific reason to think that TV may be a key contributor to early sexual activity (p. e280).

The authors, citing a report by the Kaiser Foundation, write:

> […] The average youth watches ~3 hours of TV daily. There, sexual messages are commonplace, according to a scientific content analysis of a representative sample of programming from the 2001–2002 TV season. Sexual content appears in 64% of all TV programs; those programs with sexual content average 4.4 scenes with sexually related material per hour. Talk about sex is found more frequently (61% of all programs) than overt portrayals of any sexual behavior (32% of programs). Approximately 1 of every 7 programs (14%) includes a portrayal of sexual intercourse, depicted or strongly implied (pp. e280-1).

> We conducted a national telephone survey in spring 2001 and reinterviewed the same group 1 year later, in spring 2002. The survey measured TV viewing habits, sexual knowledge, attitudes, and behavior, and a large set of demographic and psychosocial variables shown to predict sexual behavior or TV viewing habits in previous research (p. e282).

Their sample included 1,762 adolescents aged 12 to 17 years. The subjects indicated how often they saw 23 programs carefully selected by the researchers, using a 4-point scale, from "never" to "every time it's on".

> For each TV series studied, the amount of sexual content was calculated as the average number of scenes per episode containing a major focus on sexual behavior plus the average number of scenes containing a major focus on talk about sex (p. e282).

> The majority of factors we examined in our work predicted both viewing of sexual content and advances in sexual behavior. Nonetheless, when we controlled statistically for these associations, the relationship between exposure to TV sex and later sexual behavior remained substantial, indicating that it could not be explained by any of the variables in our study. Relationships between viewing sexual content and advancing sexual behavior were not attributable to the effects of developing sexual behavior on selective viewing of sexual content (p.e287).

Again we have here what I call "elaborate elucidation of the obvious". Anyone with an ounce of common sense would say that exposure to acts involving something related to sex (in my opinion, beginning with passionate kisses!) accelerate sexual development of children and adolescents. Early sexual development obviously means a partial loss of childhood and prepubertal youth, an undue acceleration of global maturity and probably a psychological imbalance. After puberty, erotic impulses make the young person think and feel too much about himself, tending to become isolated.

The acceleration of sexuality is just one of the serious accelerations produced by the media. Evidently, when a child watches a TV program that is not suitable for her age, something bad is happening, because the content cannot be properly absorbed. Strategy

video games or involving violence also accelerate the development because they force children and young people to take mental attitudes that are not appropriate to their maturity. As I pointed out in section 10, computers, in turn, force a logic-symbolic thinking, which does not affect the brain and mental development only after puberty.

The general problem of premature acceleration is due to the fact that the human being is a whole, a holistic being. Any unilateral development means the production of an imbalance. In the case of the acceleration of sexual activity, it clearly puts the young in touch with issues that require a good deal of emotional and mental maturity. For example, condom use is a matter of responsibility but the acceleration of sexuality is not accompanied by such a development. Also, there is no psychological development to face the emotional problems that arise with sexual maturation. Furthermore, the awakening and the early exercise of sexuality probably end up trivializing the feelings involved in love relationships, leading to a loss of capacity for true love.

In education there is an age for everything. This is one of the fundamental principles of Waldorf education, one of the main sources of its worldwide success: it takes extreme care not to accelerate the development of children and adolescents, with special emphasis on being careful not to promote early intellectual and emotional development.

A child prematurely developed on his intellect and emotions will probably become an immature adult. Not having been properly childish and young at the appropriate age, he will later have these characteristics when, on the contrary, he should be a mature person and with adequate responsibilities. Maturation has to be an extremely slow process. Compare the development of a human being with mammalian animals: the latter are fully developed at sexual maturity. But the human being, after this stage, still takes many years to develop mentally and emotionally. That's why there was a tradition that the age of civil responsibility was 21 years of age, at the very end of the third 7-year period. (The recognition of these 7-year periods of development is a landmark of Waldorf education, see next section.) Unfortunately, the Brazilian Civil Code of Jan. 10, 2002, in its Article 5, reduced that age to 18 years. Note here the tendency to unduly accelerate development.

Before going into considerations of electronic media from the Waldorf education perspective, let us briefly address the question of benefits of their use. Surely there are some, because there is nothing 100% good or bad in the world. But one has to be careful to balance them with the damages they cause and also with the type of research showing the benefits. Good examples of the latter are researches done by C.S. Green and D. Bavelier. For instance, in (Green and Bevalier, 2007), they examine the benefits of action video games on spatial resolution of vision using three different types of experiments involving frequent video game players (VGP) and non-players (NVGP). They conclude that "Action-video-game experience was shown to lead to an increase in the spatial resolution of vision as measured by crowding. VGPs could tolerate smaller center-to-center spacing between target and distractors than could NVGPs." But for the experiments they used exactly the same setting of video games: computer screens. Obviously frequent video game players develop the abilities required by the game. The same applies to their research paper (Green and Bavelier 2003), which was cited in many magazines and newspapers boasting the benefits of playing action video games. According to them, "[…] although video-game playing may seem to be rather mindless, it is capable of radically altering visual attentional processing" (p. 536). In (Green and Bavelier, 2006) they expounded 5 experiments with VGPs and NVGPs, all of them using computer screens. There are two big questions concerning their results: 1. Are these abilities useful for everyday life? For instance, I doubt that the visual selection

investigated in their famous 2003 paper would function if the subject was put inside a forest. 2. Do the damages produced by the games surpass their benefits? Another point is that they made their experiments with adults, and not with children and adolescents, the main concern of this text. Last but not least, their research does not verify possible negative consequences of using violent video games, e.g. the increase in aggressive attitudes (see section 9).

Once in a lecture here in Brazil, hearing my objections to the use of video games, especially by children and teenagers, someone contested saying that his nephew learned English by using violent video games. My answer was: "Wasn't there a healthier way of learning English?"

12. Electronic media and Waldorf education

There are various other negative effects of electronic media on children and adolescents, which can be studied in my article about them (Setzer, a, with more than a hundred citations of scientific papers corroborating my opinions, unfortunately only in Portuguese), including an increase of: autism, risk of attention deficit hyperactivity disorder, depression and fear, bullying, macho attitude, confusion between fantasy and reality, isolation and other social problems, diminishing creativity, etc. M. Sptizer wrote: "The most important stress factors in our modern society are lack of self-regulation, isolation and depression" (2012, p. 128, my translation).

I hope the sections discussed above in some detail have been enough to convince parents, guardians and teachers that electronic media are highly harmful to children and adolescents and should be avoided as long as possible. Let us now treat some specific questions of this subject from the Waldorf perspective. My intention is to call the attention of Waldorf parents and teachers to the problems presented by electronic media on their children and students. But this section may also be useful to non-Waldorf parents and teachers, because it presents the perspective of a successful educational method, in whose schools electronic media are in general not used, mainly before high school.

I am going to show here that electronic media is absolutely against Waldorf education, that is, against almost everything that it wants to develop in children and adolescents and the way it does with great success.

12.1 Harmonic development, according to the ages

One of the fundamental characteristics of Waldorf Education, which strongly distinguishes it from all other pedagogical methods and principles, is its original concepts (established in 1919 by Rudolf Steiner and extended by his followers) and practice about the development of children and adolescents. One of these concepts is that the development of every person follows three 7-year periods, 0-7, 7-14 and 14-21. each one with its own characteristics.

In the first period and advancing in the beginning of the second, Waldorf education puts great emphasis in preserving the childhood. This can be experienced by visiting a Waldorf kindergarten. I am to find a single person who is not excited about what is done in these kindergartens and does not recognize that children are much happier and childish there. According to the web site waldorfschule.de (see reference), there are about 2,000 Waldorf Kindergartens around the world; for lists of Waldorf schools worldwide, see the reference Waldorflinks. Other considerations about those periods will be expounded in the sequel, according to the subject being covered.

Through the whole schooling, students are treated in a highly individual way. Electronic

media obviously do not respect this development because they do not treat every young person individually, since it is directed to mass users. The highest extreme of this is the Internet, which features a fully libertarian space: everything is available without restrictions – i.e. with it young people can have access to materials that are not appropriate for their age. The most obvious negative cases are web sites showing pornography or violence. However, a site may even have a scientific content and be inappropriate for certain ages, as in the case of the story of section 5 above, about the boy who read something about global warming and became terrified. Therefore, and because of other arguments that we have seen, it is important to repeat that the use of the Internet by children and adolescents, by the way absolutely unnecessary from the educational point of view, should only be done with a responsible adult permanently at their side.

In Waldorf education literacy learning begins only in 1st grade, at six and a half or seven years of age (depending on the birthdate in relation to the academic year, and the maturity of the child), the beginning of the second 7-year period, and is extremely slow, taking three years to complete. A TV program that was seriously developed to help children to learn how to read and do arithmetic operations, directed mainly to families with low cultural level, was Sesame Street (Sesame Street, 2016; Goldman, 2012). Initially designed for children from three to five years of age, this program, which started airing in 1969, began to be seen by younger and older children. It stands out the coarse aspect of the characters, especially the Muppets, such as Big Bird, Cookie Monster, Elmo, etc. One can see a video demonstration of them in Muppets (2016); note how the characters are grotesque, with distorted voice, and show a falsification of reality, as in the aquarium fish with eyebrows. But most importantly, beyond the problem of the ready-made and moving images, preventing and impairing the imagination as we saw in section 3, is that there is no respect for the individuality of the child, her maturity and particular context – a general problem of all electronic media, directed for the masses and not to a specific individual. Note that in Waldorf education each child is permanently treated individually, one of the reasons for the existence of the 'class teacher'. As he is the main teacher for several years (ideally, from 1st to 8th grade), he gets to deeply know each child, e.g. noticing even slight changes in behavior. For a thorough report on the experience of a Waldorf class teacher, see Torin Finser's interesting book (1994).

In Waldorf education, a special emphasis is given to the triad 'good, beautiful and true', In the first 7-year period of age the emphasis should be on 'good', in the second on 'beautiful' and in the third on what is 'true' – obviously without neglecting other aspects of the triad in each period. We have already quoted in section 5 that Rudolf Steiner said in a lecture that children come into the world because they expect a good world. Imagine the unconscious frustration of a child in her first 7-year period to watch and to experience violence on TV and in video games! (Assuming that she does not witness violence at home or around it and at school, which would be extremely bad.) This greatly disturbs her healthy psychological development. At any age, the experience of what is violent, bad, ugly and false makes them trivial, banal. Later on there will be no sensitivity to recognize and reject the expressions of these characteristics. A demonstration of this is dinosaur toys. All dinosaurs are monstrous, and generally have an aggressive form. They make the child liking monstrous things or beings, and not distinguish them from what is beautiful and delicate. With grotesque toys and drawings, one kills the child's aesthetic development. Enter the children's books section of any bookstore: most children's books have grotesque illustrations, without any artistic sense.

By contrast, in the second 7-year period (7-14 years of age) period Waldorf schools promote an intense gradual artistic development. All classes and subjects are taught artistically – even mathematics. All subjects are presented artistically, with beautiful illustrations, often made by teachers on the blackboard and by students in their notebooks. The ugly and the grotesque go completely against what Waldorf Education wants to healthy and harmonically develop in children and adolescents.

Some words about comic strips or books and cartoons: they are always caricatures of nature. What is desired for a child – that she develops an admiration and reverence towards nature or that she makes caricatures of and ridicules it? For an adult, watching a comic strip with a politician represented as a pig or as a hungry wolf may seem very appropriate and humorous; but in the case of a child it undermines what she should develop: admiration and reverence for nature and human beings – something extremely cultivated in Waldorf education. I have heard the argument "But the world and society are not so." In fact this is so, however there is a proper age for everything. If a child experiences only the good, the beautiful and the true, later in young adulthood she will be able to distinguish what is bad, ugly and false, and have the courage to combat them. I'll tell here a personal case. At eighteen, in 1974, my older daughter was studying violin in a USA arts boarding school. Once a colleague invited her to walk in the city. At a certain point, this girl entered a game arcade and my daughter accompanied her. She wrote us later in a letter (there was no e-mail then), that she was horrified with what she saw there: the machines let out squeals and screams, the figures that appeared in the devices were monstrous or aggressive, etc. She started to develop a headache, excused herself and returned to their school. Question: Why did my daughter have this reaction? Simply due to the fact of never having entered a video arcade in her life before! She was not used to all that and could recognize the horror that was inside. The trivialization of what is bad, ugly and false leads young people and adults not to recognize and react against these characteristics in the world around them – and how will it be possible for them wanting to improve it?

With the popular iconic programming language Minecraft (see reference under this name for a demonstration on how to program with it), mentioned in section 12.1, its user builds animated spaces with constructions, creeks, people, etc. producing also a caricature of the real world.

As for the concept of what is true, it is undeniable that screens present a rough, very partial and false imitation of reality. If it is a film about whales, it does not show the real environment, the wind, the smell of the sea, the noise, the landscape around, the full beauty of the animals, etc. For this film to produce some educational effect, the young person must be at least twelve or thirteen, and the film should be shown in brief illustrations, as expounded in section 10. Before that age the educational effect will be negative or, at best, nonexistent.

It is necessary to address two aspects of truth in education. One is the intrinsic truth in nature. An animal or a human being are realities, they are true. Waldorf schools seek to instill in their students a deep sense for the reality of nature and human beings. Electronic media present virtual images, which are basically false, because in real life they are different.

The second aspect is the true nature of concepts, such as mathematical ones within each theory. For example, in Euclidean geometry a line is usually what is meant by this principle (which cannot be defined). In a non-Euclidean geometry, such as that made on the surface of a sphere, a straight line is actually a curve, as occurs when connecting two

points on the Earth's surface. As another example, taking up the lines of the Earth's meridians at the equator they are parallel only apparently, because they meet at the poles. By drawing a triangle on the Earth's surface, the sum of its angles will be greater than 180° and can even reach 360° in opposite meridians. But such concepts should only be taught in high school, the correct time to present conceptual truths. Prior to that, pure concepts and abstractions unduly accelerate the intellectual development of young people, damaging this ability later. Early intellectualization, absolutely anti-pedagogical in the Waldorf sense, is a result of any use of electronic media. However, it is not only the early development of the intellect that is a consequence of using electronic media. As we saw in section 11, they also produce an early development of feelings and sexuality, damaging the child's or adolescent's psyche. Furthermore, they also damage a healthy development of the will, which is affected by their tremendous attraction, making it very difficult to stop using them.

There is a fairly widespread view, imposed by propaganda generated by hardware and software manufacturers, that it is necessary to children and adolescents starting to use electronic media as soon as possible in order to prepare them for their future life, especially a professional one. That's a total fallacy, because those devices are increasingly self-explanatory and easy to use; a good example is the case of computers and smartphones. The latter have in general no help instructions, because it is evident how to use them. In addition, they will probably be very different in a few years, so that learning them today will not be of much use in the future; for example, the Internet appeared in 1991 and the popular Siri system with voice recognition was introduced in 2011. Moreover, many middle-aged an old people did not use computers in childhood but are using them without problems now.

Another fallacy is a common present trend of teaching children to program computers. The pioneer in this line was Seymour Papert (1980), with his LOGO system and language. He advocated the use of the programming language LOGO from the age of four. It turns out that computer programming is a purely intellectual, abstract, logic activity, and this forces the child to have an early intellectual development. Fortunately the LOGO system did not succeeded, but nowadays there are other systems to teach programming, including through the Internet, some of them directed to children and adolescents, such as the Scratch system (2016), designed for K-12 students. Another programming system that became very popular is Minecraft. It uses programming concepts to build constructions using basic apparently three-dimensional blocs. For a web site with progressive demonstrations on how to build what they call "realms" using a graphic programming language, see the reference Minecraft. In my opinion, such systems should be used with high school students, especially in the later grades, for teaching what a computer program is, its main concepts and how the algorithmic logic necessary to do programming works. But one should not force every young person to develop a complex program, because in my own experience many people are just not able to exercise the kind of thinking required for it. Before high school, teaching programming is an absolutely anti-pedagogical activity in the Waldorf sense.

The next section covers developmental problems caused by electronic media in relation to the mental activities thinking, feeling and willing, deepening what was briefly mentioned above.

12.2 Thinking, feeling and willing

Albeit in normal life these three inner activities come always together, they are in fact separate capacities, each with its own characteristic. A very deep study of this triad and

how education should take them into account is due to Rudolf Steiner, the founder of Waldorf education.

When one observes an object one has a sensorial perception of it. Immediately one makes an inner image of it, a mental representation. This is already an activity of thinking. Next, one relates the mental representation to a concept. For example, the reader should try to answer the following question: "What are you visually perceiving at the entrance of your room?" When I put this question to my audiences in my lectures, everybody answers "A door." Then I show that this is absolutely wrong. What is visually perceived are visual impulses. (On purpose I don't ask "What are you seeing?") The answer "door" implies that the object belonged to the category of all doors, and thus it is a concept. It happens that concepts cannot be perceived sensorially; they are *observed* by our thinking. Thus, thinking is an organ for perceiving concepts. One can make the hypothesis that concepts reside in a non-physical Platonic world of ideas. Notice that the observed object is something absolutely objective, it exists independently of our observing it or not. (I know that some philosophers, the so-called idealists, consider that objects exist only in our mind, but let us ignore this speculation.) It happens that the concept we reach when observing a door is also objective, because everybody reaches the same concept. Nobody looks at a typical door and considers it to be a bed or a diaper.

There is another essential characteristic of thinking. One may think about one's own thoughts, that is, one can be fully conscious of one's thoughts. Moreover, it is possible to determine one's next thought. Both constitute the so-called mental concentration. If this would not be possible, it would be impossible to make by hand a simple addition of two large numbers: our thinking would continuously drift to other thoughts. In fact, thinking is our only activity in which the object of the action may coincide with the action itself. For instance, we don't digest the digestion, we digest food. But we can think about our thinking, in what Rudolf Stiner called a "state of exception", because we normally think about what we are perceiving or what we may recall from our memory (Steiner, 1963).

The fact that we can be fully conscious of what we are thinking make it a clear mental activity. Also, it is possible to think on objective, universal subjects, such as mathematics and scientific or philosophical theories. But it is also possible to think subjectively, on inner activities and reactions, such as one's own feelings.

On the other hand, feelings are not so clear. Let us characterize feelings opposing them to having a sensation, using a trivial example. When someone eats a banana, this person has the sensation of its taste. Having this sensation of the taste, the next step is a feeling: The person likes the taste or dislikes it (for instance, if the banana would still be green). (I am aware of the fact that psychologists use the contrary characterizations for the concepts of perception and sensing.) Thus, perception is a sensorial activity, and sensation and feeling are inner reactions that follow the former. More basic than liking or disliking is having sympathy or antipathy. If someone likes the taste of the banana he is eating, he is having sympathy for it. And still more fundamental feelings are attraction (for sympathy) and repulsion (for antipathy).

Sensations and feelings are totally subjective – they reside exclusively in the person experiencing them. Thus, it is impossible to describe a sensation, e.g. the taste of the banana, for someone who has never eaten one. It is impossible for someone experiencing the feeling of another person. Compare this with formal thoughts, such as philosophical, scientific and mathematical ones: one can think on them, and transmit

them to another person, who will be able to think exactly the same thoughts.

Contrary to thinking, it is not possible to determine one's next feeling, because they reside in the subconscious. Nevertheless, it is possible to educate a feeling with time. If one insists in experimenting something that one does not like, such as a vegetable or a fruit that many people appreciate, one may end up liking it.

Willing is even less clear than feeling, and lies in the unconscious. In a series of lectures for the teachers of the first Waldorf school, in 1919, Rudolf Steiner characterized 7 types of willing: instinct, impulse, desire, motive, wish, intention and decision (Steiner, 2004, lecture 4 of Aug. 29, 1919). Willing expresses itself in our actions, mental or physical. In the latter one sees that it stems from the deep unconscious. Try to elevate your arm. You had a wish to do it, and you really can do it. But how does it happen? One sees the arm moving, but one is absolutely unconscious of what is happening within the body.

Steiner associated thinking with an awaken state of consciousness, feelings to dreaming and willing to deep sleep. It is interesting to note that we have the impression that we think with our head. But where do we feel? (Notice that a pain is a sensation, and not a feeling.) Even more obscure is where we have our willing. We may have the sensation of hunger, but where does our impulse to seek food comes from?

Everybody can experience the fact that it is possible to determine one's next thought, as in the case of making arithmetic calculations mentioned above. Another case is to carefully observe a simple object such as a pencil, a pen, a book, a paper clip, etc. and then close the eyes and remember its form, shape, color, function and production (how it is used and made), always concentrating one's thinking on things related to that object. Certainly everybody is able to do this mental exercise for some moments – in general, after some time thinking will drift to other subjects and images. Practicing this exercise, one may increase this time, improving one's capacity for mental concentration (which is absolutely essential for intellectual learning and production). This concentration of thinking shows that it can be self-determined – one has chosen the subject of the next thoughts and was able to maintain this inner attitude for some time. This self-determination shows something of utmost importance for a conception of the world and of the human constitution: we can be free in one's thoughts. This is an inner experience, not subjected to philosophical considerations (and there are many) negating free will. Furthermore, this experience shows something peculiar: we are not free in our thinking, but in our will. It is with our will that we have chosen the object for our concentration exercise, and maintained it for some time; these were decisions that we took. Thinking is an instrument for our experiencing free will. One doesn't have the freedom to jump 4 m high, but we are free to think on what we decide to think.

The fact that some lesion in the brain impairs some mental activity does not mean at all that this activity is generated by the lesioned part, as every materialist or physicalist scientist believes, in general as a real dogma. Scientifically, it is possible to say at most that this section of the brain takes part in the mental activity, opening the way for the essential hypothesis that mental activities are non-physical. The brain is necessary for reflecting those activities to our consciousness, thus being able to control them in the case of thinking.

The self-determination of thinking, and the experience of free will through it shows that machines will never be able to think as we do, or exercise our broad type of thinking. Machines cannot be free, they are inexorably subjected to physical 'laws' – if it was not so, machines would not do what we expect from them. Buildings are designed

according to physical laws, and it would be a disaster if they would sometimes not follow those laws. Computers follow the programs they are running and their internal mathematical rules on how to execute each instruction. In fact, computers are purely syntactical machines, they have absolutely no semantics as we do! Computers have no understanding in our human sense – and will never have –, and don't learn, they simply store data and calculate parameters directing their programs do perform some tasks.

Moreover, the fact that we can be free in our thinking shows that there must be something non-physical involved with them. It does not matter if one calls it the human soul or spirit (Rudolf Steiner has characterized their difference at length). I have a theory on how the soul or spirit may act upon the physical world, using non-deterministic transitions, but this would take us too far.

Now let us consider our feelings. Feelings are totally subjective, individual. Using the example given above, it is not possible for someone else to have someone's sensation of the banana being eaten. It is also not possible for another person to experience that person's feeling of liking or disliking the banana taste. It happens that machines, and computers in particular, are totally objective. This shows that machines will never be able to feel, in our human sense of this word.

Films such as *Artificial Intelligence* (S. Spielberg) or *The Bicentennial Man* (C. Columbus, with Robin Williams), which assign feelings to robots are completely wrong, and transmit a dangerous image of what robots and computers can be.

For more details on these questions, including the theory I mentioned above, please refer to my paper "A.I. – Artificial Intelligence or Automated Imbecility? Machines can think and feel?" (Setzer, h).

In terms of education, Steiner called the attention to the fact that the child in her first 7-year period of age is dominated by willing. In fact, it is quite cute to see a small child wishing something: she points with her little finger and arm to the desired object and moves her whole body. The whole body participates in willing, an indication that this is the strongest of the three inner capacities. There is only one way of distracting her from her wish: making her wish something else or deviating her attention to it. Another essential characteristic of children in this period, pointed out by Steiner, is that the whole child functions as a sensorial organ. So she is completely open to the outside world, therefore able to learn by imitation. This puts a high degree of responsibility on the adults, which have to behave in the best possible way and provide a sensible and artistic environment. Thus, Waldorf kindergartens take this into account and teach the child only through play, imagination by hearing stories and having a rhythm of activities. Furthermore, the class provides beautiful and natural playthings so that the child can develop her senses, feelings and imagination in a calm atmosphere in the best possible way. After about age 7, the child starts to dominate her wishes.

From about the 7th to the 14th year of age, in the second 7-year period, the child is mainly developing her feelings. This is why in Waldorf schools in this period art is so much used, in all subjects, besides specific intensive art and music classes. Teaching is not intellectual, but directed to imagination and the experience of reality, as well as developing a capacity for describing the latter. At about age 14 the child has individualized her feelings, which coincides with sexual maturation. In some warm climates and due to incentives of eroticism and strong feelings this can be accelerated.

From about age 14 to 21, the third 7-year period, the young person is developing her capacity for abstract thinking. This is the time to teach scientific theories, but always in

a critical way, showing their limitations. Obviously, artistic activities have to continue, involving more and more complex techniques.

Back to electronic media, they directly affect the development of this triad. In the case of TV, the will is totally damped, because there is no action being practiced by the viewer, who remains physically static; as we have seen in section 3, there is not even the exercise of mental concentration. In action video games (the most played type), the actions and therefore the will are mechanized, automated. Since the will is the predominant function in the first 7-year period, electronic media displaying moving images or in rapid succession are a real poison for this function.

As we saw in section 3, TV hits the feelings, stimulating them exaggeratedly and in unrealistic situations, from images which come from the outside. In the first 7-year period, as the will is the main mental activity, feelings experienced by the child stimulating her should be beautiful, noble and very calm. None of this happens with electronic media when displaying moving images. It is precisely through feelings that the user is awakened from his normal state of drowsiness imposed by the screens. As we saw in that section, images follow one another very quickly, so there is not a calm environment. It may be noted on TV that sounds are not delicate – often announcers or the characters shout, just to stimulate more feelings. In general, children's television programs display grotesque characters even when represented by humans rather than by figures and drawings. Violent video games, the most played, are the antithesis of calm and beauty. It is very common for Waldorf kindergarten teachers to recognize very well in their classes children who watched TV or played video games in the previous day or evening, as they tend to imitate the characters they have seen and to behave in an agitated mood.

In the second 7-year period, when there is a predominance of the development of feelings, great care must be taken to direct them to the beautiful, sensitive, precisely what does not happen with electronic media. On the contrary, in general the latter depicts aggressive, ridiculous, grotesque images. As we saw in section 5, electronic media in general produce an early acceleration of sexuality, directly affecting the feelings of the young person who results in paying an exaggerated attention to the own body.

In the third 7-year period feelings should be channeled mainly to the social sphere. Electronic media go directly against this development, because they cause isolation and the custom of maintaining virtual and not real relationships. Moreover, as we explained in section 9, they cause a decrease of empathy and compassion.

One of the distinctive features of Waldorf education is avoiding early intellectualization, that is, not imposing abstract thoughts upon the child and young adolescent. As a counter-example, curiously almost all Brazilians learn what is an island in the following way: "A piece of land surrounded by water on all sides." This is an abstract, formal definition, given perhaps when the unfortunate children are about eight years of age. This island has no beaches, no waves, rocks, plants, animals, sea smell, wind, etc. And as any definition (wrong, by the way, because there is no water on the underside or on the top), it remains the same for the rest of life. Rudolf Steiner emphasized that until the end of the second 7-year period, and even in the third, one should not give formal definitions of things and phenomena of reality, but characterizations, always subject to new aspects to be enriched in the course of aging. For eight year-old children, the correct thing would be to tell a story involving an island, featuring the various aspects that occur in it and making students imagine an island full with life. Another technique

is to build islands with clay, adorned with little plants, ants, etc., and surround it with water. After all, no one went through the definition of a tree as "a stick stuck in the ground at 90°, with branches at various angles, blah, blah, blah ..."; yet everybody has developed a concept of what is a tree experiencing several of them. To see how normal teaching is too intellectual and abstract, just examine any text book used in traditional schools. For example, I have in hand a text book on science used in 6th grade: there are definitions of what are Erlenmeyer, Becker and "volumetric flasks", test tubes, pipettes, etc. Probably the teacher not even shows the real objects in class explaining what they are, what they are used for and why they have their distinct shape. The correct way should be introducing them much later, using them in practice in experiments in class or in chemical laboratories. In the case in question, the book depicts them in small drawn figures just with a caption below them with the name of the object.

Definitions tend to produce people with rigid thoughts. On the other hand, characterizations lead to flexible thinking, as they are always subject to improvements as more knowledge is acquired. It is very important to know that the computer is a formally, mathematically well-defined machine. Therefore, its use in any application, including video games and the Internet, has the effect of employing rigid definitions and thus stiffening thinking.

Waldorf Education is often described as "the pedagogy of hands, heart and head," that is, an education of willing (doing something real), feeling and thinking. The important thing is that the stimulus for the development of these capacities is given at appropriate ages, that is, adequately to every age and development. Obviously, as we saw in section 3, electronic media force a great passivity, which is the opposite of active doing, and when there is something produced by the user it is something virtual, not real. When stimulated, feelings are exaggerated and unreal. Finally, virtually only the abstract intellect is encouraged, a very small part of the intellectual activity. All this occurs regardless of ages and maturation, which greatly affects the healthy development of children and youth.

Electronic media are virtual, abstract by nature, and what they exhibit generally follows the intellectualistic trend of education. In particular, as explained in section 2.2, computers are mathematical machines that force in any situation the use of a formal language and a strict symbolic logic. From the Waldorf point of view, they should be used only from high school on; but as they require a lot of self-awareness and self-control (see section 5), my suggestion, utopian today, is that they should be used only from the age of seventeen on.

One of the activities of thinking, extremely cultivated in Waldorf education at all levels is imagining, fantasizing. Creativity is the confluence of fantasy, imagination, and the ability to produce something useful for the person himself or to society, which might be called concreteness. Just fantasy may make a person 'fly' in his thoughts, to be a dreamer. Just concreteness makes a person a rigid bureaucrat, a strict follower of rules, making useful things but being unable to having new ideas and leaving the rules, a person without a minimum of imagination and common sense. Thus, to educate a person to be creative it is necessary to educate the imagination and concreteness. The first one is developed in Waldorf education through intensive artistic activities, even in traditional subject matters, which are always given artistically, even in high school. Mathematics, for example, should always be given also geometrically; it is by drawing geometric figures that one can introduce an aesthetic element in this subject (algebra has no aesthetics). The second capacity, concreteness, is developed by means of manual, handicraft works, also present throughout the whole schooling. These handicrafts

always produce useful objects: a small bag for the recorder, a weaved pan holder, a seamless sock knitted with five needles, a pullover, a carpet made with a loom, a small wooden cabinet, etc.

As was seen in section 3 above, devices with a screen, when displaying moving images or in rapid succession damp, damage the imagination and therefore thinking. Just because of this one sees that they are anti-pedagogical in the Waldorf sense. A creative adult is someone who preserved and developed the natural imagination of childhood. Waldorf schools not only preserve this imagination, but also develop and educate them, teaching techniques for making it possible to express one's artistic and handicraft abilities – as long as electronic media do not harm this development, producing a rigid thinking, eventually leading to an adult with rigid ideas and lack of broad creativity (which involves also social relations).

Note that in artistic activities thinking is exercised, but in a poorly defined space, with endless possibilities and, moreover, in a non-formal setting, leading to a flexible thinking.

12.3 The importance of experiencing

Instead of providing teaching of almost exclusively abstract subjects, directed to the to the intellect, Waldorf education seeks to create experiences. I remember very well how my second daughter studied the Roman senate in her 6th grade: her teacher asked all students to bring a bed sheet; each student dressed with it like a toga and all formed a Roman Senate, with its typical structure, in order to discuss the details of the next class trip. These are experiences that remain. I will never forget two of my daughters playing, one, the lead role in the play *The visit of the old lady* by Dürrenmat, and the other the Queen of the Night which she sung in *The Magic Flute* by Mozart, in plays of grades 11 and 8, respectively, at the Rudolf Steiner Waldorf School of São Paulo – remarkable experiences in their lives.

When students of a Waldorf school study astronomy, they make a trip to a place where they can watch the stars well, far from big cities. Electronic media are the antithesis of real-world experience, because everything is presented virtually. This may have a consequence: it makes young people appreciate more what is virtual and artificial than real nature and other human beings. I remember very well when I took my two older daughters (aged 12 and 14) to the planetarium, in São Paulo. I thought they would get excited about it (as it happened to me at 17, when it opened in 1957), but the reaction was extremely negative, "Daddy, those little lights projected on the ceiling are no fun; the stars you show us in Campos do Jordão (in the mountains, 200 km North of São Paulo) are a thousand times more beautiful!" Probably youth accustomed to TV (there was no TV set at our home) and video games will enjoy the planetarium because they admire artificiality and are accustomed to it.

12.4 Sociability

Today, an absolutely essential aspect is education for sociability. Waldorf schools should take care of this educational aspect with great care because the antisocial forces are currently enormous, much greater than in 1919 when the first one was inaugurated, as demonstrated by the increasing conflicts and violence around the world. However, regardless of this type of education, there is a feature that distinguishes those schools from other ones, promoting an enormous development of sociability: a class is formed in the 1st grade and remains the same until the end of school in 12th grade. As there is no flunking, changes in a class are due only to the eventual exit of a student, or the entry

of a new one when there are vacancies (usually the demand is very high). One can imagine the social cohesion of these young people who have grown together for twelve years!

Electronic media harm sociability, as has been demonstrated in several scientific researches. On the one hand, its use is generally done alone; on the other, when there is are one or more people interacting with each other, this interaction is virtual. This means loss of the ability to relate "eye-to-eye". In general, electronic media produce so much social isolation that many couples have separated because one spouse cannot disconnect her/himself from the devices. When a family watches TV together, each member is isolated in a state of sleepiness and; if someone wants to say something, hearing the program by the others is disrupted and generally the latter protest. Thus, TV destroys family life. But today it got much worse: one can see, for example, entire families in restaurants where, instead of talking to each other, each one is using a mobile phone or tablet.

An essential aspect of sociability today is cooperation. Waldorf schools seek to encourage cooperation and restrict competition. Already the fact that there is no grading and tests, students do not compete for them. A student can be very good in a subject matter and bad in another, without any consequence for his continuing education – which, incidentally, always worked very well in Waldorf education because teachers and parents are prepared for this scheme. Based on this experience, UNESCO recommended this type of continued education, a fact that brought it to Brazil, but with many problems because teachers and parents were not prepared for it. In particular, teachers have lost their greatest weapon to force discipline and students to study: the low notes and reproaches. In Waldorf education teachers are required to give interesting lessons, which is supported by the conception of the development of children and youth. Students do not pass the inhuman tension of getting bad grades, suffering years of flunking threats, etc. There is a proper time to learn how to compete, and adult life will teach this automatically, with no need to start early. On the contrary, education for competition affects the attitude of cooperation.

Electronic media represent and induce very well the competitive attitude, whether in TV shows (contests, sports competitions, scenes with violence, etc.) or in video games, where the competitive ones are more appreciated.

12.5 Rhythm

Another feature that distinguishes Waldorf education from other educational methods is the use of rhythm, essential for the education of children and young people. Already in kindergarten Waldorf schools introduce lots of rhythm in the child's life, e.g. relatively fixed times to play, to eat, to tidy up the class at the end of the school day, etc., besides activities full of rhythm, as round dancing, reciting poems and singing. Later in school, classes are organized in rhythms with an absorption shift (as a breath inspiration), in which students hear and watch something, and production (expiration), in which students write or draw in their notebooks or perform manual actions. But there are other rhythms such as alternations between moments of joy and sadness. The result is that at the end of the school day the children and young people leave those schools calmly. In many schools of other educational methods, they run away, agitated, struggling. No wonder, they sat for hours, virtually only absorbing contents; when released, they explode of activity: no one can withstand only inspiration!

Electronic media have no intrinsic rhythm, and end up harming the rhythmic life of children and adolescents, also at home (Waldorf students have enough rhythm in

school), especially in children's ages, such as in times for meals and going to sleep. It would be ideal if also at home there would be alternating moments of extroverted and introverted play activity, such as drawing or painting, listening to stories, etc. We never had problems with our four children, when they were children, to go early to bed because we always performed a ritual: lighting a candle, saying a prayer or a verse, singing a song (always the same!), giving goodnight kisses and then blow out the candle (my recommendation is that the parents blow it because if children do it, they have to lift their head and trunk, breaking their lying and calm position on their beds and pillows). The worst punishment with which we could threaten our children was not "praying" with them at night – they became desperate! With this example one sees how rhythm is important in the everyday life of children. For us the situation was easy, because we did not have a TV set, and other electronic media did not exist at that glorious time. It is increasingly difficult to be good parents, because the attack on children and adolescents is terribly strong and constantly increasing, especially by electronic media.

12.6 Social, artistic and intellectual skills

I consider that an adult is a harmonious person if s/he has these following three capabilities. Obviously, a person can have one of them more developed, dedicating professional life to an activity of that category; however, all people should have the three and exercise them, some more, some less. Waldorf Education seeks to develop harmonically these three capabilities, adapting them to age.

The development of artistic abilities should permeate the entire teaching, obviously becoming increasingly deep and complex with age. I recommend that readers, if available, visit an educational exhibition organized in some Waldorf schools (in Brazil the end of the academic year coincides with the legal year, so this exhibition takes place in many Waldorf schools during the so-called Christmas Bazaar), and observe the artistic and handicraft works of students from 1st to 12th grade, in this sequence. Visiting one of these exhibitions is more interesting than visiting a museum, because it is possible to follow the development of children and adolescents, something which has a profound reality. Watching the artistic works of the last grades, visitors have the distinct impression that all those students are artists, with a fantastic capacity of expression. No, they are what all high school students should be, but in general students from other schools have their imagination 'castrated' by almost exclusively intellectual teaching (recall the definition of island in section 12.2), and their artistic skills were not developed. For example, I got tired of trying to make my students from computer science courses at the University of São Paulo (the most important in Brazil) sing simple songs at the beginning of the class, helping them to focus and make a distinction relative to their previous experiences of that day; but the lack of tuning was too great. Waldorf school students sing in a very sophisticated way, which was demonstrated by the two invitations of the high school choir (all of the about 200 students) of the Rudolf Steiner Waldorf School of São Paulo, to sing at the Carnegie Hall in New York. It has been wonderful to hear this choir singing very complex pieces at the end of each year, such as Carmina Burana by Orff and Mozart's Requiem, which are also presented in some other Waldorf schools around the world.

Social skills are those that lead to having social sensitivity and openness to others, compassion for them, feeling responsible and taking action to help them, besides what is much appreciated in enterprises: ability to work in teams, leadership, speaking in public, etc. In particular, theater plays staged on the 8th and the 11th or 12th Waldorf grades especially develop social skills to speak clearly and in public, paying attention to the

other acting classmates, etc. In fact, from the 1st grade on Waldorf students are accustomed to appear in public in semester presentations for their parents, in small theater plays, reciting poetry, singing, playing their recorders (which all learn), etc.

As expounded above, an abstract intellectual development has its place only in high school, without neglecting artistic and social capabilities. From an intellectual point of view, this means not only enabling students to think and express themselves scientifically and mathematically, but also having a flexible intellectual thought.

The development of social skills is, in particular, absolutely essential nowadays. There is no use for someone being a great technician if unable to work in a team, expressing properly in public, exercising leadership, solving conflicts, etc. Social skills were called by Daniel Goleman "emotional intelligence", in his book with this title (Goleman, 1995). He draws attention to the fact that this is the main feature for professional success.

12.7 Induction of a materialist concept of the world

Rudolf Steiner called the attention to the importance of religiousness in childhood, and also during adolescence in case the young person has inclination to it. Waldorf schools are not religious schools, but cultivate religiosity, mainly in the first grades. As has been well shown in Wanda Ribeiro' research (Ribeiro and Pereira, 2007), Waldorf alumni do not consider that they went through a religious school. The important thing is for the young person to having gone through an education with religion, at the appropriate age, in order to be later able to decide freely whether they want to have a materialist or a spiritual view of the world. By contrast, education of traditional schools tries in general to induce and even force materialism or physicalism (that is, believing that there are only matter and physical processes in the human being, in nature and in the universe). A classical example is the theory of Darwinian evolution, which is taught as a fact and not as a theory full of problems (such as the fact that there are several conflicting evolutionary trees, all with gaps, the so-called 'missing links'). Another example is the teaching, as a scientific fact, of the planetary model of the atom, due to Rutherford in 1911; unfortunately the electron is not a tiny ball (to begin with, it is admitted today to be punctual, but paradoxically having mass) and does not revolve around the nucleus; in fact, it is not known what the electron really is. Another example: the human heart is taught in schools as a hydraulic pump which makes the blood circulate; if it were so it should have a big size and incredibly great power to push and pull blood, a highly viscous liquid (about 4.5 times more viscous at 37 C than water at 25 C), through about 100,000 km of blood vessels, mostly capillaries. A biologist once made an analogy: it is as if a pump were in New York and pumped water to San Francisco, while irrigating the fields along the way...

Speaking about neo-Darwinian evolution, it is interesting to observe how Waldorf education has solved the classical conflict between teaching biblical creationism and Darwinian evolution. It happens that this biblical story is an image, and not a reality. This is absolutely clear in Gen. 1 (King James version):

> 14. And God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years: 15. And let them be for lights in the firmament of the heaven to give light upon the earth: and it was so. 16. And God made two great lights; the greater light to rule the day, and the lesser light to rule the night: he made the stars also."

19. And the evening and the morning were the fourth day."

So the Sun, the Moon and the stars were 'created' in the fourth 'day'; how come were there then three previous 'days'?, This means that these words stand for images of spiritual, and not physical realities, that is, 24-hour days. On the other hand, Darwinian evolution is a theory, an abstraction. Nobody was present in pre-historic times to verify the appearance of the various species, so it is not a scientific fact.

As already mentioned, Waldorf education avoids teaching abstractions in elementary school. In fact, the Old Testament is part of the 3rd grade curriculum, and biblical stories are told without explanations, as they are, just images. This is absolutely appropriate for small children, who live in great part in their fantasy. Darwinian evolution is taught in high school, when adolescents are ready to begin to absorb abstract concepts. It would be a mistake to teach biblical creationism in high school. At this age students, if properly educated, want to have explanations, to understand, and should not be satisfied with images – unless when dealing with art. Hopefully, as explained above, evolution is taught as a theory, and its problems should be discussed, such as, besides questions about the evolutionary tree of various species already mentioned above, the unknown 'common ancestor' with the apes (scientifically, it is admitted that it is impossible that humans have evolved from apes), the appearance of speech, why humans have no fur, scales or a leather skin, etc. Darwinian evolution is taken as a dogma by most biologists and evolutionists, because most of them are materialists and just cannot think differently than using physical processes. It is worthwhile citing here, for those that do not know the true story, that Darwin was not the sole discover of the theory of natural selection: it was developed independently and in parallel by the great biologist Alfred Russel Wallace. It happens that Russel Wallace was not a materialist; as some other great scientists of the 19th century, he was interested in mediunistic phenomena, and said that the natural selection theory should not be applied to humans. I presume that this is the reason why in general his contributions to that theory is not taught.

Electronic media tend to induce a materialistic world view, damaging the free will mentioned in section 12.2. (From a materialistic point of view, free will makes no sense, because matter is inexorably subjected to physical laws.) TV, for example, invariably presents in its programs an exaltation of science and technology, and an exaggerated admiration for them, because TV is in itself a high-tech device. Unfortunately, nowadays scientists have in general a conception of a totally materialistic world and have great prejudices against any spiritual idea. The computer is the greatest metaphor for the equivocal view that the human being is a machine, a purely physical system, because computers can simulate a class of our thoughts (logic-symbolic, algorithmic ones). So from this point of view the use of the media is entirely contrary to Waldorf principles, which are based upon a spiritual conception of the world, Anthroposophy, introduced by Rudolf Steiner.

12.8 Development of free will

In a foreword to an edition of Rudolf Steiner's lectures on Waldorf education given on 1923 in Ilkley, England, Marie Steiner apparently wrote a sentence that is used as a motto by many Waldorf schools, because it represents very well one of the most important principle of this education, translated as follows: "Our highest endeavor must be to develop free human beings who are able of themselves to impart purpose and direction to their lives" (Steiner, M., 1943). A free human being should have no prejudices, should have a flexible thinking, and should always be ready to make new

observations and adopt new, good ideas. Waldorf education does not give full freedom to its students – it is not a libertarian education. It recognizes that children and adolescents should be oriented, and that they expect it: they know intuitively that they need someone to care for them and orient them gradually to become independent. They intuitively feel a great frustration when parents or guardians let them do whatever they want.

The Internet presents a totally libertarian space. One can have access to it at any time and, nowadays with smartphones and tablets, almost anywhere, and access and keep any content that is stored into the net. So it gives undue freedom to children and adolescents, without any guidance, totally independent of age. This represents another undue acceleration factor in the development, damaging the future life. It is another reason why parents and guardians, if mistakenly letting children and adolescents access the Internet, must always be at their side to control the use of time and what contents should be accessed. As seen in section 5, access restriction programs do not fully prevent reaching unwanted sites.

A freedom not as great as the Internet is also present on TV and in video games. In the case of cable TV, there are now hundreds of channels, many or most of them unsuitable for children and adolescents – who have the freedom to see what they want if there is no constant control by those responsible for them. Also too much freedom is given them if electronic media are installed in the bedroom or cell phones have a data package, as discussed in section 5.

As expounded above, it is desirable that education develops a flexible thinking, not subjected to prejudices and fixed ideas. We have also mentioned that electronic media tend to stiffen thinking and condition ideas.

12.9 Other damages for Waldorf education

There are several other factors leading electronic media to undermine an education in the Waldorf sense; we will cover some very shortly.

Electronic media carry a clear induction of consumerism – not only the propaganda on TV and the Internet, but also the continuous launch of new models of the devices themselves and video games, with forced obsolescence. But Waldorf education rightly emphasizes not the having, but being and becoming; it does not encourage wastefulness and ostentation – on the contrary, seeks to educate to avoiding them.

Waldorf education can be characterized as a pedagogy of quietness, contemplation and concentration. Electronic media, in contrast, are vehicles of unrest, imposing an avalanche of images and stimuli to the feelings and the intellect, as seen in section 3 above. For example, Nicholas Carr cites in his excellent book research showing that the more links contained in a text at the Internet, the less memorization and understanding are produced in people who read it. This is obvious: if someone is reading a text and clicks on a link, jumping to another page, he will interrupt and lose the sequence of the first text. Carr also draws attention to the fact that the Internet is a vehicle of distraction, not of concentration (Carr, 2010).

In section 12.2 we have seen that Waldorf education strongly implements Steiner's concept that a child in her first 7-year period can be considered a whole sensory organ. She is fully open to the environment and, according to Steiner, essentially learns (and should only learn) by imitation and playing. He said the following (my translation): "In spite of all political complaining about freedom, and in spite of all the other talk, people will become free only if we ingrain the strength of imitation in them during childhood"

(Steiner, 1997, 8/9/1919, p. 11).

This openness and capacity for imitation lead to a learning that will never be so intense and cause so much transformation: acquiring the upright position, walking, talking and thinking. So, one should be extremely careful with stimuli coming from the child's environment, which should be calm, beautiful, good and true. Children need people who are good role models for them. Electronic media generally present the antithesis of good human models, besides being virtual, not real, and generally with exaggerated stimuli, precisely contrary to the calm environment necessary for a good development. They will be recorded forever deeply in the child, mainly in the unconscious, with extremely damaging consequences for the future. It is very common to see children imitating deplorable, often aggressive gestures, accompanied by coarse grunts they have watched and heard on TV, in movies or video games. Imagine, therefore, how much electronic media can nullify the efforts of Waldorf teachers, aware of the characteristics and needs of each individual student, trying to have only good attitudes, beautiful and calm, to be worthy of imitation.

According to Steiner, imitation has a much more drastic and deep consequence:

> There are two magic words which indicate how the child enters into relation with his environment. They are: Imitation, and Example. The Greek philosopher Aristotle called man the most imitative of creatures. For no age in life is this more true than for the first stage of childhood, before the change of teeth. What goes on in his physical environment, this the child imitates, and in the process of imitation his physical organs are cast into the forms which then become permanent. 'Physical environment' must, however, be taken in the widest imaginable sense. It includes not only what goes on around the child in the material sense, but everything that takes place in the child's environment – everything that can be perceived by his senses, that can work from the surrounding physical space upon the inner powers of the child. This includes all the moral or immoral actions, all the wise or foolish actions, that the child sees. […] The child, however, does not learn by instruction or admonition, but by imitation. The physical organs shape their forms through the influence of the physical environment. Good sight will be developed in the child if his environment has the right conditions of light and colour, while in the brain and blood-circulation the physical foundations will be laid for a healthy moral sense if the child sees moral actions in his environment. If before his seventh year the child sees only foolish actions in his surroundings, the brain will assume such forms as adapt it also to foolishness in later life. […] The child who lives in such an atmosphere of love and warmth and who has around him really good examples for his imitation, is living in his right element. One should therefore strictly guard against anything being done in the child's presence that he must not imitate. One should do nothing of which one would then have to say to the child, 'You must not do that' (Steiner, 1907).

One can then imagine the tragic consequences of the terrible environment and rubbish presented so often by the electronic media.

13. Conclusions and recommendations

For all that has been seen, it can be concluded that any benefits provided to children and adolescents by electronic media are by far outweighed by the harm they cause.

It is possible to curb the use of electronic media by children, but it is increasingly

difficult to prevent teenagers from using them, especially when they have their own devices. In this sense, it is very important to delay as much as possible this use, but if it occurs it is necessary to try them to be accompanied by an adult.

I hope I have sufficiently shown that the use of electronic media by children and adolescents frontally contradicts what Waldorf education tries to develop, undermining the effectiveness of this education. If a parent or guardian recognizes the validity and the good results of this pedagogy, they should not let their children use electronic media. Even if they use them just a little, this will induce them to use more and more, and in adolescence it will be almost impossible to stop them. If they are Waldorf students and are able to use these devices at home and outside of it, there will be an inner conflict, because at school they are not used and the students should have been warned not to use them.

Anyone who studies Waldorf education and knows its practical application recognizes that its concepts and methods are wonderful, proven to help the healthy and harmonious development – social, artistic and intellectual – of children and adolescents. Wanda Ribeiro and Juan Pablo Pereira (2007) made an interesting research, cited above, asking a hundred Waldorf alumni how they regarded their old school, and obtained excellent results, including the fact that almost all had gone through a college education. Another study interviewing alumni and showing excellent results was done by Douglas Gerwin and David Mitchel (2007). The big problem of any good pedagogy is that it is applied by human beings, and then some problems may arise, so by no means Waldorf is an educational paradise.

Due to the damage to the education of children and adolescents, Waldorf schools should tell parents about the problems caused by electronic media, as well as the damage to the education that is trying to be taught in these schools. Teachers should immediately contact parents of students who show some strange behavior possibly due to the use of the media. One possible recommendation to be made to parents is that if they wish to have a TV at home (which is totally unnecessary), it should only be installed in the parents' bedroom. It should only be switched on to watching special programs, and then turned off, which will require great discipline, because programs and the device itself are made to attract viewers. If the TV set provides a password, one should not tell it to the children; if there is no password, one can install an electric switch with a real key, preventing the children of turning on the TV, especially in the absence of the parents. Having computers or tablets at home, their passwords should also not be revealed; the same goes for local networks with routers. As discussed in section 5, cell phones used by the children should not have a data package, preventing the access to the Internet.

There is not the least necessity for children and adolescents using the Internet. However, if their parents or guardians mistakenly find it important that the former use it, to avoid the resulting problems – starting with the questions of addiction and danger (sections 4 and 5 above) –, it is worth insisting on the fact that parents or guardians should remain all the time next to their children. This is quite possible with respect to children, but very difficult with teenagers. In his case, a contract as described at the end of section 5 can be of great help to prevent some problems and exaggerations.

I have tried to address here various aspects of the problems caused by electronic media, and how they are literally anti-pedagogical in the Waldorf sense. I hope readers do not keep restricted to my words, but study books and articles, especially scientific ones, and also observe how electronic media are being used for, seeing for themselves that I am right or at least have some reason.

To those people who try to reduce the effects of my ideas declaring that I am radical, remember that in section 10 I recommended the use of devices with displays to show brief illustrations in the classroom, but only after a certain age. Radical is the degree of penetration of electronic media everywhere, anytime, with lots of (maybe mostly with) inappropriate content for children and adolescents.

We are in urgent need of a change of mentality, our way of thinking and of regarding the world, because the one that prevails today is destroying nature and humanity. Electronic media represent, today, the biggest and strongest attack on children and adolescents – and there is nothing more effective to destroy humanity than to destroy the youth. This change necessarily involves placing electronic media in their right place, avoiding them when not really needed and making a conscious and highly controlled use of them when they are useful. In particular, the concept of utility needs obviously a concept of what is appropriate for each age and what a harmonious and healthy development should be – precisely one of the strengths of Waldorf education.

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