Is the Web Turning Us into Dummies?

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Abstract: With the rapid penetration of the Web into all areas and niches of society there is also an increasing number of warning voices: that the Web leads to more and more plagiarism; to the spreading of half-truths; to mobbing with sometimes deadly consequences; to an erosion of morality due to sites full of pornography and brutality; to the loss of memorizing ability since we store less and less in our brains and more and more on the Web; to a reduction of the ability to reading complex matters; to a myriad of interruptions and intrusions preventing any coherent and deep thinking; to networks of pseudo-friends whose maintenance eats up all productive time; to a life that takes place more in cyberspace than in the real world.--- One early target of complaints have been search engines with which we "build up a distorted reality"; this was followed by researchers who seemed to show the rather negative effects of new (social media) on learning; and it has culminated in a German bestseller written by the well-known cognitive neuro-psychologist Manfred Spitzer on "Digital Dementia: How we make sure that all of us are getting stupid" (Note: The book has not appeared in English yet; the title is a self-made translation of the German one).--- In this paper we present some of the major and potent arguments showing the danger of the Web. We all should be aware of them, since some points are indeed well-taken. Clearly, our society is changing due to the Web. However, some of the criticism is ill founded and is more reflecting a personal attitude of Spitzer than an objective truth

1. Introduction

Everybody agrees that the Web (and mobile devices) have changed the fabric of our society in an essential way. It will continue to do so.

The hype surrounding this ranges from "all information at our finger tips", "the wisdom of crowds", "crowd-sourcing solves problems unthinkable before",   "social networks add to the value of our lives", "democracy has finally arrived", "everyone can now be a publisher" to "learning as we know it is changing dramatically", etc.

There are also success stories that are a bit more ambivalent, and it is worth to consider some of them:

"Wikipedia has wiped out classical encyclopaedias": This is more or less true, if one sees the desperate struggles of formerly leading encyclopaedias like the English Britannica and the German Brockhaus: event they try to get now most of their revenues from electronic versions, desperately trying to support an editorial team that provides more up to date and even more reliable information than Wikipedia. Britannica is offering a basic service for free, but full access ("premium service") by subscription only [1]. Brockhaus is also working with a payment model and is mainly surviving by analyzing what typical students need, i.e. not a plethora of distributed information but well structured longer expositions on "all topics of interest" [2], [3]. There are other attempts, particularly more regional servers such as e.g. the Austria-Forum [4] and the Serbia-Forum [5] where the first author

is involved in personally, or special types of encyclopaedias arising due to the nature of an institution. A good example is the Smithonian in Washington that is receiving a stream of queries all the time and has decided to make answers available to the public [6]. Overall, the wealth of information on Wikipedia is unprecedented, yet whether a single player should dominate the field with not clearly transparent editorial policies or known specialists behind it is of concern to some.

The Linked Open Data Initiative allows the publication and semantic-enabled linking between between content of different content providers. Many libraries have started to release data about publications in Linked Data formats: Among many others, the Open Library [7], as an "open, editable library catalog, building towards a web page for every book ever published, makes about 20 million book description in RDF available, more than a million with searchable full text. It combines different editions of a work and links out to OCLC's WorldCat and the Library of Congress [8].

"e-Books are going to replace traditional books":   Much material where the copyright has expired is now available, mostly even free, over the Web, due to massive digitalization efforts of leading libraries, of Google, or enterprises such as the Open Library [7]. But also a good part of currently published works is available in the form of e-Books on various readers, from Tablet PCs to Amazon's Kindle. As tempting as it is to take a whole library of books with us on a device not heavier than a pocket book, there are sometimes surprising side-effects, mostly due to copy-protection algorithms. Typically, when you download an e-book on e.g. a Kindle and you happen to like it, so you want to borrow it temporarily to a friend for reading, you run into the problem of copying it onto the friend's device. Assuming that such "early   problems" will be overcome and still better user interfaces will be provide it seems clear that the market of printed books is going to shrink dramatically. Hence the statement:

"Bookshops where you can order via the Web both printed and electronic books are threatening the classical bookshop" includes the unproven assumption that indeed internet shopping will continue to grow rapidly, or more radically, there will even be   no demand at all any more for classical bookshops, or other classical shops, classical travel agents, etc. Although many of us by now shop some stuff using online stores of some kind and traditional stores do suffer. However, they have suffered at least as much because of the advent of easy to access huge shopping malls and the like, and nobody seemed to complain much. And the growth of online shopping is smaller than some would have expected: PriceWaterhouseCoopers published a study early 2013 showing that of all internet users a surprising 17% is not using the internet for any purchase whatsoever! (By they way, the same report also reveals as a myth that Smartphones and Tablets will overtake stationary PC soon: it is still 97: 58 for stationary PCs.) [32]

The fact that huge libraries of streaming videos and mp3 audio clips are available or are becoming available is clearly going to change the whole media scene. And are virtual museums going to replace real ones, virtual travel real travel? Will the percentage of work-at-home rather than at a fixed office location increase dramatically, and will the loss of personal contact be compensated by almost free (multi person video) communication?

This list could clearly be continued. The few examples serve only to demonstrate that not all that is going to happen is what we really want. Network technologies have many positive aspects, quite a few a bit more ambivalent, and also some that are potentially threatening our society, or even our mental health. It is those rather dangerous aspects that we will be mainly concerned with in the rest of this paper, presenting both dangers, yet also warning of an attitude that is unjustifiable critical. It is this that has been the driving force for this paper, based on the 2012 book by the well-known cognitive psychologists Manfred Spitzer [9] who tries to tell us that computer networks are threatening our sanity. His arguments (and we will present the most important ones) are valid to some extent, yet the wave of partial consent the book has found in German speaking countries makes it necessary to put some issues back into the right perspective.

In what follows we discuss a number of arguments how networked computers have changed our world and education, culminating on a discussion of Spitzer' s bleak outlook.

2. The Copy and Paste Syndrome and Its Effects

There are three entirely different angles to this.

One is the concern that plagiarism is on the rise. This is due to the fact that writing an essay or seminar paper for a school or university assignment is now very easy by using a search engine to locate   relevant literature and to use copy and paste. It is true that this is particular a problem in schools since a number of websites blatantly support this kind of process: sites like [30] offer full ledged essays for about just any school topic. The site [31]

boasts that they can cover 200+ topics from school to Ph.D. level. Although plagiarism detection software can help, see [12], [13] or [14] it does not offer a full solution. Some software for scrambling an essay (e.g. using synonyms) making plagiarism detection harder is now also available; still more troublesome, plagiarism detection is virtually non-existent across language boundaries: thus, some Japanese student may well take a top research paper from a university in the US, translate it into Japanese (or the other way around) and get away with it. Our recommendation is thus to use plagiarism detection software in schools (even searching for a random sentence in an essay may already give away the cheater); at research level it seems that only a systematically kept research diary as suggested in [28] offers real protection.

A second concern is that Web sites are not reliable. Hence by just using the first best result given by a search engine is quite dangerous: information may be wrong (the source and date are often not known) or ranking of search results may have been adjusted for commercial reasons. Looking at the first few entries of a search "boiling point of radium" using Google yielded 1737, 1430, 1140, and 1500   Centigrade! (Query May 3, 2013)   Well, who cares about the boiling point of Radium? However, when I checked the edibility of one of my favourite fungi (Echter Ritterling) in 2012 I got "Very good eating" in one entry, yet "Deadly poisonous" in another.   Detailed investigations do indeed explain the discrepancies, but Weber in [18] has a good point when he states "We are Googling reality". Actually, the situation is worse: we are not Googling realitiy, but some kind of fake reality created for us. After all, I hope all readers realize that ranks of search results are "manually adjusted" here and there, and (yep!) there is nothing illegal about it.

The third concern is that copy-paste is used by pupils and student to an extent that they do not even read, let alone understand the essay they are composing by gluing together snippets form various servers (mind you, some clever plagiarism detection algorithm may notice the change of style between parts of the essay.). .). Further, a survey with 300 students of economics and business administration conducted by the research group of the second author revealed that more than 50% of the students are using social media for the search for scientific information including searching in scientific wikis and blogs. For scientific wikis and blogs curated by so-called "citizen scientists", however, traditional quality assuring mechanisms, such as peer review, ceased to be valid; but pupils and students often consider content on the web as being true and valid without any further reflection. It was Brabazon [17] who was the first to point out that copy-paste and short message systems like SMS or Twitter reduce the ability to read "with comprehension" and to write coherently, one of the strong (and indeed correct) arguments of Spitzer [9]. We will return to Spitzer's arguments in Section 5.

Independent of whether we are concerned about plagiarism, it has become clear that essays written by students in schools are indeed most often not "written", but glued together by searching on the web and then using copy/paste   with a minimum of "filling" in between to yield a "new" essay. With the support of the Austrian Ministry of Science and Research we have tried to work with students age 11-17 within the so-called Sparkling Science Program to teach them alternatives. Students can choose some topic they are interested in to write about. However, before doing so they have to consult the school library, search the web for relevant material and pictures or other media clips they can use or link to (without violating copyrights) and they have to document what they have looked at, adding to their essay a list of "proper citations."

We define as a citeable item anything that is stable (i.e. does not change in time) and has a well defined source. For a paper or book this may be the name of the authors with links to their biographies so readers can check the qualification of the authors. For other contributions it may be some dictionary, archive, museum or some "trustworthy" website with information of some stability.

Although we did convince students that this is the proper way to write about some topic by first looking at previous efforts and analyzing the topic from various points of view we ran into two difficulties:

   i.   (i)   It was not clear what contributions on the web satisfied our criteria for "proper citations". In particular it was clear that contributions in Wikipedia do not qualify: except for citing particular versions (whose URLs   are not trivial to access) there is no stability in time and the real author is not known. A contribution is often written by many, some using a pen-name, i.e. qualifications unknown. For this reason, a major source had to be the Austria-Forum [4] for which we give a brief description in the next but one paragraph.

   ii.   (ii)   Even more distressing was an other phenomenon: although students would investigate various sources (as we determined by questions, i.e. not just relying on the list of references they provided) they did not write the essay with their own words, but ended up pasting together various bits and pieces from the sources identified, without substantial "creative writing".   Thus Brabazon's and Spitzer's concerns (to which we return in Sections 4 and 5) that new media resources undermine writing

seem to be justified, and much effort is needed to work against this trend.

For completeness sake let us now briefly mention the main features of Austria-Forum as one of the reliable sources for citations. The Austria-Forum is a special kind of encyclopaedia with a number of unique features:

- — It concentrates on issues that have some connection to Austria or Austrians
- — It only is concerned with contributions of some temporal stability (i.e. no information on current weather, sports, events, etc.)
- — Most of its contributions are "frozen", i.e. do not change any more. Comments to such contributions are welcome and shown, but the frozen contribution as such cannot be changed any more; of course an entry on some topic might change in time: then a new contribution for x is added to the Austria-Forum: the search will give the new version, with a pointer back to the one earlier frozen: if the new item is frozen immediately or "left open" for changes for some time depends on the item and editors involved
- — Multiple contributions on the same topic are welcome: "One cannot understand a complex issue unless one examines it from different points of view"
- — Books are part of the Austria-Forum as "Web Books": when opened, they look like a printed book and pages can be turned; yet full-text searching is possible and- most importantly-links to other book pages or Austria-Forum pages (and conversely) are possible, and metadata and comments can be attached to book pages
- — "Time travel" is possible: If you have found e.g. an entry on a city in Austria, you can move back in time, at least to those years (2003, 1995, 1996, 1955, 1938, 1915, 1902, 1835) where full-fledged encyclopaedias of Austria are available. Entries for years inbetween may well exist due to other historical documents, like the famous 60 volumes "Wurzbach" on Austrians (1881), or the famous book on poisonous plants (1871) or the handbook on Styria (1897)
- — We integrate contribution from other sources (including Wikipedia) by "freezing" them and having an expert (whose name is then used in citations) to guarantee the quality of the entry

3. Privacy and Psychological Issues

In computer networks, privacy (and security) and psychological issues (what are beneficial, what are negative side effects) are very hot and contentious topics. The fact that over 500 (!) books in English have appeared on privacy alone in the last 15 years on this subject says it all. However, if it were not such a critical topic it would almost be amusing to see how sentiments have shifted during this short span of time. [34], written in 1999, still asks the question "Will Technology Force Us to Choose Between Privacy and Freedom?". More recent books like [35] and [36] are already stressing the almost unavoidable danger of current applications of technology to privacy; and [37] goes even a step further by stating that "privacy is a thing of the past".

Many publications on the privacy issue focus on the net, on data-collection done more or less openly on the web, and on social networks. Yet it is clear that privacy is and has been rapidly disappearing also in other ways. The use of credit cards, bank cards, bonus cards of all kinds, etc. leads to a clear profile of preferences of users. A recent application has surprised us sufficiently to warrant a report on it here:

A world-wide acting supermarket chain keeps records of everything purchased by each customer with a bonus card, compiling huge amounts of data (creating truly "big data"). When a person pays for a new purchase, the profile of the customer is compared to products available in the shop that should be sold with priority. To be concrete, let us assume that the profile of the customer shows a liking for bananas; suppose further that the store has bananas that are already very ripe and have to be sold. In such a case, when the receipt is printed also a special voucher is produced with a message like: "Since you are a valued customer we would like to present a gift to you. If you now return to the store you can take six bananas without paying for them." It turns out that this approach has many advantages: goods that would have to be thrown away anyway, or promotional material for new products, are offered as gift, strengthening the ties of the customer with the supermarket chain; it also turns out that customers that do return to pick up their free gift often find something else they "forgot" to buy before. The challenge is to combine in a fraction of a second the user profile (collected from many locations) with topical information on inventory available. Despite the fact that the supermarket-chain is employing a data center with 600 large computers to do

what is described, figures show that the investment pays off handsomely!

Privacy is lost in many ways. Supervision by video cameras, supported even by clever software for license plate or face recognition, has become common place. It is interesting to note that some feeble attempts are made to restrict taking videos to some extent. A typical example is the ruling of the Austrian Data Protection Agency December 2012 [38] that makes it illegal to install a video camera in a car to video all the time the surroundings of the car. The reason for doing this to start with could e.g. be to have good documentation in case of an accident; the ruling against it is based on the fact that it infringes in an unreasonable way on the privacy of other people with (on average) little gain: after all, how often is one of us involved in an accident? It is completely overlooked that such laws cannot be policed due to better and better technologies. There are now classes that look identical to ordinary ones that have a video camera built in that allows (using only the batteries in the glasses) to record 30 minutes of HD video. Thus, anyone wearing such glasses like the one in [39] can take videos of what is seen at any time, anywhere, in a car, a museum, a party, etc. without anyone noticing. Google glasses are more noticeable for the time being, but due to their mobile phone connection uploading YouTube videos will soon be reality. The situation is still more complicated by the fact that video cameras "have learnt to fly", i.e. can be and are integrated into small remotely controlled aircrafts that turn into drones: some will just record a video what they see and hear, others may actually send the video stream to a ground station. Thus, drones (so far mainly used for military purposes, including drones that can destroy objects) are starting to be also available for private purposes. Searching for "rent a drone" on the web is an eye opener.

High resolution aerial images or the street-view application of Google, or similar applications, are further examples for the invasion of privacy due to (invisible) photography.

We all know that search engines collect information to establish user profiles. Email or chat services   can extract information from our actions; cookies and similar devices can be used to analyze user behaviour; various social network have become infamous for the fact how much they reveal about user; internet shops like Amazon use the information on what we have ordered before to recommend further items; etc.

A number of applications are tracking user behaviour on the web. After all, advertising on pages with little traffic does not make sense! One of the best known engines for compiling statistics on the use of a website is Google Analytics. Even if we never explicitly use any services from Google we are constantly in contact with Google applications, since more than 50% of all large servers (at least in Europe) have installed Google analytics. How much personal information is extracted by Google analytics and made available to Google for adding to personal profiles is not known.

Many of theses services are a two-sided coin from which users also profit: after all, being shown new books or movies close to our taste may be quite convenient! The down side is that if everything we see on and get from the Web is "personalized", then we are in a sense closed in into our world, never seeing things outside it. It is a good lesson to carry out the same query with the same search engine on different computers in different locations: the (ranking of) results presented will be quite different. Again, even this is sometimes helpful. If I search for "Pizza restaurant" on a computer in London I am probably interested in restaurants different from the ones I find with a computer in Paris. And – so we assured- we can override such default options by searching "Pizza restaurant in xxx", where xxx is the city we are interested in.

Information extracted from interactions on the web, in particular in social networks, is not just used by companies but also by individuals. Stories that someone invites a small group of friends to a party using Facebook and suddenly hundreds turn up are not news any more. Cyber- mobbing is sometimes taking on unprecedented dimensions, in some instances even leading to serious distress and suicide.

It is fair to say that if such things happen, often the person mobbed is to blame for being too frank in some way: like not checking to whom invitations will be sent; or making an intimate picture available to a "friend" who ceases to be a friend at some stage and takes revenge by circulating the picture to others. However, new technologies are certainly enticing users to do things the consequences of which they are not aware of. Here is one typical example:

If one sends a picture using Snapchat [40], it disappears after a few seconds. It says on Snapchat explicitly:

"Snapchat is the fastest way to share a moment with friends. You control how long your friends can view your message - simply set the timer up to ten seconds and send. They'll have that long to view your message and then it disappears forever."

This certainly might suggest that sending e.g. an intimate picture following a request "be brave, show me…" will not be harmful. However, maybe the receiver takes a screen shot before the picture disappears. Snapchat has tried to solve this problem and is now announcing, additionally:

"We'll let you know if they take a screenshot!".

Clearly this is not a real solution: If the screenshot has been taken, it may be too late; reportedly there is SW for taking screenshots that is not detected; when the picture arrives how is one sure that only the person whom it is intended for is watching; one can always use a digital camera to take a photo of the screen; etc.

Concerning picture sharing, the first serious picture sharing network was "flickr". With many excellent pictures and 70 million photographers it is quite impressive, but (in contrast to Wikicommons) most pictures can only be viewed but cannot be used otherwise without explicit permission. With 100 million users and growing, "Instagramm" is also a platform for sharing photos, mainly within predefined groups. A score of other picture- or animated picture applications is also trying to seduce persons to share pictures, often artificially enhanced, like Gifboom, Cinemagram, Flixel, Vine, Tout, Viddy and Keek.

A serious complaint against many such providers is that pictures once posted can often not be recalled. However, this is also particularly true of search engines. Documents once indexed cannot be removed by authors in the sense that the search engine does not list them any more. This, together with photo sites that do not allow the removal of pictures or other information can lead to unpleasant situations. Suppose X posted a photo with boyfriend Y at some stage, but now has a new boyfriend Z. X will not be excited that Z can search for X and still find the photo of her with Y. Similarly, a photo taken years ago and available on the net may be an obstacle to get a certain job, etc. Hence the usual advice to think hard what one posts on the web should indeed be taken seriously. We often say: "Posting a picture on the web is similar to getting a tattoo … you many not like the looks of the tattoo on your wrinkly skin in 20 years time, but it will be close to impossible to get rid of it."

It is clear that information on the web is influencing all of us. It certainly has changed how children grow up, moving from childish innocence to having access to everything much too fast. Neal Postman's book "The lost childhood" (written with TV in mind) applies very much or even more so to the Internet! The amount of information on violence or sexually related material is tremendous: much has been argued that this may well be detrimental. Are the many violent, blood-dripping games that are available on computers in stand-alone versions or via the web "a valve to release aggressive thoughts", or is it the other way around, do "shooter games" like the sample of 408 (!) listed under [41] not teach how to maim, kill and destroy?

All evidence points to the latter. Let us quote from [42]:

"In 1972, the Surgeon General issued the following warning on violent TV programs: "It is clear to me that the causal relationship between televised violence and antisocial behavior is sufficient to warrant appropriate and immediate remedial action. … There comes a time when the data are sufficient to justify action. That time has come." (Steinfeld, 1972).

That was over 4 decades ago! In the years since this Surgeon General warning was issued, hundreds of additional studies have shown a link between violent media exposure and aggression (…).The Surgeon General warning was about violent TV programs and films.

What about violent video games? There are at least three reasons to believe that violent video games might be even more harmful than violent TV programs and films:

In summary, there are good theoretical reasons to believe that violent video games are even more harmful than violent TV programs or films. We also have empirical data showing this. … The results showed that boys who played a violent video game were more aggressive afterwards than were boys who merely watched.

Some people claim that violent video games are good for you. Some players believe that violent video games are cathartic (i.e., they allow players to release pent up anger into harmless channels). The scientific evidence directly contradicts this idea. Over 130 studies have been conducted on over 130,000 participants around the world. These studies show that violent video games increase aggressive thoughts, angry feelings, physiological arousal (e.g., heart rate, blood pressure), and aggressive behavior. Violent games also decrease helping behavior and feelings of empathy for others.

Other people claim that playing violent games increases eye-hand coordination, and research supports this claim. However, violent content is not be required to obtain these beneficial effects.

Another big issue is the social effect of virtual reality, virtual worlds and virtual communities. We are not aware of studies showing conclusively positive or negative effects in general. It is very much dependent on what is being done. After all, virtual worlds can e.g. be used for learning, for communication, for playing, etc. But when it comes to playing, the question is very much what the game is like.   If it is a violent game, we are back to violent computer games; if it is playing strip poker it "may be bad for morality" (as has been claimed numerous times); if it is a game for learning it may or not help depending on the quality and how much you believe or do not believe Spitzer (Section 5).

There is some tentative agreement that virtual worlds can have negative effects such as:

- • — Psychological effect such as addiction
- • — Behavioural effects such as isolation
- • — Physical effects such as injuries or even deaths
- • — General social effect such as family disunity

Positive impacts include:

- • — Used in schools in E-learning hence developing learning activities
- • — Used in hospitals for hypnosis and promoting health facilities
- • — Social network interactions
- • — Eliminates social barriers such as age, race and religion, hence promoting diversity
- • — Forms platform for learning from and for different people

4. Modern Media Decrease our Mental Powers

There has been concern, first voiced clearly and with some data to prove the point in [17], that modern media, particularly networked computers are endangering our capacity to think, to remember clearly, and to read and write with concentration.

The term ADS (attention deficit syndrome) hardly existed a decade ago. Now, more and more children in schools are identified as having this syndrome, i.e. as being unable to sit still, concentrate on what is said or on some other coherent activity.

This is not just true for kids. In a way, our world is on the way to a "global attention deficit syndrome" (our terminology) due to the overwhelming avalanche of information   that is bombarding us all the time: mobile phone, mail, tweets, chats, skyping, video-clips that are usually turned off if longer than 20 seconds (because we have become very impatient), we do channel hopping when watching TV, internet pages with animated pictures, quivering links to attract attention, pop-ups all over the place, an audio clip when we move the mouse over some part of a page--- unless we are listening to music with a plug in our ear, already. When we have to wait we become restless. Rather than relaxing we are trying to solve a Sudoku, etc. Seriously: When was the last time we did lean back and think concentrated without interruptions about our lives and what is good or wrong with them!

Our memory is failing, not because of Alzheimer, but because we don't practise it: we are not remembering phone numbers any more- why should we? We have a reminder function on our smart phone telling us about upcoming meetings; we do not know when we have the next three trips (it is all in our smart phone); we get lost if GPS does not work; if I misplace my smart phone I ring it up with the smart phone of my wife or friend, and then can easily locate it. (Too bad, I cannot ring my car keys yet, or my shoes, but this is bound to be possible anytime soon with smart tags.)

Our thinking and observation suffers. Why should we worry about the rear end of our car, the distance warning peeping is all we need; we have a park assistant to park our car. Why should we worry about whether the change we get is correct when we pay: we use a credit card, anyway. Why the heck should we still be able to add a few numbers, or multiply two of them (let alone long division!) when we have a small calculator in my smart phone. Do we really still have to write when there is good speech recognition? Or more basically, is correct spelling something we still need to know when our text processing software has an excellent spell-checker? Will we still read newspapers, when we can listen to them while driving to work (using not only the "common" mp3 recording of someone reading the paper professionally: even without human voice, new text to speech software is so good that it is hardly recognisable as computer generated). Surely this list can be continued arbitrarily!

Summarizing, the information flood created by new media and the possibility to get answers to just about anything through the web is reducing our concentration, our ability to remember and to think clearly, is brainwashing us along the ideas of the main stream in whatever society we live in, and possibly makes much learning unnecessary. Putting it more positively, we are working more and more symbiotically with networked computers.

The main question is: how far can we go this way and still remain human? If we have to learn, why not be able to learn more efficiently using computers? Spitzer in [9] gives strong answers to this: that we are going too far,

already. Learning (and keeping our brain as main computer) will always be necessary, and computers and media are more detrimental than helpful for the learning process.

"Computers in schools for teaching about biology are as important as it is to use bicycles for teaching how to swim", Spitzer writes, provocatively.

In the next Section we will look at some of his arguments in some detail.

5. The Man Spitzer Arguments and Answers to Them

His point that computers for teaching are useless is clearly something none of us working in e-Learning will accept easily. As we will see there is a grain of truth in it. But before we go into it is fair to clarify in what way Spitzer objects to computers in schools: he of course agrees that students have to learn how to use computers for preparing talks, presentations, investigations on the web, etc. And he does not object to teachers using networked computers in the classroom to show some experiment or interesting video clip. He does object, however to the belief that (i) "the more media we use, the more students learn" and (ii) it makes sense that all students in class should have their own tablet PC.

Concerning (i) there are indeed books [33] that show that it is partially true. Media (including interactive ones) often distract and take up more time to convey some idea than is necessary. Let us give two examples: in teaching physics to students using computers, elaborate programs exist that allow to examin the parabola of e.g. an object thrown. After experimenting a long time students will come to the right conclusion (or should we call it a guess?) that the object travels the further most when thrown at an angle of 45 degree. This is of course true, but a simple diagram with the formulae explaining what happens will take much less time, and the student then has the proof (instead of the guess) that 45 degrees are optimal. Similarly, video- and audio clips are much harder to navigate than text mixed with pictures: with video clips one often does have no alternative than to watch the laborious explanations; a combination of text/diagrams/pictures can be browsed more rapidly, depending on the reader, rather than on the speed of the video or audio clip. Extensive tests with over 10.000 students discussed in [33] show clearly the ambivalence of (too much and interactive) media in teaching: more is often NOT better.

Concerning (ii), experiments we have been involved in by giving an iPad to each student in a class of e.g. 20 also support Spitzer to some extent: most teachers do loose control over a class when everyone is using such a device: some write email, others are in a chat, others play a game (and switch to another screen when the teacher is near them), etc. When teachers try to explain something they often get little attention. However, in some cases we also observed that teachers manage to give different tasks to students or groups of students and then students often work with enthusiasm and success. From our experience the verdict is still out if such classes will work in general or not: it depends much on the teacher, the students involved… and clearly teachers have to use completely new paradigms!

Spitzer very dramatically describes the decrease of the capability of memory due to new technology.

As neuro-psychologist he has examined the part of the brain that is responsible for memory. He shows that this part is much larger in the brain of cabdrivers in London than of cabdrivers in Los Angeles. The reason seems to be clear: to become cabdriver in London you have to pass a very difficult test, knowing all streets, one-ways etc. , i.e. you have to work on memorizing this information for months (!). In the process, the relevant area of the brain increases. In contrast, to become cabdriver in Los Angeles you only need a driver's license and a GPS.

However, Spitzer is not proving that cab drivers in London also remember other things better, or have a higher IQ or such. But even if this were the case, so what? Since we have devices that help us, why not use them? The average person hundred years ago was able to walk much longer with heavy loads than the average person today. Yet the average person today can move with still heavier loads both further and faster by just using a car.

A point that we have mentioned before and was first scientifically analyzed in [17]   is the fact that school children heavy into SMS, Tweeting,   Chats and such are doing worse in writing and comprehensive reading. Spitzer provides further examples and warns that this is a phenomenon that we cannot tolerate.

We believe that Spitzer is probably correct in pointing out the consequences, if we loose good creative writing and comprehending reading capabilities. Yet it seems to us that the conclusive proof that a reduction of the capability of creative writing also means that persons cannot express themselves as clearly any more when speaking, is missing; and so is the proof that not being able to read complicated text implies that we cannot understand complicated issues. To be more specific: we tend to believe that good writing and reading does indeed help us to communicate and understand well. However, it may also be that writing and reading are just crutches that we had to

use for centuries since we had not other way of recording information and knowledge. And that we are nearing the demise of written language as we know it in favour of other ways of recording and transferring knowledge, like using symbols, audio, vide clips etc. We have done fairly extensive research on this in [44], [45] and [4] and were able to show that at least in some domains (like traffic rules) the use of symbols and video clips is quite superior to using written language. And let us not forget: if we buy furniture from IKEA for self-assembly we get diagrams with no words at all!

Further important credos of Spitzer are that learning will remain an essential activity, but computers help little to ease the learning process and even if they did, it would be counter productive: since serious learning means deep understanding and this has to happen in the brain of persons.

Most seem to agree that learning as activity will remain, and will be necessary to make sure that our "muscle" brain does not degenerate as much as the muscles in our arms have after we stopped chopping wood. Some computer scientist believe that future humans will live symbiotically with computer networks and are more radical: even if our brain degenerates, if we, together with computers are more clever than before, what is bad about this?

However, let us assume with the majority of scientists that learning (logical thinking and certainly also memorizing some facts) will remain an important activity. Then a burning question is: what are the important things we have to learn? Probably not arithmetic (we have relegated this to calculators years ago); probably not spelling (we leave this to spell checkers); probably not handwriting (we are inputting text now mainly using keyboards); probably not the basics of foreign languages (this will be replaced by translation programs, unless we want to dig very deep into a specific culture); probably not how to construct triangles or other geometric problems (the argument that this is good for learning logical thinking is weak, since learning how to play chess would do the same and be more fun for most of us); etc. Thus, a rethinking of what to teach is probably more important than the question how we teach (to an issue we return to shortly).

We often hear that among the new things we have to teach are computer skills and how to use the web (we agree on this). However, it is surprising to us that crucial aspects of our life are currently mostly excluded from teaching in schools: why do we teach about the geography of some remote corner of the world   as is usually found on curricula of schools (at least in Europe), but medicine/health is not, yet clearly they are more important for our lives. Similarly, how come we teach much about "old" history, and little on recent history or political issues; or why do we not teach child-care and how to bring up children (is this not THE most important job in our lives?); and how about learning how to make sure that partnerships last and if not, how to avoid "rose wars" at the end?

Those topics seem to us of paramount importance, yet Spitzer ignores them more or less and focuses on negative comments about new technology for teaching. It is true that no e-Learning environment has ever been proven to be superior to good old-fashioned teaching and tutoring on a large scale. The hype that "universities become unnecessary because of e-Learning" is as unjustified as the hype a few hundred years ago that "the printing press will make universities obsolete." Yet Spitzer does ignore that printed books are useful for education in some cases, and so are e-Learning modules if they are well done and used where it makes sense: because of time or location constraints; on the job when needed; as preparation for some course or activity; as repetition of material learnt earlier; to catch up missed material because of illness, or whatever; etc.

Maybe one section of Spitzer's book deserves serious thinking. He claims that if we found a new and much better way to teach (with computers or without) it would not help, as hinted at above: to truly understand something we have to "rack our brain" as much as we have to sweat and exercise a lot if we want to be good in some sports-activity. This is certainly true to some extent: when good teachers explain some difficult material they sometimes use tricks, pretending to falter, or they make mistakes that they then correct: all to show to the students that there is a difficulty. Other teachers might hide the same difficulties by eloquently passing over them, leaving the students with no feeling for the real problem behind the nice speech and diagrams. "Bad" teachers are not necessarily bad for students: because students did not understand what was explained, they have to consult other sources and eventually work out what is needed on their own, in the process getting a very good feeling for the problem.

Yes, it is somewhat discouraging that there is little correlation between the quality of teaching and the quality of learning. However, if we achieve by new techniques a high quality of learning, at the same time avoiding frustration and making students enjoy the process – much like a good sports trainer does in his activity- we have reached a lot and can be proud.

Hence, let us continue to try to find better and above all less frustrating ways to learn, and surely good approaches to e-Learning belong to that category.

6. Conclusion

In this paper we have argued that we have to watch out that the web does not turn us into dummies: it does have serious potential for this. However, to use this as excuse to damn the web, e-Learning, computers and other technologies is very dangerous: it ignores that some developments may not be beneficial, yet others are.

To make all innovation bad as essentially Spitzer is doing in the area of computer networks and e-Learning will just be an excuse for those who are too lazy to seriously look at innovative approaches.

And it should be clear to all of us that innovation is the key for our future.

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