

Digital, "Highly connected" Children: implications for education.

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I belong to the "Ice Age" generation. When I was a child there was no refrigerator in our home. We had an icebox. We used to carry ice blocks in a Utah cloth up to the third floor. A telephone was a rare item and a telephone line was extremely hard to get. One had to wait for years to get one.

A transistor radio was a rarity. I watched television for the first time at the age of 25 when I arrived in the USA. I've yet to master how to program a VCR and I became acquainted with a PC only 15 years ago.¹

My presentation today will focus on the cognitive and social changes brought about by the digital revolution. I will emphasize the impact this revolution has on the highly wired young generation and the need for a new literacy. I'll end my talk with some ideas about the new role educators have working with the "highly digital" children. In the past decades tremendous digital-technological innovations have flooded our lives. The impact of these inventions on socialization, ways of thinking, and modes of learning, is far reaching. The new digital technologies challenge many of our concepts and beliefs and make new demands on us as to understanding the new high-tech, digital culture. In order to do so one has to be skilled in digital literacy.

According to Yoram Eshet-Alkalai, a scholar from the Tel- Hai College in Israel, the new digital literacy is penta componental². These five cognitive thinking strategies can help the perplexed:

¹ Edna Aphek, View from Israel: The Intergeneration Project

http://www.acm.org/ubiquity/views/e_aphek_2.html

² Yoram Eshet Alkalai, Digital literacy: A new terminology framework and its application to the design of meaningful technology-based learning environments

1. photo-visual literacy
2. Reproduction Literacy
3. Lateral Multidirectional Literacy
4. Information Literacy
5. Socio-Emotional Literacy

Let me elaborate on each of these components:

1. Photo-Visual Literacy

Eshet- Alkalai points out to the shift from alphabetic literacy to Photo-Visual Literacy, in which icons have become the new letters. This Photo-Visual Literacy is based on the notion of using vision to think.

If we look for example at our computer desktop, at our car panel or at the cellular phone, we'll see that they all give us iconic information. These photo –visual signs serve as shortcuts for action and do away with the mediation of the cognitive skill of deciphering and understanding the alphabetic symbols.

The use of emotics e.g.; ☺ ;-),(-: and the shortened internet writing such as **b4b** and **cu**, all emphasize the tendency to break away from the traditional alphabetic writing.

2. What is Reproduction Literacy?

Reproduction Literacy could be likened to what John Kao calls jamming: “taking a topic, a question, an idea, disseminate it, break it, manipulate it, and reassemble it...creating something new”³

Dali's Mona Lisa with the moustache, could serve as a good example of what Eshet means by reproduction literacy.

In the information world, an enormous amount of information and spiritual creations are ‘out there’ in cyberspace. Billions of pages carrying artistic work, articles, essays, music and graphics, can be accessed and made use of.

We are therefore, faced with a new challenge -to use these existing spiritual treasures in innovative ways, thus creating new concepts and forms.

<http://infosoc.haifa.ac.il/DigitalLiteracyEshet.doc>

³ John Kao, Jamming : The Art and Discipline of Corporate Creativity, HarperBusiness,1996



Another visual artistic example of Reproduction Literacy would be Warhol's print of the ["lips" of Marilyn Monroe 1967](http://www2.kenyon.edu/Depts/IPHS/Projects/pop.up/andy.htm)⁴ which depicts the loss of personality in images of celebrities.

⁴ <http://www2.kenyon.edu/Depts/IPHS/Projects/pop.up/andy.htm>



3. Lateral literacy

A strategy much needed for deciphering and navigating in the new digital literacy, is lateral- multidirectional thinking. This literacy marks a shift from the more structured, well planned traditional book- like literacy.

Unlike the closely structured book environment in which the amount of information and the order of presenting the information are predefined, the net environment is open to rearrangement.

Linear structures following sequential logic, give room to non- linear, hypertext, associative structures. On the one hand this loosely netted structure fosters creativity and is open to new creations and interpretations, on the other hand, the new open- ended exploratory environment is dynamic and even chaotic.

New cognitive skills are needed in order to navigate **freely**, yet **mindfully** among the many sites, and from site to site, while using the hypertext. The ability to focus, as well as integrative and summative skills are necessary in order to reconstruct knowledge out of huge chunks of information arrived at, in an unstructured manner.

4. Another problem, we are faced with, is that of reliability: how do we know that what we read, saw or heard comes from a reliable source? How do we evaluate the information gleaned?

Yoram Eshet suggests a cognitive tool in order to cope with this problem: Information Literacy: Trust nobody

This literacy acts as a filter:” It identifies false, irrelevant, or biased information, and avoids its penetration into the learner’s cognition.... without a good command of information literacy, how can one decide which, of the endless pieces of contradicting information found on the web, to believe? Which of the news on the web to trust? Which political opinion posted on the web to adopt?”⁵

5. The fifth literacy advocated by Eshet- Alkalai is the Socio- Emotional one.

Much of the work and information sharing done on the internet is conducted in cooperative learning or any other form of information sharing: in chat rooms, online communities, groups and forums. Meeting of the other and Cooperative Learning necessitate socio-emotional abilities.

The socio- emotional literacy also has to do with the ability to tell right from wrong and good from bad: to know how to roam the web with discretion and to tell the sincere and honest person from the imposter; to spot disseminators of hatred and pedophiles, and to take precautions at the chat room and the instant messengers. This literacy has to do with protecting oneself from the dangers of the digital, highly- connected world and at the same time to guard the rights of the other by adhering to the rules of netiquette ie; the etiquette of the net.

⁵ <http://infosoc.haifa.ac.il/DigitalLiteracyEshet.doc>

I would like to add two more literacies to the five literacies mentioned by Eshet-Alkalai.

6. Moderation and Self-regulation Literacy

The new technologies have the power to carry us away. There is much talk about the addictive element of the internet⁶ and the danger of information overload which might result in the IFS- Information Fatigue Syndrome⁷, (researched by Reuters). In order to avoid these dangers of addiction and of becoming datacholics, we must learn and teach strategies for using the digital media with discretion and moderation.

And the last literacy is-

7. Quality Assurance Literacy

This literacy is sort of 'meta literacy' as it is needed in all the other literacies.

It entails first and foremost an awareness of the need and commitment for quality and excellence.

With the use of the new technologies at the tip of one's fingers, new embellished creations can be relatively easily produced. The external beauty of PowerPoint presentations and websites might cover for the lack of quality of their content which though reliable, might be shallow.

Technological mastery is no way equivalent to deep thorough thinking.

There is a dire need for quality assurance at a time when seemingly everything and anything goes.

⁶ <http://netaddiction.com>

⁷ *Dying for information*, Reuters, 1996
<http://www.cni.org/regconfs/1997/ukoln-content/repor~13.html>

We need to develop new standards for evaluating the excellence of the digital creations. These standards will help those working in the digital environment to evaluate their own work as well as the work of others

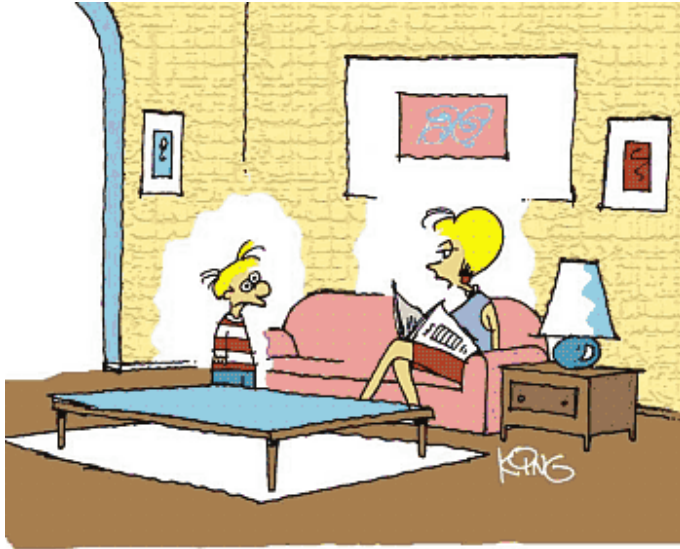
The various literacies or strategies are interconnected and sometimes they even overlap. They function as guidelines to help us find our way in the maze of the digital-information world and to best use the immense options and possibilities this world has to offer. These literacies are needed outside the Digital Culture scene, but when it comes to the digital environment the mastery of these literacies becomes a must.

I have just described an academic framework for working in the highly digital environment. Kids are great consumers of this environment. Strangely enough they have become the masters of the new technologies.

“We learned to crawl alongside the PC. We came of age with the Internet. Early-adopting, hyperconnected, always on: Call us Children of the Revolution, the first teens and tweens to grow up with the network.... While others marvel at the digital future, we take it for granted. Think of it as the difference between a second language and a first..... In the past, you put away childish things when you grew up. But our tools are taking over the adult world...”⁸

The following cartoon says it all:

⁸ <http://www.wired.com/wired/archive/10.09/borndigital.html>



*"No, you weren't downloaded.
Your were born."*

The kids seem to be quite good in the photo-visual, the creative and to some extent in the reproduction components of the digital literacy. However they aren't always in control of the information, socio- emotional ,moderation and quality assurance aspects of the aforementioned literacies.

At this stage I would like to present **some statistics** to corroborate my point that kids are great consumers of the Digital media

It's important to note that much of the data I am going to present comes from the American scene. However, these statistics might give us some indication as to the trends of media and especially internet usage by children and teens in other countries, especially the Western ones.

Kids are great consumers of the Digital media.

A study conducted by Knowledge Networks in 2003 "finds that a significant number of children have various media and entertainment devices in their bedrooms"⁹.61% of the

⁹http://www.knowledgenetworks.com/info/press/collateral/H CUT_2003_PressSummary.pdf

kids who took the survey have a television set in their room, 57% said that most of their internet access is done from their bedroom.

Another research done by Nielsen at the end of 2003 shows that more than 2-in-10 Internet users during September 2003, were between the ages of 2 and 17.¹⁰

A study from the same year, run by the Indiantelelevision.com team, indicates that most teenagers and young adults in the US prefer surfing the Internet or watching television over reading for recreation¹¹

Here are the figures of the Indiantelelevision.com team, giving information about the number of hours teenagers spend on the various recreation activities

Activity	Hours per week
Internet surfing	16.7
Watching TV	13.6
Radio	12
Talking on phone	7.7
Reading books/magazines	6

A survey published in March 2003, conducted by Grunwald Associates, found that 2 million American children have their own websites¹²

¹⁰ <http://www.nielsen-netratings.com/>

¹¹ http://us.i1.yimg.com/us.yimg.com/i/promo/btbw_2003/btbw_execsum.pdf

¹² <http://www.grunwald.com/>

The survey also predicts that the number of kids with personal sites is expected to rise to more than 6 million American children by 2005

The following table prepared by Grunwald Associates will give us some idea as to the ages of these young web masters.

Kids as Webmasters		
	Have Site	Plan Site
Ages 6-8	4%	28%
Ages 9-12	9%	33%
Ages 3-17	15%	29%
Ages 6-17	10%	30%
Base: Kids 6-17 with home access		
Source: Grunwald Associates		

It is only logical to ask: what influence do the Digital Media have on the wired kids?

I would like to present two opposing views as to the influence the electronic media might have on the Digital Born children.

One view formulated in the eighties, is that of Neil Postman, an American philosopher. Postman deals mainly with the children of TV.¹³

Postman is wary of the new technologies .He fears that by adopting them too quickly we bring about the disappearance of childhood and destroy learning and logical-sequential thinking habits, structure and order.

The contrasting view is that of Don Tapscott, who comes from the business world. Tapscott's view deals mainly with the children of the internet ¹⁴ . Tapscott believes that

¹³[Neil Postman](#), The Disappearance of Childhood, NY:Vintage Books,1994

a new better order is emerging; he finds the Net children who master technology, to be inquisitive learners, responsible, tolerant and caring individuals.

Let's take a closer look at Postman:

According to Postman, the world of electronic communication is a world without values, books and order. This is especially true of the world in which television reigns. Postman's child is one who lost his childhood but never reached maturity. Postman describes a society in which children and adults watch the same movies and soap operas, listen to the same pop music, and play the same computer games.

The adults in such a society become more and more childish as they try to pursue the youth culture, whereas the children, to whom all the secrets of adulthood are revealed, especially those of violence and sex, become, seemingly, mature. Seemingly, because they are mature externally, but not emotionally.

As the differentiating line between the child and the adult blurs, concepts that distinguish the adult from the child, such as independence and responsibility, become unclear too. Postman describes a society at risk, living in a sinking world without books, without order; a chaotic meaningless world.

In his writings Postman describes children who live in a "twilight zone" between illusion and reality. It is a world in which parents and teachers have lost much of their authority: Postman suggests that adults should gradually unfold the world of adulthood to their young ones. The content, the dosage and the timing, should be determined by the adult, or else the very essence of childhood will disappear.

Another view of the New Child: Don Tapscott and the Net Generation

Postman places television at the center of our children's life, and blames TV for many of the illnesses of today's youngsters. Unlike Postman, Don Tapscott thinks of the new child as the computer-and-Internet child. Tapscott points out that whereas the TV child

¹⁴Don Tapscott , Growing Up Digital: The Rise of the Net Generation, NY: McGraw-Hill, 1998

is passive, computer-and-Internet children are creative and active in meaningful ways.

In his book *Growing up Digital* Tapscott describes the highly connected N-Geners: These youngsters love to learn. They are curious, inquisitive, studious and responsible. Tapscott's children tend to learn in unorthodox ways. These high-tech children don't necessarily study the curricula written by adults. They take responsibility over themselves and their learning, are full of initiative, and are willing to give of their knowledge to others. According to Tapscott these digital children are caring, outspoken and aspire to improve reality.

The N- Geners learn, play and work on the internet, which has become the new country of immigration. From different parts of the globe, people are coming to the new land of unlimited possibilities in which sound, music; picture, animation and text are intertwined. In lands of immigration, the young ones are the first to integrate in the new society and to speak its language. Very often they teach their parents and even grandparents the language and customs of the new land.¹⁵

This is what is happening nowadays, as the highly-connected children build sites and teach older generations the language of the high-tech.

Tapscott characterizes the N-Geners as tolerant, inquisitive and eager to learn. A company named Advanced Network & Services harnessed this inquisitive element, to the building of subject-matter-oriented Internet sites. The company initiated a competition, geared to schoolchildren, on Internet site-building. Students have constructed more than 5,000 such sites for students, teachers and Netizens¹⁶-citizens of the net.

¹⁵Roni Aviram, in Ha-Hinuch Bemivhan Hazman, Tel-Aviv: 1997 (in Hebrew)]

¹⁶ <http://www.thinkquest.org/library/index.html>

The following site *-Butterflies - On the Wings of Freedom*,¹⁷ could serve as an example for the scholarly and humane work done by the participants in Thinkquest.

The site was built by three students: from California, from Germany and from Hongkong.

In this site ,the three Thinkquest participants teach about butterflies, but they also call on youngsters to reach out to other youngsters; to write poetry, to learn science and to learn from butterflies using bionics ie;innovations based upon nature

We are told that “Researchers examine the surface of butterflies' wings as possible model for future computer chips.... Copying the scales’ structure, researchers might be able to solve the problem of heat produced by the components of a computer chip. “

The N-Geners are a caring and sharing generation. They often create new Internet sites for the common good. Jason Fernandes, then 15, from Mumbai in India ,built such a site.¹⁸ Jason's site gives support to children with learning disabilities and their parents and teachers. The site (in ten languages!) contains thorough and valuable information on various types of learning disabilities.

When I uploaded my article on Children of the Information Age to the Internet, Jason got in touch with me via e mail. This alone might indicate the busy life and the involvement of the youngsters on the net. I asked Jason what prompted him to build his site. He said that he learnt from the founder of Apple about the power of the individual and that the site he, Jason, built is a manifestation of his own individual power.

¹⁷ <http://library.thinkquest.org/C002251/index.shtml>

¹⁸ <http://www.perceptivei.com/jason/jason2/LDkids/index2.htm>

Three youngsters with physical disabilities set up a site for other young people, suffering from physical problems.¹⁹This is how they explain why they took up this endeavor upon themselves:

“We set this web site up for three reasons:

- we feel the information available for young people with disabilities at the moment is too often written from an adult's perspective
- information tends to be based around one region rather than covering the country
- the information available assumes that every young person with a disability has a similar background “



Another characteristic of the young N-Geners is their emotional openness. There is nothing which is secret anymore, everything is read, everything discussed, everything said. Postman would probably see this element as an indicator of the disappearance of childhood as secrets are divulged and children share and gather unscreened information on the internet quite often without the mediating voice of the adult to guide them. In the Herzlia High school in Tel Aviv, Israel, as in other high schools in various countries, a group of trained youngsters 15-18 listen and give advice to other

¹⁹ <http://www.wheelg2life.info/who.htm>

youngsters in distress.²⁰ The problems they counsel others on range from relationship to drugs, alcohol, family problems, sexual identity and more.

The N- Genres are also well informed and involved in political issues.

A few years ago, John Katz, an American journalist, wrote an article named: “The Birth of the Digital Nation”²¹

Research was conducted in light of Katz’s article and its findings showed that the more digital a person is, the more informed of political issues he/she is, more critical of what he/she reads and hears on the media and more tolerant of others.

Tapscott claims that the N-Geners are independent thinkers who are critical of manipulations. They strongly believe that much of what they hear on radio or watch on television is manipulated by the big companies, whereas much of what is written and displayed on the Net is created by ordinary people who would like to share their world and knowledge with others. The N-Geners use the Net to express their opinions, independence and their protests against big companies and the controlling establishment.

The new technologies also assist us in becoming technically independent. Many of the professions held in the past solely in the hands of adults, such as printing, publishing, graphic design and others, are now at the tip of the fingers of youngsters and anyone else possessing computer skills and the ability to build Websites.

The new land, the Internet, is a mega-publishing house. Unlike traditional publishing houses where a chosen group of people decides whether a poem, a story, an essay or an article are fit to print, or a work of art fit to display, on the Net such decisions are

²⁰ http://www.gymnasia.co.il/info_services.asp

²¹ <http://www.wired.com/wired/5/04/netizen.html>

usually not made. Everyone, regardless of age, gender or education can publish their work. The children of the Net eagerly upload their ideas and works to the Internet.

These independent, active, innovative youngsters are about to change, according to Tapscott, our ways of learning and working and our social structure.

Computer and Internet activities outside the Net

The children of the computer and the Internet are active offline as well. They are willing to give from their vast knowledge in computers to others in face-to-face meetings.

For the first time in history, children have mastered knowledge much needed by adults. Therefore it is only natural to train these "new masters" in imparting with their knowledge and in teaching others. The new era is also an era of role reversal. In 1999 the Bar Lev Junior High in Kfar Sava, Israel, initiated a computer trustees education program. One evening a week, students tutor their teachers at computer and Internet skills. These are simultaneously learners and teachers. In addition, they also serve as information officers during classes, assisting teachers in searching for sites most appropriate to the subject matter being taught, and solving computer and Internet problems. These youngsters also serve as a telephone help desk in the afternoon and give computer support to the public via the telephone. In some schools, the computer-and-Internet children tutor other children, both intra-school and inter-school, in the computer and Internet skills.²²

Computer usage and mastery is mainly in the hands of the young generation, whose status in society has undergone much change with the introduction of the new technologies. The technological revolution, so it seems, has passed over the older members in our society.

²² Edna Apeh, Learning and Growing by Giving : Children as Agents of the ICT, http://www.developingteachers.com/articles_tchtraining/childproj1_edna.htm

In this situation, it is appropriate to have a meeting between the two polar groups, the young speakers of high-tech and the much older ones for whom the world of computer and the Internet is an unknown land . In this meeting, between the young and the old, the young ones teach the language of the new country, the land of technology, to the old ones.

For the last six years I have been implementing a program I initiated and started: The Intergenerational Program: Preserving Heritage in a Technological Environment²³. In this program young students, grades 4-11, tutor senior citizens at computer and Internet skills and learn from their older students, a chapter in the latter's personal history.

Together they write a digital version of the story, scan pictures, albums, and documents, and search for information on the Net as well as in other sources.

There is a saying that when an old person dies an entire library is set on fire. In the intergenerational program we preserve whole libraries, treasured in the minds of the elderly, by the means of the new technologies.

Summary and Discussion

I have just presented facts on digital media consumption and internet usage by our youngsters. I also discussed two very opposing views of the new technologies and their impact on our children and youth. I pointed out to the very many beneficial activities of these youth on the internet and off- line.

In light of the above, it would be only logical to ask what are the implications of these for education?

²³Edna Aphek, Preserving Culture in a Technological Environment, <http://www.techknowlogia.org/March> 2003

Many educators are suspicious of the new technologies and especially of the internet, feeling that learning via the internet might not be **real**, thorough learning. They fear that the dangers that the Internet carries supersede its advantages. Many believe that using the new technologies might be of value only if it improves the teaching of math, English and other subjects which are part of the **existing** curriculum.

On the other hand, Don Tapscott, John Katz ,Carol Tell and others remind us that “Instead of providing an isolating and mind-numbing experience, technology is a creative and exciting tool that gives teens freedom—to express themselves, to get information, and to learn”²⁴

Observing the computer-and-Internet children, one can't help but realize that the old hierarchical structures of teachers-and-children and parents-and-children have disintegrated. In the new reality dictated in part by the new technologies we can't expect the ‘highly-wired’ children to adhere anymore to the old rules of time and place. We, educators, can't expect them to be satisfied with predetermined content material and subject matter. In this reality many of the concepts we teachers and educators grew up on are undergoing a major shift.

The meanings of "difficult," "easy," "first," "important," "unimportant," and "graded learning," are changing. The teacher is accustomed to a certain order, to learning and teaching in installments. The teacher's concepts are still based on adults' knowledge and ideas as to what is easy and what is difficult to learn. Curricula and books are still written according to these notions. However, our N-Geners live, work and perform in a very different world which involves much doing.²⁵ Their world is complex, ungraded, multi-age, interactive and dynamic. In this environment the youngsters decide for themselves what is easy and what is appropriate. The N-Geners learn and research

²⁴Carol Tell, Generation What? Connecting with Today's Youth
http://www.ascd.org/publications/ed_lead/199912/tell.html

²⁵ Nicholas Negroponte, Being Digital,NY:Alfred A.Knopf.Inc 1995
Nicholas Negroponte Nicholas Negroponte points out that learning via the computer and the Internet is a new type of learning because it involves doing. Negroponte talks about new forms of learning: playing with information, learning through research because of a learner's desire to reveal new things in ways most appropriate to the individual learner.

thoroughly that which they find interesting. They are the decision-makers as to pace, rate, content and the time element involved in the learning process.

The digital media and especially the computer and the Internet have revolutionized the balance between the power of the adults and the status of children. The loss of authority on the part of the adults on the one hand and the new power held by children on the other, is ever changing the adult-child relationship in schools and at homes. This reversal of roles and "Power Shift" presents us with a probortunity²⁶ i.e.; a problem which is really an opportunity:



an opportunity to re-define the purpose of education



to rethink our pedagogical beliefs and concepts; to reassess the theories we base our work on and whether they are appropriate to the Information Age.



to let our highly digital learners guide us as to how to take advantage of the unique features of the computer to further develop and create new learning modes and environments.²⁷



to re-examine our criteria as to who "a good learner" is



to create new criteria for quality and excellence of work in a digital, highly-connected environment






to develop new ways to use the new technologies in order to foster and advance our thinking processes.

This, I think, is only part of our huge new task as educators. The other part, I believe, has to do with educating our youngsters in the strategies of digital literacy they are less


²⁶ <http://www.infinn.com/creativity/iitfullscreens.html>

²⁷ *The kids really do know how to use the Internet and they want it to be exploited in the ways they know it can be exploited. Outside the classroom and outside of any formal instruction, the Internet is a key part of their educational instruction.* Pew Internet and American Life Project August 2002

knowledgeable of. Therefore, we have the opportunity and the responsibility to balance:

-  the photo-visual literacy with the alphabetic literacy
-  the almost infinite accessibility to information with tools for screening and evaluating information
-  to balance the zappiness nature of learning and researching of the young ones, with our methodical, thorough ways of learning

We also have the moral responsibility

-  to be less busy with covering specific subject matter material and to be more concerned about guiding our digital youngsters morally and emotionally on their voyage into the socio- emotional virtual and non- virtual space.