There is no place for computers in early childhood.

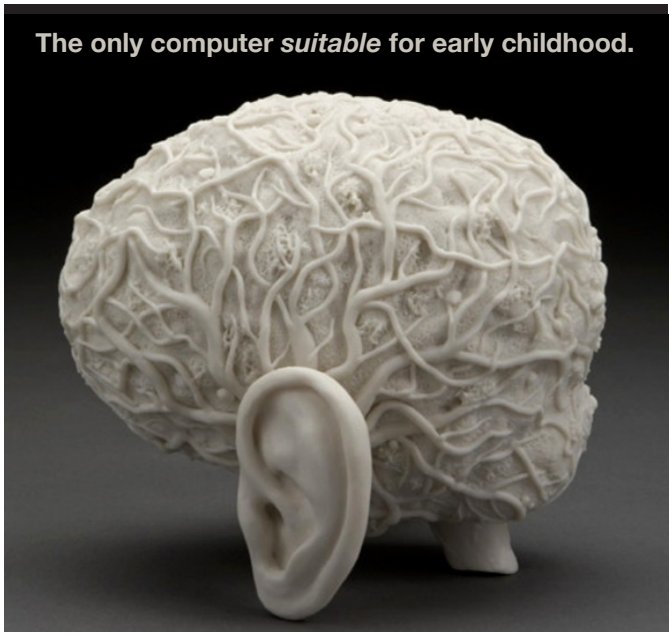
by Pennie Brownlee

The white elephant in the classroom

The post titled "There is no place for computers in early childhood"on my facebook page, 'Dance with me in the Heart', set off some of the most lively conversations since I launched the page in November 2012. The title of the post is an accurate statement, intended to attract readers' attention.

Nature needs nurture

Now that I have your attention, let me explain why there is no place for computers in the child's early years. What happens in the young child's developing mind-brain-body when she uses computers ***interferes with what is supposed to happen in a young child's mind, brain and body***. Just one consideration is movement. Movement in those early years *builds* the brain. It literally constructs the brain using body-mind-brain sequences trialled and fine-tuned over thousands and thousands of generations. Educational kinesiologist Carla Hannaford states, "Movement is the architect of the brain", and you know what happens when someone has a stroke in the brain. The body is affected because body and brain are indivisibly connected. Being in front of a screen precludes the movement that builds brains.



Sculpture by Kate McDowell

Novelty is a brain hit

The human (brain) loves novelty, and that is one of the drivers behind the curiosity of the young child. It is that curiosity that generates the child's exploration, rolling, touching, smelling, tasting, balancing, moving, jumping, comparing, weighing..., all of which build not only the brain (as important as that is), but contribute to building a literal body of knowledge unique to that child. Every body of knowledge is unique to the individual because the connections-skills-competencies that are developed, are dependent on the experiences the individual has. It is the human brain's love of novelty that assures infants and young children will physically follow their curiosity and explore everything in their environment.

Novelty in information technology

Who could fail to be impressed with the novelty within the range of information-technology hardware available? Who could fail to be impressed by the functions and capabilities of the different devices, and similarly impressed by the vast range of programs-apps available for those computerised devices? It truly is mind boggling. No doubt about it, information-technology hardware and software designer-engineers are good. They know how to serve up the novelty required to keep aficionados wanting to upgrade, which not coincidently, keeps the shares of their respective corporations afloat.

Novelty: the two-edged sword

Normal human fascination with the novel capabilities of technology drives much of the push to have computers as a major factor in every child's 'education', from tertiary where it is a most suitable tool, to early childhood where it couldn't be more unsuitable. Like it or not, there will also be a commercial element behind this push to have computers introduced in the early years. Research shows children's buying behaviours are largely set by age 6-7, so product allegiance at an early age is not something manufacturers will have overlooked. Further, if teachers can be persuaded that information-technology has benefits for early

childhood, those same teachers become the agent of persuasion to others within their profession.

Child magic wins

And that is what has happened. Teachers who are fervent about the capabilities of the technology have omitted to look beyond the magic of the device toward the magic of the young child. In their delight in the technology, teachers have overlooked

- the specific developmental requirements of the young child,
- the nature of the biologically determined cognitive shifts at 1 year, 4 years, 6-7 years, 10-11 years and 15 years
- the limitations of the virtual 2D world in a child's 3D development
- the difference between knowledge and information
- the difference between learning and teaching.

Overlooked by the pro-technology lobby, these five points are none-the-less critical to the physical, intellectual, spiritual, psychological and neurological outcomes for each child.

Child-centred not skills-based

The arguments put forward by those who exhort the use of computers in early childhood do not line up with the requirements for young child's unfolding, and/or are based on 'logic' and research about the competency/skill-sets that can be gained by very young children using computers. There is no denying that young children can build up impressive computer skills. Indeed, young children have baled out many tech-illiterate parents and grandparents with their expertise. However, it is the role of education professionals to have the child's wellbeing to the fore and weigh up the benefits of the learned competencies-skill-sets-expertise against the developmental priorities of the human child - mind, brain *and* body. It is not that computers are 'bad' (hell no, I love my Mac); the issue is about age and developmental appropriateness.

Start with the hardware

The brain is the hardware, the original 'computer'. Computer 'nerds' don't try to run software while the hardware is still under construction, and the young child's brain (hardware) is under construction. At birth the brain is 25% of its adult size, by three years it will be between 85% - 90% of its adult size. Construction happens in the brain when the child interacts in the world in three dimensions - not in two dimensions. A two dimensional screen encounter is, by definition, impoverished in sensory input. There is not enough sensory information with which to construct a body of knowledge involving multiple senses and multiple intelligences. The child *must* interact with their mind, brain *and* body. That is how they are designed.
In computer terms, you wouldn't expect brilliant performance from a compromised operating system running on a miniscule amount of RAM.

Interactive learning, but not in the virtual world, in the real world of miracles and wonder.
Artist: Nancy Noel.

3 is the magic number

At three years of age the actual brain construction is almost done. That is one of the reasons the first three years of the child's life are so important, the bulk of the child's hardware is built, complete with individualised default settings. The child uses the next three to four years installing the programs that *three dimensional living and playing provide* ***free*** *with each child*, all of which will be the exact right platform to launch into the next phase/mode of information processing in the neocortex at age 6-7. These three dimensional play programs prepare the way for the neocortex to handle abstract symbolic learning. It is beyond me why education professionals would risk compromising and/or damaging this exquisite genetically fine-tuned design by introducing 2D technology when it is not age appropriate? What is the hurry?

The real world rules

There is general confusion among teachers about learning in the real three dimensional (3D) world, and in the virtual two dimensional (2D) world. When children play in the real world with all of their dimensions (physical, emotional, intellectual and spiritual - at least), they use all of their senses (19 recognised so far) to build a body of knowledge. This 'body of knowledge' that they 'build' is quite literal. The intelligence of the body learns how to do whatever it perseveres with: e.g. to balance, crawl, sit, walk, or to deliver an ace of a tennis serve, or to become the barista who can use the coffee machine and make an awesome flat white - while the other barista who uses the same coffee machine makes rejects every time. One barista can learn while the other barista is slow on the uptake. Why? Like all learning in the real world, barista learning is learning in *all* dimensions. 3D learning includes the body intelligences, which take into account details like the grind of the bean, the humidity in the air, the temperature of the milk, the duration of each phase... and on and on. In the real world the choices are many - maybe even infinite. Playing and operating in the real world is the way people learn *how* to learn.

A child is a spirit, in a body, who feels, and thinks - in that order

So important is this practical body of intelligence that according to play researcher Stuart Brown, JPL (Jet Propulsion Laboratory) NASA and Boeing will not hire graduates for their research and development teams, no matter how great their degrees, nor how prestigious the university that awarded the degrees, ***unless the applicants have done things with their hands, made things and fixed things,*** like making rafts, building flying foxes, pulling apart toasters and fixing cars. People who have not worked with their hands cannot problem-solve in real life, and this because the hand and brain are linked in ways neuroscientists believe to be seminal to the actual structure of the neocortex - the great thinking human brain - *and* in its development. So get out the clay, the sellotape, the flax and the cardboard... our children should be making things in three dimensions, in the real world, ideally up until they are eleven years old when yet another cognitive shift occurs.

3 beats 2, exponentially

2D learning is just that - working in two dimensions (width, length - but no depth - literally and metaphorically) with predominantly 2 senses (hearing and sight), with binary choices. Yes, computers are 'clever', yes, even very impressive - *and* they are not the real world, they can only offer a virtual world. Even a '3D screen display' is a 2D optical illusion. *Virtual* is an adjective meaning, "not physically existing as such, but made by software to appear so". In a virtual world you cannot be there; you can only learn ***about*** it. It is little wonder most educators are confused and think computers are great. Schools rarely do experiential learning which would enable students to build for themselves a body of knowledge so critical for learning and problem solving. Rarely do teachers facilitate a real *experience* so their students can make knowledge from 'the doing' for themselves. Most commonly, we teachers task our students to 'learn' ***about*** things - i.e. google it/find it in a text/watch a video. In other words, we task them to seek *information*, to see what others have done-thought-felt. That's the difference between having a delicious Middle Eastern meal - and reading the recipes. No comparison.

Play grows heros and adventurers.
Screens breed voyeurs of life
Artist: Ron Francis.

The screen-spread virus in the human brain's abstract-symbolic 'processor'

All abstract symbolic metaphoric higher learning depends on the ability to think in images, and not only

two dimensional images, but to think with the whole body of knowledge recalling every dimension of the image. For example, if I say 'aardvark' *(the stimulus)* your *response* will be as good as your experience of aardvarks. For some there will be no response at all, but for most of us we'll recall a two dimensional image of an aardvark we saw in a text or on a screen. Among us, someone might have (improbably) kept an aardvark as a pet, and that person will have a body of knowledge about aardvarks. That person will know their habits, actions, communication vocalisations, reactions, smell, movements, bowel movements, texture of skin, of fur-hair... and on and on. It is all of THAT knowledge which is the aardvark keeper's ***rich*** and instant response in the mind-brain-body to the *stimulus* of the word 'aardvark'. Now extrapolate out of that example and you will understand why computers short change young children who are just getting to explore, know and understand being here on this three dimensional planet. Further along in the child's education teachers will speak about poultry, thrust, centrifugal force, thermodynamics, metamorphosis etc. The child, who may have picked up all sorts of *information* about those topics in front of a screen, simply cannot have the *knowledge* from which to work in the abstract in a meaningful way. Keeping hens, riding the zip wire, self induced giddiness, spinning with a full bucket of water, lighting fires, growing swan plants - real life living in three dimensions - that is what sets children up for the abstract symbolic processing we call reading, writing, and numeracy. After all, reading and writing are just recording in a way to stimulate the brain to recall-synthesise-amalgamate-create data from the body of knowledge existent.

When the virus is deadly

You and I take it for granted that when someone offers a *stimulus* - e.g. the word 'hedgehog' - the brain will automatically offer a *response* and provide an image. If the child is lucky and did the real-life-3D-get-to-know-hedgehog-thing, the image-response will be multidimensional. What most early childhood teachers overlook is that this *stimulus-image response* is a learned skill, which every child can learn, *as long as the conditions are right*. So what are the right conditions that enable the brain to set itself up for imagining, creating and processing abstract symbolic information? I have written an article that goes into this in more detail, but here is a short version: three dimensional experience builds up a body of knowledge which includes the actual images of the experience being available 'in' the brain. Children are curious and get into everything, so they build up heaps of images available in the brain. Are you still with me? Then when someone speaks *(stimulus)* about the little red hen *(three stimuli there: little, red, and hen)* and the grains of wheat (*stimulus)*, the child calls up her images *(response)* of little, red, hens and wheat from her experience, and sets about moving-combining-synthesising her own images into a creation so she can make sense of the story/stimulus. Try this: maz sarkans vistu. No response? It isn't the right stimulus for English speakers, maz sarkans vistu is Latvian for little red hen. This *stimulus-response* function is pure brain alchemy, and all higher learning is dependent on this function.

There is a window for the brain-alchemy function

The child isn't born able to do this, the brain is not complete enough at birth. The child has to prepare and install this function through their exploration and play. In other words, the brain develops this function during a biologically determined window of time. Miss the window and the child (and society) is in serious trouble. This window happens to be in the early childhood years. Until recently this particular *stimulus-response* brain function has always been developed and installed like clockwork, but not any longer. There are many children who have so much screen time that the process is stymied. These children don't develop the stimulus-response function, and to understand why that is, we need to look at how screens differ from real life. When I say to you, "the little red hen", your brain responds to the stimulus with images. When the screen says to you, "the little red hen", the screen *(stimulus)* supplies its own *response*; the image of the little red hen is there before you on the screen. There is nothing for your brain to do: no retrieving, no connecting, no synthesising, no creating... no growth and no development. Too much of this for a young child and the window is missed, and closes. Encephalograph readings of people watching screens read very close to brain dead, there is nothing for the brain to respond to. That's fine if you want to blob out in front of a screen, but it is not fine for the human child building the

functions of her ‘brain processor’, functions which will decide her ‘computing’ capabilities.

Justification is the art of telling ourselves stories so we’ll feel better doing dodgy things

One argument put forward by the pro-technology-in-early-childhood lobby is that we need to introduce computers at an early age because, like it or not, we are living in the age of technology. True. Many infants and children know what it is to be sidelined by their parents in favour of phones, screens, and/or computer games, and children learn to use whatever technology they are surrounded by. Almost every child comes from a home where there are smart phones, MP3 players and computers, and many spend the bulk of their waking time being entertained in two-dimensions. What these children lack is enough time living and playing in the 3D world. Too little screen time is not the burden of today’s child; quite the reverse.

Play is the highest form of research.
Albert Einstein • Artist: Takahiro Hara

The ‘we use it as a tool’ story

This week I have spoken with teachers who are enthusiastic about computers as tools - me too, this program I am working in now beats handwriting for speed any day. But for teachers to say computers encourage research skills, curiosity and creativity in early childhood is justification at best, and disingenuous at worst. There isn’t an child who has to be encouraged to research, to be curious or to be creative - they are all born that way. Young children just have to touch, they use all of their senses to get to know what they examine, they are fascinated. What we have to do is make sure they stay that way by ensuring their environment is as ***rich and harmonious*** as possible. Such an environment is always going to be in the three dimensional world. Sorry, a 2D tablet simply won’t cut it.

Computer engineers, programers, designers wanted: Apply if you are 7 or older

Children who meet computers/screens after they have turned seven will have all the time they would need to become first class computer nerds because of the *cognitive shift that occurs at 6-7 years*. That shift enables the brain to engage in the mode of functioning where the two dimensional abstract virtual world of computers becomes an ***appropriate field of play and learning***. The few computer nerds I know started on a Commodore 64 in their teens. It was early enough. As for the argument that ‘children love them’, they love chocolate biscuits and cartoons too. That doesn’t mean a diet of chocolate or screens is good for them - or us. Both are addictive and addictions take us away from engaging in the rich living which Life offers.

Age and stage appropriate

Legality aside, we wouldn’t let a child of ten drive a car on the open road even if they could (and some can) because it is not age appropriate. We don’t start teaching children to drive before they are 15, even though they could learn, because there is no need to teach them until it is age appropriate. Instead, we use that freed-up time to offer/facilitate learning opportunities that are age appropriate. Let’s use the same restraint and wisdom with information technology.

Don’t be sucked in

Early childhood is not school - don’t be fooled-wooed into thinking your children need technology at your place. They don’t. Use this precious window in each child’s life to support their 3D Play in Real 3D Life.

References: (All links live at time of writing - August 2014).

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Knowledge is experience ~ anything else is information.
Albert Einstein • Artist: Steve Hanks