

## DIGITAL KIDS OF THE HEISEI ERA: EXPERIMENT AT TOYONAKA BUNKA KINDERGARTEN

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**Abstract:** I wonder what most people think when they hear of small children playing on computers in kindergarten.

One can almost hear the responses: "Why should kindergarten children have to use computers?" "Small children are using computers? It's much too early!" "At kindergarten children should be singing, playing games, and making mud pies!" A computer is the epitome of the artificial. If we really make a mess of things, humans will become slaves to computers. What can they be thinking, putting such things in kindergartens as a child's toy?

Many people who think in this way have never touched a computer, and it often seems the case that these "emotional opponents" are opposed to them only because of their own preconceptions. There is still a preconception that "a computer = a square machine like a TV with lots of difficult-looking keys". Computers are now in virtually all of the electronic appliances we use every day, refrigerators, washing machines, vacuums and televisions, and we think nothing of it. We live each day using computers, but only the "square" computer invites such contempt. Why is this the case?

On the other side, there are the "proactive endorsers", who think "Computers have spread thus far in society and schools, so we must let children become familiar with them from a very young age!" These people often seem to want to teach everyone everything. There is much to know about the image and use of computers. They seem to think that if adults don't teach them, children won't understand anything. On this point, they are at the same level as the "emotional opponents", in that they conceive of computers as being something out of the ordinary.

No one knows how the future will have unfolded for the digital kids of this era kids who freely operate computers when they come of age. Should we adults, then, with our narrow sense of the image and use of computers, and our meager experience, really be allowed to instill in them our one-sided views?

Among this same "endorser" group, there is the softened opinion of the "skeptical endorsers" which goes something like this: "Computers have only come into our lives in the last ten years or so at most, so there is no way we can tell yet if they are good or not". Thus, their opinion is that we should at least give them a try, Or else: "If they are bad, stop; if they are useful, keep using them". They would be happy if computers in kindergartens like the Freibell toys or the monolith that leads humanity in the movie 2001: A Space Odyssey. Set off by computers, children have their own adventures and expressions of pleasure, and share this information among themselves. Adults would do better simply sitting back and watching over them with the smile of affectionate parents.

At two years old, a child can play on a Macintosh, in kindergarten draw computer graphics, and then, in grade school, exchange electronic mail with friends from

around the world. For children born in the Heisei era (born in or after 1989), having computers in their environment is perfectly natural. It is only to be expected, then, that there will be a difference in the way people interact with people as well as this difference between those who first touched computers in adulthood and those who used them almost since the time they were born.

The practical research we have done so far was conducted from the position of a "skeptical endorser". For this presentation, I would like to report on this research focusing on the items below.

- Digital turtle (turtle graphics) and children.
- Digital drawing and children.
- Interactive picture books and children.
- Kindergartens and the Internet.
- Mothers' networks.

### 1. What is the Computer

#### A. Image

- a) Mechanical, Cold, Individualistic
- b) In the realm of education
- c) Preconception, Preconceived stereotypes

#### B. Background

- a) Nature and Artificial
- b) Papert
  - (1) Mindstorms
  - (2) LOGO (Computer term)
- c) Freibel toys
- d) Skeptical endorser

### 2. Computer use in the realm of pre-school education

#### A. Computer as a toy

- a) Search and Expression
  - (1) Digital turtle (Turtle graphics) and children
  - (2) Digital drawing and children
  - (3) Interactive picture books and children

#### B. Computer as a tool

- a) Information sharing
  - (1) Kindergartens and the internet
  - (2) Mothers' networks

### 3. Themes for early childhood

#### A. Perceptions

#### B. Basic data

#### C. Environment

- a) Interface
- D. Individual notions of child rearing, education and values
  - a) However good the tool is...
  - b) Negative effect "real contact" with computers
    - (1) Affluent information = is it good?
  - c) Moral issues surrounding internet use
- 4. Prospect in the realm of children's education
  - A. Children's education is in idealistic environment?
  - B. "Skeptical endorser" of computers

## Digital Kids

Contrary to what you might think, the expression "Diji-kame" does not refer to the digital cameras that have become so popular recently. Rather, it means "cyber-turtle", from the English word "digital" and the Japanese word kame, which means turtle.

The turtle is controlled with the programming language Logo. Unlike difficult, arcane languages, languages like BASIC and C, Logo developed for use by children. One of Logo's functions is Turtle Graphics. Its name suggests, the program uses a turtle to draw pictures. In the original version the turtle was a robot controlled by the computer, but in the version used today it is a pointer that the user moves across a screen. A pen is attached to the turtle, so, as it moves around it draws a line, just as if it were a snail leaving a trail behind it. At first, the turtle can follow only a few simple commands. If, for example, the user tells the turtle FORWARD 20 (move forward 20 pixels) and RIGHT 90 (turn right 90 degrees), it draws a line as it completes these commands. Although it is unable to instantly execute a complex series of moves like, "Move slightly forward, turn right, go forward again, turn left at such-and-such a corner", by putting the commands it already knows into a loop and naming it, the user can teach it new ones.

Teaching the computer new commands is programming. For example, by repeating the commands LEFT and RIGHT several times and giving the procedure a name such as TRIANGLE or SQUARE, the computer can be made to learn new command for drawing these shapes. Then, by combining these new commands, the user can teach the computer yet another new command, like combining TRIANGLE and SQUARE to make HOUSE.

How can children use the Diji-kame to play and learn? What is it like for children to have the experience of teaching, instead of being taught? Here is one case. A child starts off pressing keys randomly, which makes the turtle move randomly, resulting in a scribble. However, if a triangle or a square appears

somewhere in that scribble, she starts wanting to complete the task of drawing a triangle or a square on her own. This task is not something that is imposed upon the child by another person, and thus she does not see it as an unpleasant chore. It is at this point that she begins to want to figure out how to move the turtle to draw what she wishes.

The process works this way: The child writes a program, implements it, makes mistakes, corrects these mistakes, rewrites the program, implements it again, finds new mistakes, corrects these. Finally he is successful, he has a sense of accomplishment, becomes motivated, and seeks the next challenge all by himself. The focus is not on the result, but on the process itself. It is one of building up and breaking down, breaking down and building up again. Children's experience of programming is similar to that of playing with building blocks.

The Diji-kame has another interesting feature: it offers children the chance to examine their own thought processes. There are many ways to approach the problem of drawing a square. What sort of thoughts a child has, what sort of mistakes she makes, how she changes her way of thinking—all this becomes instantly clear. It is as if she can see inside her own head.

Logo is like an updated version of building blocks. How about taking another look inside your own head? Having the workings of one's own mind exposed can prove to be more embarrassing than nakedness.

## **Digital Pictures**

When you hear that children are using a computer graphics program in kindergarten, do you think, "What? That early?" Many technophobic people suppose that "computer graphics" means that the computer itself does the drawing. But this is not the case. Thinking of a computer drawing its own pictures might make one imagine it wears a beret, smoking a pipe as it ruminates over where to make the next brushstroke... At the moment, though, the computer is nothing more than a tool, a device that allows human beings to create pictures. It is like brushes, paints, and canvas. The one who makes the picture is the human being who uses the tool.

How do computer graphics images differ from conventional pictures? The biggest difference is that a digital image is easily redrawn and easily edited. For example, one can change the color in one part of a computer graphics picture and then see how its overall balance is affected; or select an area, cut it, and paste it in somewhere else. How easy is it to do this in a picture done in paint or crayon? Furthermore, even an adult would be daunted by the task of making one hundred or even two hundred squares, each colored differently. For a child, it would be

impossible. But this kind of thing can be accomplished in seconds when one uses a computer graphics program.

There was an exhibition of art created by children using computer graphics. An artist who specializes in oil paints looked at the children's work and said, "Did children really do these? You could show them at Nitten (Japan National Art Exhibition) and no one would know they were not done by adults. How extraordinary these young people are".

Computer graphics allows people to express things that they have always felt, but have been unable to do so because they lacked the right skills. This is a tremendous thing. And this potential is not limited just to children, but adults, older people, and the disabled can use it to express themselves as well. This the real advantage of this new tool.

Of course, computer graphics has a down side as well. It raises many tough questions, one of which is that of originality. "Digital" may mean "ease of editing", but it also means "ease of copying". We sometimes see the following sort of thing happening with children drawing pictures: The child starts by opening a file containing his friend's picture; He makes some slight change to it, and then saves it as his own. Children make copies with no awareness of the fact that they are copying. Whose work is it really, in such cases? Originality is a major issue among adults, too. To what extent should copying another's work be permitted? What becomes of copyright? In a age where questions of human rights extend even to genes, the problem of originality will grow bigger as our society becomes more and more digital. No doubt computers will revolutionize our way of thinking about the question.

As one child said, while gazing at a screen, moving mouse around on his desktop to draw a picture, "This is a magical desk". For him, the computer did not exist. How about putting aside your old notions and assumptions, and try making a digital drawing of your own? You may discover a new aspect of yourself, and don a digital artist's beret.

### **Interactive Pop-up "Books"**

The phrase "outdoor activities by computer" no doubt makes many people wonder how things as diametrically opposed as analog and digital could be reconciled. But they can. One example is an interactive picture. When the user clicks on "hotspots" on the interactive picture, other elements such as pictures or information can be made to appear. Children can play and learn by searching through these pictures.

We have made interactive picture programs like this together with children. First, the children used a digital camera to take pictures of the landscape from several

vantage points along a familiar hiking trail, then transferred them into the computer. A digital camera is different from a conventional one in that it stores images in a digital format. For this reason, the image can be processed and edited easily by the computer. There is no need to load the camera with film or have the pictures developed.

We then linked together the images of the landscape, and created a program that enabled the user to have the experience of walking along the hiking trail. While this program was not quite 3D virtual reality, it allowed the user to point to the places on the screen that he or she wished to visit, move forward, backward, left and right-a kind of cybernetic picture-show. Then the children took pictures of animals and plants they had discovered during their hike, and transferred those into the computer as well. These new data were hidden on the screen in places analogous to the real places where the children had made their discoveries. When the user clicked on a hiding-place, the image would jump out, just as it would in a pop-up storybook. For example, if the user clicked on a clump of grass, the image of a grasshopper appeared, and when the user clicked on a tree-stump, mushrooms appeared.

It has become normal for children to play with interactive story "books" in nursery school. What sort of reaction do children who have had a real experience outdoors have to playing with interactive picture programs? Not only do most children enjoy searching through the images of the things they discovered themselves, but they are strongly interested in the pictures of their friends' discoveries. Some children have taken particular kinds of images and used them to make a game. One such example was a game that made use of pictures of animal droppings. The children called it "Poo Hunt".

Children who return to the hiking trail after having played with this interactive software often say things like, "There was a... here in our computer program!" "A... came out of there in the program, I'll bet there's something in there now!" The experience of using the interactive picture program stimulates the children's interest in animals and desire for discovery. A virtual experience inspires them to have the actual experience, and the actual experience makes them want to have a virtual experience. Virtual and actual experience form a cycle: the one leads children to seek out more of the other.

The number of digital images that children collect on hiking trips is increasing. Every time the children go on another journey of exploration the number grows, and we are steadily developing a fine collection. As this collection continues to get larger, in five or ten years it could well turn into a global database for education on nature and the environment. In the future it will be possible to add motion and sound to these still pictures and turn them into interactive multimedia.

Why not take your children hiking? Collecting insects with a digital camera is lots of fun.

Internet in the Kindergarten? Tools for Communication.

Until a few years ago, the internet was mainly text-oriented. But we have now entered the era of multimedia. Web pages complete with images and sound are coming out thick and fast. Even children who are too young to read can visit and enjoy these web pages. Just like the cartoon character Doraemon's "Door to Anywhere", the internet allows children to instantly visit museums and zoos all over the world from their own kindergartens or homes.

Being able to get information without knowing how to read is being able to communicate without words, using drawings or photographs, being able to send out messages that express one's own thoughts and ideas. Computer graphics and a digital camera make this easy. Up until now, communication in the nursery school classroom has mainly taken the form of newsletters children make for their teachers by hand. Very rarely, they may find their way into newspapers or magazines, or onto television. But the Internet allows children to share their thoughts with the world on an everyday basis. Their messages can be viewed again and again by other children and by grown-ups, by parents, grandparents, people in the neighborhood and around the world. Adults who do not know much about children may see these messages and revise their opinions, realizing how amazing and wonderful children are. People overseas who imagine that Japanese still wear kimono, carry swords, and shave their heads like samurai might also learn a thing or two.

We now help children design web-pages for their kindergartens. We held a live sports meet on the internet in Autumn 1997. In the future, we will enable parents to watch their children playing in kindergarten from the workplace computer, and Net nursery school visits are also being planned. Much still needs to be done, but we plan to keep making innovations. Please keep coming back to visit us at [www.e-kids.org](http://www.e-kids.org).

Today's children are without question Heisei Kids. (Note: Heisei refers to the reign of the present emperor, which began in 1989. The previous era was called Showa, 1927-1988). Not long ago, people used to talk about the changes that would take place "ten years from now" or "fifty years from now". But in the Heisei Era, we cannot foresee the changes that will take place in the next decade. Our way of thinking could well shift 180 degrees in a matter of a few years. These days, Showa Grown-ups have a difficult task ahead of them, thinking of the best way to educate Heisei Kids in a way of thinking that has existed for only a few short years.