

(The following text is adapted from *Four fictional views of the future of learning* by Alfred Bork.)

Neal Stephenson — the diamond age

This is the most recent of the four sources considered in this paper, published in 1995. Learning, central to the novel, is described in detail (150 years from now?).

A wealthy and powerful man is worried about the education of his granddaughter, Elizabeth. He talks to a wonderful engineer about the problem. “. . . to raise a generation of children who can reach their full potential, we must find a way to make their lives interesting . . . Do you think that our schools accomplish this? Or are they like the schools that Wordsworth complained of?”

The answer is that the schools are not adequate. With support of the powerful person, the engineer develops *The Young Ladies Illustrated Primer*. Two copies of this book are produced initially, one illegally. One falls into the hands of a poor 4-year-old girl, Nell, living in very unhappy circumstances. Another is later produced for the engineer’s daughter, Fiona. Later, hundreds of thousands are produced, again all for girls. We see in some detail how Nell learns from this book, throughout the novel; we do not encounter the other two young ladies until later, and we do not view them using the book in any detail.

The first time Nell opens the book, it begins with a story about Elizabeth, the granddaughter of the wealthy person. But the book quickly learns that this is not Elizabeth, but Nell. The engineer says, “It is unlikely to do anything interesting just now. It won’t really activate itself until it bonds . . . it’s looking for a small female. As soon as a little girl picks it up and opens the front cover for the first time, it will imprint that child’s face and voice into its memory.” The device has a camera.

The book bonds with Nell. The first learning session is portrayed in a marvelous passage.

“The book spoke in a lovely contralto . . . Once upon a time there was a little princess named Nell, who was imprisoned in a tall dark castle on an island in the middle of a great sea, with a little boy named Harv, who was her friend and protector. She also had four special friends named Dinosaur, Duck, Peter Rabbit, and Purple.

Princess Nell and Harv could not leave the castle. But from time-to-time, a raven would come to visit them.

'What's a raven?,' Nell says.

The illustration was a colorful painting of the island seen from up in the sky. The island rotated downward and out of the picture, becoming a view toward the ocean horizon. In the middle was a black dot, and it turned out to be a bird. Big letters appeared beneath. 'R AV E N,' the book said. 'Raven.' Now say it with me.

'Raven.'

Very good! Nell, you are a clever girl, and you have much talent with words. Can you spell raven?

Nell hesitated [the book sees that she cannot read] . . . after a few seconds, the first of the letters began to blink . . .

The letter grew larger until it pushed all the other letters and pictures off the edges of paper. The loop on the top shrank and became a head, while the lines sticking out the bottom began to scissor. 'R is for Run,' the book said. The picture kept changing until it was a picture of Nell. Then something fuzzy and red appeared beneath her feet. 'Nell Runs on the Red Rug,' the book said, and as it spoke, new words appeared."

This passage continues in this interactive way. The reader can find the original beginning on page 94 in the paperback edition.

Several things are important. The book already knows quite a bit about Nell! Her brother Harv and her toys are mentioned immediately, within a fanciful story, told to her with pictures in the book. Her mother and her mother's horrible boyfriends also are incorporated in the legend.

This information is not programmed in the device; it was not known that Nell would be the user. Nell has not used the book before, but it has been listening to her and to what has been happening around her! It has a picture of her. It has begun storing a record of her situation and interests, soon to be augmented with information about Nell as a learner when she uses the book.

The basic story of Princess Nell (or another person) is programmed. At Nell's next session, there is a summary of the entire fantasy, including a happy ending. So Nell knows from the beginning how the story will end.

As with Education and Ecstasy and the Troika Incident, learning to read is the basis of

further learning, and again it occurs at a very young age. The book remembers what progress Nell makes, and what her learning problems are. When the story speaks of a raven, Nell, living in a slum, ASKS what a raven is. The book hears her. Not only does the book tell her, with a picture, but it also starts to spell raven. It quickly determines that she cannot read, and begins to help with the alphabet, highly interactively.

The book has other skills that we see later. It can record and illustrate things that Nell tells it (writing). It teaches Nell the art of self-defense, and helps Havn and Nell escape when their situation becomes life-threatening. It can defend itself against those who try to steal it. Nell learns to cook healthy foods. The book contains an encyclopedia. It displays books, like the machine in The Troika Incident.

It has game-like situations that encourage problem-solving. Nell seems to participate in these situations, as Princess Nell, as with Clarke's sagas. "As she climbed the switchbacks, she forded those delightful current of air over and over . . . the little shrubs that clutched rock and cowered in crack became bigger and more numerous. . . 'Nell looked for a safe way down,' Nell essayed . . . 'No, wait!' she said." These situations become more important as Nell approaches the end of her education. They even include learning to program 'Turing machines.'

The book (a computer without keyboard) gets outside help for voice output. It seeks humans who can work with Nell. They are paid for this. We see one person, a ractor Miranda, who is willing to do this; perhaps there are others. We assume it was her lovely contralto voice Nell heard when he first opened the book, and continues to hear. A ractor is a new technology-based actor. Nell has no contact with Miranda, as it all happens through the computer. Miranda works from a script. They do meet, at the very end of The Diamond Age.

The engineer regards this need for a human voice for speech output as a design problem. He is unsatisfied with the quality of computer-generated voice. When he must generate hundreds of thousands of copies of the book, and so the ractors are no longer practical, he uses computer-generated voice. These users of the book become Nell's 'mouse army.'

Nell does eventually go to a fancy school, Miss Matheson's Academy, one that would not normally be available to someone of her background. She continues to work with the computer. The other two ladies with the book, Elizabeth and Fiona, are also at this school, and they are the three brightest students.

But Nell is the best, perhaps because of the real-life problems she encountered because

of her poor environment. The wealthy person attributes this difference to the factors. In Elizabeth's case, many factors were involved. For Fiona, it was mostly her father, the engineer. Nell develops a mother-daughter relation with Miranda, not by personal contact but through the book.

It is curious that no boys learn with the book. Different programming would be needed, since the fundamental story is oriented toward girls. The possibility that this could be the educational system for all is not considered, except possibly by implication in the comment about schools by the wealthy person. But this is a novel, not a treatise on learning, so it is unfair to this novel to complain about such things. If the wealthy man had a grandson instead of a granddaughter, the novel would have been plotted differently.

Four fictional views of the future of learning

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Received 16 April 2001; accepted 25 May 2001

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