

Chapter 37

Squeak Etoys

Interactive and Collaborative Learning Environments

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ABSTRACT

Squeak Etoys is a free software program and media-rich authoring system with a user-friendly visual interface. The software is designed to help six to twelve year-old children learn through interaction and collaboration; it comes preinstalled on XO laptop computers distributed by the One Laptop Per Child Foundation. The goal of the One Laptop Per Child initiative is to create novel educational opportunities for the world's children by providing each child with a book-size, light and portable computer for personal use at school and at home. This chapter elaborates on the educational dimensions of the XO laptop and the Etoys environment developed to empower teachers and students with the capacity for creative learning, exploration, interaction, and collaboration. The authors focus on how the hardware and software capabilities of XO laptops can be utilized to allow children to interact, work together on projects, and engage in computer simulations and games while learning mathematics, physics, chemistry, and geometry.

INTRODUCTION

Squeak Etoys is a free and open source media-rich authoring system with a user-friendly visual interface which comes preinstalled on One Laptop Per Child XO computers. The One Laptop Per Child

(OLPC) project¹ is a revolutionary blueprint for children's personal computer use created to bring an efficient and functional educational technological tool to nearly every child between six and twelve years old, throughout the world. The OLPC initiative is especially important to students in developing countries due to the fact that "most of the nearly two billion children in the developing world are

DOI: 10.4018/978-1-60566-368-5.ch037

inadequately educated or receive no education at all. One in three does not complete the fifth grade.”²

Founded in 2005, One Laptop Per Child Foundation³ is a non-profit organization which brings forward innovative ideas on the use of personal computers by children and promotes widespread realization and assimilation of computer technologies. The goal of the OLPC Foundation is to create novel educational opportunities for the world’s children by providing each child in developing countries with a book-size, light and portable computer for personal use at school and at home. As the outcome of the OLPC program, the XO laptop is a low-cost, low power, Internet ready, multifunctional laptop computer. It is equipped with built-in speakers and microphone, video and still camera, and comes with preinstalled open source Linux operating system and free software for various activities: such as, reading, writing, drawing, painting, recording, music editing, web browsing, and basic computer programming. In case of limited availability of electrical energy, an XO laptop can be charged with alternate power sources. The XO laptop is safe to carry in a backpack and has sturdy hardware design with a waterproof keyboard. XO can withstand heat, humidity, and accidents that are ordinary in everyday lives of children; moreover, the computer has five-year life expectancy. In addition to a built-in standard WiFi capability, every XO computer can function as a wireless router creating a decentralized, self-configuring mesh network of interconnected computers within range. It allows children to collaborate and share activities in the classroom, and interact and communicate with classmates from home. As OLPC is an ongoing project, the XO-2, an improved model with less power consumption, is planned for production in 2010.⁴

The OLPC project was initiated by Nicholas Negroponte, professor of the Massachusetts Institute of Technology; it quickly expanded to include a wide range of dedicated people from academia,

industry, and the open source community. Due to their efforts according to *The New York Times*, nearly 600,000 XO laptops have been ordered since 2007 to be distributed to children in more than 30 developing countries (Lohr, 2008).

The idea of an affordable notebook computer specifically designed for children’s use was long thought to be an unlikely scenario. Four decades ago at the early days of computer technology most computing machines were the size of a room and almost no one would dream that they would ever be suitable for children to use. However, the adaptation of the Logo programming language⁵ for children in Seymour Papert’s experimental work at MIT demonstrated the educational potential of the constructivist ideas and computers in children’s education (Brand, 1987; Negroponte, 1995).

A dialect of high-level programming language LISP, Logo was developed in 1967 by a group of computer scientists including Papert. With its facility for symbolic manipulation Logo was specifically designed for children’s educational use. Initially, it was applied for teaching mathematics in schools. In 1970 Papert initiated the MIT Logo Group to investigate the impact of computers on children’s learning by making programming a part of their education. Stressing the importance of children’s early introduction to the emerging world of computers and computing, Papert (1980) noted in his seminal book *Mindstorms: Children, Computers, and Powerful Ideas*,

The computer is the Proteus of machines. Its essence is its universality, its power to simulate. Because it can take on a thousand forms and can serve a thousand functions, it can appeal to a thousand tastes. This book is the result of my own attempts over the past decade to turn computers into instruments flexible enough so that many children can each create for themselves something like what the gears were for me. (p. viii)

The ideas of Papert were shared by Alan Kay, “the father of personal computers” (Negroponte,

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