

Disabilities and Scratch

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People with disabilities meet barriers of all types. By using computing technology students with disabilities are capable of handling a wider range of activities independently. Still, students with visual and motor disabilities face a variety of barriers to Scratch use that restrict them to enjoy the experiences provided by this program. Although, these barriers can be grouped into different categories, the most important one is that the Scratch interface is not designed according to the Universal Design principles: a) Equitable use, b) Flexibility in use, c) Simple and intuitive, c) Perceptible information, d) Tolerance for errors, e) Low physical effort, and f) Size and space for approach and use.

Hardware and software tools (known as Assistive Technology) have been developed to provide functional alternatives to standard computer operations. To assist students with visual and motor disabilities in using Scratch we have used specific products and approaches as a *bridge* between the students and Scratch. The approaches and the obtained results are described below.

Magnification of Visual Information.-

This is a useful software for making more accessible the information displayed on computer screens to students with low vision. Zoomtext¹ (Figure 1) can enlarge the size of a portion of the screen display.



Figure 1. "Zoomtext" screen magnifier supports Scratch

Mouse and Keyboard Alternatives

- The *HeadDev*² is a free software developed in Spain. The webcam on top of the monitor tracks the movement of the student's head. This system provides access to Scratch for students who cannot use their hands for operating the mouse, including students with cerebral palsy, muscular dystrophy, an spinal cord injuries, among others.

- *On-Screen Keyboards* provide access to Scratch for students who do not have the motor ability to use the keyboard. *Clic-N-Type*³, places an image

of the keyboard on the computer monitor. Scratch blocks are selected by clicking on them with a switch, a joystick, or a head pointer.

- Rocío, is a student with spastic tetraplegia. She is using the *Mousekey*⁴ and an independent numeric keyboard to interact with Scratch (Figure 2). Windows comes with this accessible feature that allows students to direct the mouse pointer and execute all mouse function with any program, including Scratch, using the numeric keyboard keypad.

Currently, our research group is in the process of (a) evaluating different approaches to introduce Scratch to students with disabilities, and (b) making a Scratch guide for special education teachers. We will continue trying different assistive technology products with Scratch. We are specially interested in *Jaws* (Screen Reader, useful to people who are blind, visually impaired, or learning disabled), and in *Dragon* (Speech Re-cognition, useful to people who are unable to use their hands, from the profoundly physically impaired to people with mild repetitive stress injuries).



Figure 2. Rocío, is using the MouseKey to interact with Scratch.

We thought that the Scratch@MIT conference would be a good forum to present and discuss our work and to make software developers aware of the difficulties that people with disabilities face using Scratch. Hopefully in a near future we will find ways to make Scratch more friendly and accessible for diversity.

¹ Ai Squared: www.aisquared.com

² Vodafone: <http://fundacion.vodafone.es>

³ Lake software <http://cnt.lakefolks.com/es-intro.htm>

⁴ Microsoft Accessibility: www.microsoft.com/enable