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# Use of a computer-assisted program to improve metacognition in persons with severe intellectual disabilities

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## Abstract

Metacognition and self-regulation are processes extremely relevant to education of persons with intellectual disabilities. They play a central role in specific limitations, such as outer-directedness and lack of strategy transfer, and are related to desirable educational objectives such as self-determination. Although computer-assisted training has shown to be successful in training specific abilities and general cognitive processes, interventions of this nature centering on metacognitive development are rare. A computer-assisted program aimed in this direction is presented. It was applied to 21 adolescents and young adults with a mean IQ of 36. Metacognitive scores improved for this group at posttest relative to pretest to a degree significantly different from gains found in an equivalent control group. Improvement was clear from the first sessions of the intervention and was maintained at a 6-month follow-up.

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## 1. Introduction

The use of computers for the education and instruction of persons with intellectual disabilities dates back to the appearance of electronic and video devices for general use.

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Already in the 1970s, the University of Florida developed the first laboratory for the design of computerized educational programs (Moreno & Mora, 2001). Programs were specifically conceived for persons with intellectual disabilities and cognitive limitations in that decade at various centers in the United States (Lynch, 2002). The 1980s were, however, the mark for the proliferation of the application of software to educational and clinical contexts, with the use of video games, general educational and specific rehabilitation software. Later, commercially available programs of educational content appeared with hardware development that allowed improved designs. Together with these, other software centered specifically on the training in particular skills or areas of interest for persons with intellectual disabilities has continued to be developed up to the present date. Purchasing skills are an example of this kind of abilities, considered relevant and trainable with computer-assisted instruction. Ayres and Langone (2002) developed a package of this sort to teach elementary school students with mental retardation these skills. Similar principles were also used for teaching vocabulary of grocery items and how to locate them in a shop (Mechling & Gast, 2003; Mechling, Gast, & Langone, 2002). Personal sexual safety is another issue incorporated into specific computer software aimed at this population (Lee, McGee, & Ungar, 2001).

Other programs have aimed at underlying cognitive processes, such as attention, memory, problem-solving skills, or perceptual-motor skills, expecting to improve overall psychological functioning by training those abilities found to be limited or underdeveloped in persons with intellectual disabilities.

Dube, Moniz, and Gomez (1995), for example, found that computer delivered prompts were highly effective in learning of visual discrimination tasks in subjects with mental retardation. In another study, an individualized multimedia program helped girls with Rett Syndrome in the learning of symbols, with positive maintenance results over time (Hetzroni, Rubin, & Konkol, 2002).

Other commercial software packages have broader objectives, aimed at more than one process or task. *Thinkable*, for example, is a multimedia program that centers on attention, discrimination, memory and seriation. It presents the user with graphic, visual and auditory stimuli that act as training or reinforcement contents. Some published research has informed of improvement in subjects with cognitive disabilities of diverse nature (Guiaquinto & Fiori, 1992; Ruff et al., 1993). *Rehacom*, another program of a similar nature, has an even broader list of training modules, ranging from sustained, focused and divided attention, verbal, lexical and figure memory, visual training, reasoning or purchasing. It uses both auditory and visual stimuli and, the same as *Thinkable*, provides feedback to the user and task difficulty can be adapted to needs. *Rehacom* has proven to be successful in brain-damaged subjects (Friedl-Francesconi & Binder, 1996; Regel & Fritsch, 1997), and in improving attention and memory scores with schizophrenic patients (Pfleger, 1996). Another example of this kind of software is *PSSCogReHab*, a program structured around eight modules that include 64 training tasks. Intervention areas are attention, visual-spatial abilities, memory and problem solving. Studies with *PSSCogReHab* are of a preliminary nature and, although promising, not conclusive (Chen, Thomas, Glueckauf, & Bracy, 1997).

Most of these and other examples illustrate the main advantages that have justified the inclusion of computer assistance in cognitive and thinking skills programs. Computers, it has been claimed, are practical inasmuch as they allow an easy presentation of different

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