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# Picture Planner™: An Icon-Based Personal Management Application for Individuals with Cognitive Disabilities

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## Abstract

This paper describes a cognitively accessible personal activity management application for use by individuals with cognitive disabilities and their caregivers.

## Keywords

Accessibility, cognitive disabilities, life skills, personal management, life skills software

## ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces---graphical user interfaces, screen design;  
General terms: Human Factors

## Introduction

For the past ten years Eugene Research Institute has been engaged in research and development of life skills software for individuals with significant cognitive disabilities [1.2]. One of the results of these efforts is a cognitively accessible personal activities organizer called Picture Planner™. The application uses a graphically intensive, icon-driven software interface to provide users with cognitive disabilities with a means to construct and manage activity schedules. A screen shot of an icon-based view of an art class that has been

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scheduled using the application may be seen in Figure 1, below. A more detailed interactive tutorial and overview of Picture Planner [1] may be found at the following web address:  
[http://www.eugeneresearch.org/picture\\_planner](http://www.eugeneresearch.org/picture_planner).

Picture Planner is a versatile tool for engaging in the kind of daily and weekly self-scheduling activities outlined by Bambara & Koger [3] in their guide to facilitating daily choice making. A computer-based approach for this purpose also has the advantage of making it more practical to use personal pictures as prompts [4,5].

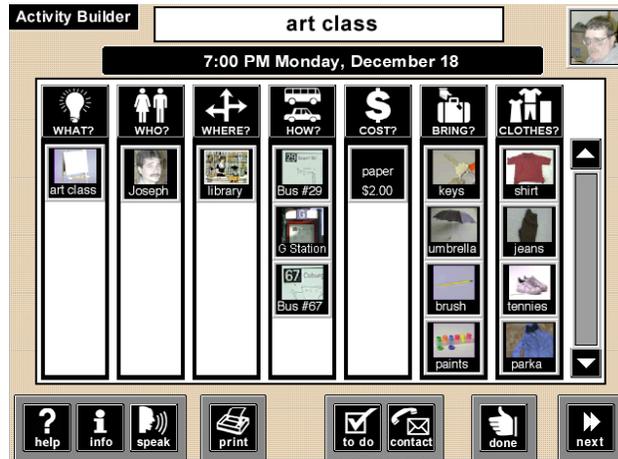


Figure 1. Activity Screen Detail from Picture Planner

Picture Planner is in essence a tool for self-management and prompting. The user creates a schedule, prints out the results and can then refer

either to the onscreen information or the printed schedule throughout the day or week as an aid in remembering all aspects of their activities.

### Design Concepts

Picture Planner incorporates several key design goals and related features. The first is to enable maximally independent use by individuals who have limited reading ability, while at the same time facilitating assistance from caregivers. Toward that end, virtually every interface element is a tri-modal icon, consisting of an image, text label, and text-to-speech function that speaks the text label or describes the image contents when the icon is selected.

The second goal is to enable use by those for whom standard commercial software interfaces are overly complex and non-intuitive. Features addressing this concern include the fact that the need for double-clicking is avoided throughout the program, in favor of single-click operation. Not only does this lend itself to easier integration of alternate input methods such as touchscreen or handsfree mouse operation, it is less cognitively confusing and less motorically challenging for the user. An effort has also been made to use uncluttered screen layouts and user action sequences that avoid having multiple screens open at the same time. This limits the extent to which the user can "tunnel down" and possibly get lost in layers of application windows. The design instead favors an "out and back" user action sequence through which the user inevitably returns to the primary activity planning task after making selections to add to the activity description. Other navigational features include a "Speak" button that will repeat the last text that was spoken by the text-to-speech feature, and a "Today"

button that will always return the user to the current day's activity planning screen in the event they do become confused.

The third major design goal is to have the application incorporate a metacognitive approach to interface design that seeks to anticipate the information management challenges experienced by individuals with cognitive disabilities. A typical user of a paper or computer-based organizer might enter a word or two, or perhaps just a single name, in a certain time slot, relying on that prompt to cue a metacognitive set of implications about that activity that an individual either actively considers or that is unconsciously retained in memory and called up as needed to successfully accomplish an activity. Choosing and arranging the activities that constitute one's daily, weekly, or monthly schedule involves many considerations that are more metacognitive in nature: knowing not just "what" activity is scheduled, but making explicit the many meta-elements of an activity that bear on its successful, satisfactory, and self-determined completion: What activities are available to choose from? How much money do I need for the activity? Who am I doing it with? When and where does it happen? How will I get there? What things should I remember to bring with me? What clothes are appropriate? For many of us, this entire information set is held in our memory and cued by a simple name or word entered in a planner. Many individuals with significant cognitive disabilities, however, need these metacognitive sets of information explicitly presented and they need accessible ways to choose among options in each domain.

In our application, upon selecting an activity or event to be scheduled, the user is systematically presented with and "stepped through" each of these considerations. These are general skills of time and activity management that can continue to be developed throughout a lifetime, and that are applicable across home, work, and community settings.

### **Preliminary Field Test Findings**

We are currently field-testing Picture Planner™ in secondary school programs for students with cognitive disabilities in two large school districts and with adults in community living settings [1]. Field testing has included over 25 individuals with significant cognitive disabilities, ranging in age from 16 to 63 and with IQ and adaptive behavior scores that would place them in the moderate to mildly disabled range.

Preliminary findings from our work indicate that many users with significant disabilities quickly grasp the basic steps of using the Picture Planner application for activity planning, and that they require decreased staff assistance with sustained use and limited direct instruction. Our most recent data indicate that after an average of one-half hour of weekly instruction over a period of 8 weeks, one cohort of five users with significant disabilities averaged 54% successful completion of the steps of a novel activity planning task, with either no assistance or with only nonspecific verbal prompts. Individual rates of step completion at that assistance level ranged from 29% completion to 82% completion.

Although we have been surprised by the extent to which some students learn to independently use much of the application, many will still need at least some

assistance from instructional assistants with whom much student contact in life skills and community transition programs occurs with, rather than directly with teachers. Family members also play an increased role. How support is provided across settings and the impact on the role of paraprofessionals and family members constitutes an important future research question. Our observations suggest that software for personal management not only provides computer accessibility for students with cognitive disabilities, it provides an instructional framework for interactions between assistants and students in ways that affirm goals such as self-determination and independence, regardless of the level of expertise a student or assistant brings to the context.

With regard to social validity assessment or consumer satisfaction, users have expressed sustained interest in using the software, and program staff reported that students looked forward to the weekly instruction sessions, talking about it in advance, and wanting to make sure they would be able to use the computer for activity planning. Users also reported improved self-esteem related to increased independence in computer use and staff have made concurrent observations about participating students. Both students and program staff have expressed strong interest in continued use of the program and involvement in our research and development activities.

### **Biographical Sketch**

Thomas Keating Ph.D. is Director of Eugene Research Institute, and Managing Partner and Research Director for AssisTech Systems LLC in Eugene, Oregon. He is also Adjunct Faculty in the Computer and Information Sciences Department of the University of Oregon.

Keating's work over the past ten years has focused on the overall role of assistive technology in the lives of transition-aged students and adults with disabilities, on design and development of cognitively accessible life skills software, and on development of remote monitoring technology for community living support. His perspective in all of his work is strongly influenced by his role as primary care provider for a brother with autism.

### **Two Research and Development Questions of Interest**

1. What are the potential roles and implementation issues involved in using AI/expert systems technology in the development of cognitive prosthetics on mobile and other platforms for life management/ADL's (activities of daily living) for individuals with disabilities, including elders with dementia?
2. What are the current status and development challenges with various smart home/aware environment technologies, and what do we know about features and GUI characteristics for both consumers with disabilities and caregivers that will contribute to feasible implementation and consumer satisfaction?

### **Relationship to the Goals of the Workshop**

I believe our work would fit well with the expressed goals of the workshop for several reasons. We have been actively involved in development and field testing of cognitively accessible software for over ten years and would look forward to discussion with others involved in similar efforts in a workshop format that would facilitate a deeper communication than typically occurs in a conference setting. We are also fortunate enough to have ongoing funded research involving

development of residential support applications that utilize expert systems approaches. Our work has involved extensive field testing with a wide range of populations, including individuals diagnosed with mental retardation, autism, traumatic brain injury, and cerebral palsy, and one of our current projects also involve seniors. This has sharpened our awareness of the many development challenges involved in designing for heterogeneous populations. It has also resulted in the incorporation of caregivers as an explicit end-user target, and led to an interest in enhanced understanding of the interrelationship between the information management needs of both user groups.

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