

Smoothing the path to an independent life for people with cognitive deficits

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VRVTS offers vocational training by simulating a boutique, where users assume the role of a shopkeeper. Credit: The Hong Kong Polytechnic University

Virtual reality is a powerful tool to simulate real-life environments and situations. Scientists from The Hong Kong Polytechnic University are exploring the medium as a way to help people with cognitive limitations

overcome difficulties in life. Among the many kinds of disabilities, cognitive deficits may bring more hindrance to a person's life than others. For examples, dementia affects a patient's ability to do basic tasks such as grocery shopping or travelling to a specific place, while the slow responses related to mental disorders make it difficult for a sufferer to get hired.

But patients with cognitive impairments can now be better prepared for challenges in life. Two non-immersive VR computer programmes, namely Virtual Reality based Vocational Training System (VRVTS) and VRRehab, have been developed by Professor David Man and his team at the Department of Rehabilitation Sciences. Running on personal computers or tablet PCs, the programmes reconstruct real-life scenarios that would be experienced by users in the community or a workplace, enabling them to learn various skills virtually. As virtual environments activate brain processing in a similar way the [real world](#) does, patients can easily apply the skills to their daily life.

VRVTS simulates a typical workplace where users build necessary work skills before hitting the real job market. In the 3D virtual boutique, users assume the role of a shopkeeper and meet with non-real customers, listening and responding to their concerns by observing a set of pre-defined business rules and workflows. Basic and advanced sales techniques such as greeting customers, selling goods and checking stock will be acquired during the course of training.



Using public transport is one of the community living skills covered by VRRehab.
Credit: The Hong Kong Polytechnic University

Based on well-established psychiatric research, VRVTS was also designed to improve attention, memory, sequencing, sorting, and problem solving, thereby enhancing patients' cognitive functions. For example, the use of frequent prompts for actions and decisions induce higher levels of attention and brain activities.

While VRVTS addresses to the patients' need for job hunting, VRRehab aims to develop community living skills in them. The training involves a wide range of situations, including [grocery shopping](#), money management, making phone calls, as well as using pedestrian facilities, public transportation, and using ATMs. By completing different tasks in the virtual space, users gradually pick up the everyday skills that can be applied in the real world.

In conventional rehabilitation programmes for patients with cognitive

deficits, real-life exposure is only available in later or final stages of training. With VRVTS and VRehab, patients can start the training early on, as the systems provide a safe and comfortable environment where they can obtain the gradable, necessary skills without being distracted or interrupted by complicated circumstances of the real world. "Training should start as early as possible because the thought of living alone can be daunting," said Prof. Man, a specialist in memory and cognitive research. "Effective training in the early stage of rehabilitation is essential to their independence and community integration."

Apart from that, the vivid audiovisual stimulation and the interactive VR experience are entertaining and appealing to patients. The difficulty levels can also be easily customized as users progress in training, increasing their motivation to carry on. Also, the tasks and virtual environments based on the real world familiar to them encourage them to transfer the skills acquired to daily life. Preliminary trials at the Department of Rehabilitation Sciences have already supported the new approach as patients taking part found themselves grow in confidence and ability in managing [daily life](#) after training.

Thanks to their proven efficacy, VRVTS and VRehab have been successfully licensed to a rehabilitation services company, and are ready to benefit those in need. In fact, the VR platform is highly expandable to cover other scenarios like wet market shopping or serving in a restaurant. To reach a wider audience, the team will also develop apps for smart phones so that users can take part in training anytime and anywhere.

Provided by Hong Kong Polytechnic University

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