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Development of toys for rehabilitation and non-pharmacological treatment of dementia.

Gerontechnology 2016;15(suppl):124s; doi:10.4017/gt.2016.15.s.920.00

Purpose Dementia is characterized by decreased cognitive functions beyond normal aging, usually associated with behavioural disturbance and other mental health disorders. As getting older, the prevalence of dementia becomes higher, resulting in a huge and negative impact on personal health. Dementia is usually not easily identifiable until it turns to be moderate or severe. Non-pharmacological treatment is the most important treatment to dementia patient’s rehabilitation in cognitive and reality orientation functions¹. Non-pharmacological treatment such as music therapy, reminisce therapy, multisensory stimulation can all benefit from technological assistance. This paper presents the methodology ‘TOIS’ for designing ‘toys’ for non-pharmacological treatment. Several toys were developed and tested with dementia patients.

Method There are four design elements in the methodology TOIS: (i) Training, rehabilitation is designed into simple games; (ii) Objects, toys are designed into artefacts familiar to the older adults; (iii) Interactivity, multisensory interactions are provided by the toys; (iv) Service, all toys are connected to mobile devices for personalized settings and adjustment of difficulty levels of the toys. Four non-pharmacological treatment toys: ‘Racing’, ‘Rising Star’, ‘Remember’, and ‘WhizToys’ (Figure 1) have been developed using the TOIS framework. ‘WhizToys’ allows the user to select different games from apps, such as music for piano, number for calculator, and colour for palette for cognitive training. The user plays the games by stepping on the pressure sensing units for lower limb exercise.

Results & Discussion A usability test was conducted at the 2015 IT Month exhibition. Several questions were asked to score from 1 to 7 points, such as easy to learn, easy to understand, and flexibility in use. Table 1 left shows the average points of 150 testers (age and gender not recorded). Currently these toys are used in a dementia day care centre for a long term user experience test. Table 1 right shows the preliminary over two weeks data from 6 older adults (4 males, 2 females; Age 75-80: 66%, Age 81-90: 34%) with mild dementia. In our observation, the dementia patients not only interact with the toys but also interact with the caregivers, and seem to have fun and motivation for rehabilitation. Caregivers can observe and record the using state from the mobile device app to plan a proper way of using these toys.

References

1. Douglas S, James J, Ballard C. Non-pharmacological interventions in dementia. *Advances in Psychiatric Treatment* 2004;10(3):171-177; doi:10.1192/apt.10.3.171

Keywords: dementia, rehabilitation, non-pharmacological

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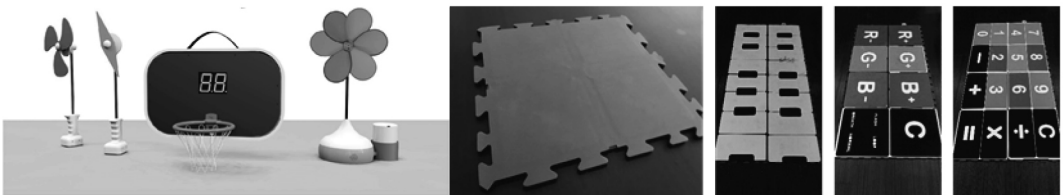


Figure 1. Toys developed using the TOIS framework

Table 1. The average scores of usability test and user experience evaluation; scale ran from 1 (negative) to 7 (positive)

Game	Usability test, n=150					User experience, n=6			
	Easy to learn	Easy to understand	Flexible in use	Appearance	Multisensory	Rehabilitation	Stability	Safety	Usage count
Rising Star	6.4	6.4	5.9	6.0	5.9	5.3	6.6	6.6	10
Racing	6.3	6.2	5.9	6.0	5.9	6.0	6.3	6.4	7
Remember	6.2	6.1	6.0	5.7	5.9	6.2	6.1	6.4	16