Usability Evaluation of a Game-Based Virtual Reality Station for Cognitive and Motor Training in General Occupational Therapy.

Lena PARETO, Ph.D.¹, Daniel GOUDE, MSc ², Martin RYDMARK, MD, Ph.D.³, Jurgen BROEREN, Ph.D.⁴, ⁵
¹ Laboratory of Interaction Technology, University West, Trollhättan, Sweden.
² Institute of Biomedicine, Mednet, Gothenburg University, Gothenburg, Sweden
³ Sahlgrenska University Hospital, Department of Occupational therapy, Gothenburg, Sweden

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Training with haptic devices using Virtual Reality has been suggested to enhance stroke rehabilitation ([1],[2]). One such station (curictus.com) use 3D game playing as motivational activity [3], which combines motor training (force feedback input device) and cognitive training (game activities). Previous studies ([1],[2]) focussed on rehabilitation effect in laboratory or stroke-specialist settings, but evaluation of utility games also need to consider user experiences [4], in realistic settings [5]. This study therefore focuses on practical usability issues of the station in a non-specialist setting, as well as the practitioners’ perceived usefulness of the station as a training device in daily therapeutic work. The purpose is to identify design challenges [6] and explore potential uses of such equipment. The result will be input to development and indicate further studies to exploit usefulness.

The study was performed in a small, general rehabilitation centre, deploying general occupational therapy for out-living patients. It proceeded for 6 months and involved 3 occupational therapists and 15 patients. A prototype station was used, and subjects were selected among ordinary patients, based on the practitioners’ judgement of the suitability of the training in question. Three subjects chose to go back to previous training methods. The remaining twelve subjects used the station several 1-2 hour sessions per week for periods ranging from 3 to 12 weeks. The age ranged from 20 to 85, four were women and four were non-stroke patients. They suffered from fractures affecting upper limb mobility, burn injury or multiple sclerosis. For each subject, an individual training plan was developed, including regular check points with a diagnostic test of their performance. At each check point during the training period, hand movements, choice of games, performance and experience were recorded in questionnaires by the practitioners. Each patient was interviewed by their therapist after the entire training period, regarding their experiences using the equipment. The therapists’ and their patients’ experiences as well as their professional judgements were collected in the middle and at the end of the study by in-depth group interviews. Interviews and questionnaires were analysed.

Being an exploratory study, the results can only be suggestive. The therapists’ all found the station interesting and fun to work with, and judged the coming product promising. One therapist stressed that the “the equipment was very helpful in assessing patients cognitive abilities”. The motivational effects among subjects varied, but most were positive and some got highly involved in the play resulting in intense training. Usefulness for non-stroke patients showed positive indications: subjects all liked the training, and it had beneficial effects on them, as quoted by the therapist: “the patients forgot to be afraid to use their injured hand”.

Future design challenges include a wide range of difficulty levels in the games to match the range of users’ cognitive abilities; an extremely careful and consistent design of interaction schemes in the virtual world to avoid obstacles in hand and eye coordination, as well as a classification of games based on training purposes. More and confirmative studies of usability and user experience of potential user groups are also needed.

References