The Outcomes of Haptic Virtual Reality Training of Activities of Daily Living for Special School Students with Upper Limb Disabilities

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Background: Special students with upper limb disabilities receive different types of training at school. A new way of training for activities of daily living (ADL) using haptic virtual reality (VR) system was introduced to a special school in Hong Kong.

Methods: Thirty-two students with upper limb disabilities were recruited for a pre- and post-test equivalent group study through purposive sampling, each attended four 20-minutes training sessions (T1 to T4) over a period of 20 days for three tasks of ADL, including 1) unlocking a door with a key, 2) pouring water into a glass, and 3) cutting a piece of meat. Completion time of the tasks and percentage of water successfully poured into the glass were recorded. Student's levels of exertion and satisfaction towards the VR system were examined through the Task Specific Feedback Questionnaire (TSFQ) and Borg Scale of Perceived Exertion (BSPE). Useability of the VR system (measured with the Computer System Usability Questionnaire – CSUQ) and performance of the three ADL in reality were also evaluated by occupational therapists (OT).

Findings: Significant differences in reduction of time were observed for VR task 1 (p = .012) and 3 (p = .04), except task 2. The percentage of water successfully poured was significantly more at T4 than T1 of the VR training. However, there was no significant difference in time for all tasks (and percentage of water poured) before and after the training in reality. Student satisfaction was generally good while their exertion level was mainly low. Feedback of OT was positive but their impression of task performance improvement in reality was unfavourable.

Conclusions: Inconsistent results on performance after the haptic VR training and in reality were observed. The findings provided useful insights for further studies in haptic VR training for school students with upper limb disabilities.