

Developing Cognitively Gameplay as a Rehabilitation Tool for Elderly Living with Dementia using Participant Observation and Participatory Approach: Universal Design focus

In Hong Kong, the population is incontestably expected to remain on an ageing trend. Population proportion aged 65 and above is projected to have a rise from 1,065,900 to 2,582,300 in 2014 and 2064 respectively, constituting 15% and 33% of total population. Longer life expectancy has resulted in a rapid increase in aging population. In 2014, more than 70,000 aged 70 and above were diagnosed as dementia patient, expecting to have a substantial increase to 250,000 in 2036. Dementia is a syndrome due to disease of brain, progressive nature in which there is disturbance of memory, orientation, comprehension, calculation, language and judgement (World Health Organization, 2016). According to Aging, Demographics, and Memory Study (ADAMS) in United States, 13.9% of people aged 71 and older have been living with dementia (Plassman et al. 2007). The impact of dementia continues to accelerate and become more prevalent with the growing trend of aging population all over the world.

This paper discusses the role of designer as an observer in conducting social research with elderly living with dementia who were invited to participate in one existing gameplay in a natural setting. Through participant observation the designer would learn their languages including the insider phrase and aware of the little details of their life, in particular to those who may have speech disorder and visual and spatial reasoning. Try to maintain naïveté so that you could conduct your research more naturally and become an inexperienced member of a specific culture. The designer, could serve as a complete-participant role, participant-as-observer, observer-as-participant and complete observer to collect data in day-to-day activities related to social life by gaining deeper understanding of them (Gold, 1958). The designer in present research project invited the centre manager from Christian Family Service Centre to serve as a facilitator while he himself will become a participant-as-observer. One example of the gameset is a classic tangram which have been used as a rehabilitation tool for several years.

The first subject, Lung-Yum (LY), aged 82 who had retired for over 20 years. He lived alone in Hong Kong while his family had already moved to United States many years ago. According to the centre manager, the Mini-Mental State Exam (MMSE) score of LY is 23, while people with normal cognitive function is 27-30. The first task was designed to let LY match the geometrical graphics imprinted on a piece of paper with the plastic colored pieces. First, LY tried to grasp one piece of it but unsuccessful. After giving a few trial, he intended to use other method by navigating the targeted one to the edge of the table with his right hand. He finished his task assisted with his left hand, holding the piece firmly and tried to match with the outline printed on a piece of A4 paper. His hands are shaking gently sometimes. LY spent a few minutes to grasp 2 tangram pieces. Rotating the single triangular piece seems not easy for LY, and became a major

barrier for him to play with the game assisted by a facilitator. He could not complete the game in elementary level by himself within given time limit even if he had chosen correctly.

The designer tried to redevelop existing gameplay with cognitive focus using the 7 Principles of Universal Design to enhance the overall play experience through iterative approach. The integration of universally usable features in products and environments makes older people become indistinguishable if it is applied successfully (Story, 1998). Universal design is not a style in design, rather, it is a method of design focusing on different ages, sizes, mental abilities and physical abilities of all individuals. Seeking a universal design solution to health issues is not only a consideration on social responsibility, but also becoming a financial necessity due to the rising cost of healthcare. Universal design has much to contribute to solving any social problem in which usability, health and wellness, and social participation play a major role in design response. It is a concept that emphasizes accessibility, adaptability, aesthetics and affordability (Behar, 1991). The seven principles of universal design are given as follows:

1. Equitable Use;
2. Flexibility in use;
3. Simple and Intuitive Use;
4. Perceptible Information;
5. Tolerance for Error;
6. Low Physical Effort;
7. Size and Space for Approach and Use.

This Participatory Design Approach allows designer to develop product and solution with the users, and modify the prototype during the process in several times. The co-design experience offers an opportunity for end-users to get involved in the design process and express themselves creatively so that the designer with the user blend to each other to discover tacit knowledge that cannot easily be expressed in words (Polanyi, 1983).

The research was supported by tertiary institution by acquiring 3D Printing Technologies in newly established research laboratory. Knowledge of advanced technologies such as fused deposition modelling (FDM), stereolithography (SLA) and direct metal laser sintering (DMLS) could be beneficial during the research and development process. The shorter period of time in modifying the first prototype using emerging technology, the more possible ways and solutions could be proposed during the process within the allowed schedule. This research approach could be applied to investigate and evaluate the capability of the disabilities in using existing assistive product design as future research direction.
