

Development of English Language Based Cognitive Rehabilitation Using Mobile Devices

Seongsoo Cho¹, Jongsup Lee², and Bonghwa Hong³

¹Department of Electronic Engineering, Kwangwoon University, 20 Kwangwoon-ro, Nowon-gu, Seoul 139-701, Korea

²Department of LINC, Dongguk University, #710, 82-1 Pil-dong 2-ga, Jung-gu, Seoul 100-272, Korea

³Department of Information Communication, Kyunghee Cyber University, Korea
{css}@kw.ac.kr, {jsleearmy}@dongguk.edu, {bhhong}@khcu.ac.kr

Abstract. With the vitalization of smart devices, various cognitive abilities using such in the functional learning field are closely related to real life and the function responsible by the brain. Characteristic techniques of children with cognitive disability are information delivery method most familiar to humans, which was designed using inspiration and attachment to words through placement of completed words and dynamic visualization of words, as opposed to simply selecting English words, allowing fun rehabilitation training for rehabilitation training of people with cognitive disability, through mobile education programs.

Keywords: Cognitive skills, Rehabilitation exercises, Mobile and functional training. Interface, Content

1 Introduction

With the recent dissemination of ipads and smart phones, interest on touch platform mobile instruments is rapidly increasing, and in particular various instances of utilization of such technology in the education field are existed [1-3]. The new movement in relation to education activities of disabled students is utilizing computers, internet and the virtual space in accordance with the ubiquitous era. This is a changed situation in accordance with the digital era, and stands for the movement to overcome the limitations of disabled children by utilizing games represented by virtual reality. As interest in virtual reality increases, various support for disabled children are being provided [3-4]. In particular, with the development of scientific technology, research on the brain is actively being carried out. There is high interest on the overall functions of the brain regarding the effect of brain functions on human life and the relationship between the brain and ageing [5-6]. In this study, in order to reduce boredom in terms of cognitive ability training, we suggest a cognitive ability training system which overcomes the time and spatial limitations to allow periodic training using mobile devices.

2 New Classification of Functional Game

John Huzinga defined games as being not serious [7]. As such, games which are not serious but induces concentration of the user that has started to become serious as Clark C. Abt stated. Abt used the terminology “serious game” to express functional game which is a new game genre [8].

Medical functional games have the image of overcome of psychological diseases through psychological stimulus, increasing treatment will on the basis of understanding of the diseases, or rehabilitation treatment on patients, however there is also a need to consider the perspective of the medical practitioner as opposed to the perspective of the patient. In other words, making medical simulation for training of difficult surgical procedures such as endoscopy, or simulation which allows virtual experience of processes from diagnosis of patients to prescription into games may help acquisition of functional skills of the medical practitioner. Research on medical simulators is mostly concentrated on manufacturing tools which can realistically mimic the process of medical procedure rather than the perspective of functional game. However, as with other functional games, medical simulator with the objective of acquisition of medical techniques can also have their contents side made into games to increase the efficiency of acquisition.

3 System design implementation

Figure 1 is the overall System Architecture. It can be largely divided into client and server. Client can be divided into User Interface, Serious game, Parser Module, Ranking Module, and Profiling Module. Server can be divided into Web Service, DBMS and OS. The system was materialized using mobile device. XCode was used as the development environment and program language of Objective-C. Linux and Mysql were used in server. Script language called PHP was used to send and receive user data information.

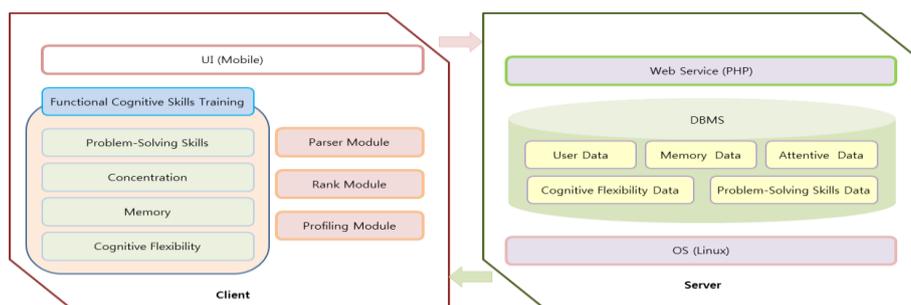


Fig. 1. System Architecture

After one-time registration, you are able to use without login using the database inside the mobile. For movement of data, when the game is ended, PHP file is

automatically accessed, comparing the user data and saving on the server. Furthermore, when importing data from server to device, data is provided in the device through the parser module of device in PHP file.

4 Algorithm Implementation

Materialization algorithm brings the word applicable to the level of the user when the cognitive ability training starts. Level of user is read from the database table member, it is multiplied by the range of random variable, and the word number of table vocabulary is randomly extracted. If the user answers 15 words correctly in a level, they are allowed to go to the next level. As such, this is vocal training and pronunciation correction contents away from the boring rehabilitation treatment and composed to allow fun rehabilitation with games with smart phones. The designed game has increasing difficulty, allowing not only rehabilitation training but also enjoyment through competition of score between the players. Cognitive ability training with medical objectives must have priority consideration on approach of “turning into games” of existing treatment through close cooperation with the medical field.

5 Conclusion

Cognitive ability rehabilitation training is contents with the objective of treatment by causing changes in the psychological status of the patients, in order that the patient has a more active rehabilitation will and embraces hope. In this study, functional cognitive ability rehabilitation training suggested to increase effectiveness of language cognitive rehabilitation treatment out of rehabilitation of stroke is utilized to increase the will of the patient for rehabilitation by improving cognitive function embracing execution ability, language ability, memory, perception and caution, and increasing concentration and absorption by the patient while feeling interested in the rehabilitation treatment in the language disability part for aphasic patients who have lost the ability to speak or write.

References

1. L P. Nagarajan, G. Wiselin, Online Educational System (e- learning), International Journal of u- and e- Service, Science and Technology. 4(3), pp.37-38 (2011)
2. O. Boyinbode, A. Bagula, and D. Ngambi, An Opencast Mobile Learning Framework for Enhancing Learning in Higher Education, International Journal of u- and e- Service, Science and Technology. 4(3), pp.11-18 (2011)
3. S. Cho, K. C. Son, C. H. Kim, and Y. Lee, Development of Mobile Games for Rehabilitation Training for the Hearing Impaired, Lecture Notes in Electrical Engineerin, 240, pp.621-625 (2013)

4. S. Cho, B. Shrestha, K. C. Son, and B. Hong, A Design and Implementation of Mobile Puzzle Game, Communications in Computer and Information Science, 184(2), pp.273-279 (2011)
5. H. W. Mahncke, B. B. Connor, J. Appelman, O. N. Ahsanuddin , J. L. Hardy , R. A. Wood, N. M. Joyce, T. Boniske, S. M. Atkins, and M. M. Merzenich, Memory enhancement in healthy older adults using a brain plasticitybased training program: A randomized, controlled study, PNAS. pp.12523-12528 (2006)
6. M. Beirne-Smith, R. F. Ittenbach and J. R. Patton, Mental Retardation(6th) New Jersey: Prentice Hall (2002)
7. J. Huzinga, Homo Ludens : A Study of the Play-Element in Culture, Beacon Press, pp.13 (1971)
8. C. C. Abt, Serious Games, University Press of America, pp.9 (1987)