ISSN No:-2456-2165

Emotional Sustenance of Autistic Children: Development and Study of Serious Games based on Virtual Reality

Xufeng Ma [1,2], Joonki Paik [1*]
[1.] Graduate School of Advanced Imaging Science, Multimedia and Film, Chung-Ang University, 06974, Korea,
[2.] Qingdao University of Science and Technology, 266061, China

Abstract:- Emotional sustenance of autistic Children with the special analysis on the development and study of serious games based on virtual reality is conducted in this paper. We not only look forward to the changes that virtual reality technology will bring, but also look for and explore the application prospects of VR in the application field, especially in the field of college education. With the VR equipment becoming more and more portable and miniaturized, as well as the spatial positioning ability gradually enhanced, then VR technology can help users quickly virtualize the surrounding environment in limited space, combined with 5G network transmission ability, spatial information link speed can achieve the effect of live broadcast. This paper proposes the novel perspectives regarding the serious games based on virtual reality. The system is designed and implemented and the perforamcne is validated.

Keywords:- *Virtual Reality, Autistic Children, Serious Games, Emotional Sustenance.*

I. INTRODUCTION

In recent years, with continuous development of information technology, digital games have achieved the unprecedented development. People are enthusiastic about various forms of games, and many people even reach the point of "abandoning the bed and forgetting to eat". It has not only developed into a huge industry, but also a significant cultural phenomenon that affects the lives of contemporary people. Compared with the European and American countries, the introduction of serious games in China is relatively late and the development is relatively slow. The recognition among the people is not very high. Government agencies, general private enterprises and educational institutions are the main beneficiaries of serious games in China. In order to make the serious game popular and promoted in the whole society and change the current application situation of the serious game in China, it is necessary to promote the concept of the serious game in the whole society. Since the birth of the game, it has then been inseparable from military applications. In this regard, the United States has taken the lead in the world. The US Army invests a large amount of money each year in the development and purchase of military training games. In 1994, the United States Marine Corps established the world's first gaming military training organization. In 1995, the U.S. Air Force and Army followed suit with games as an aid to military training. Today, the application of various high-tech equipment often starts from simulation equipment. For example, a tank driver can familiarize himself with the various complicated road conditions in a simulation tank driving game to adapt to the ability to respond to extreme conditions; the pilot can they learned the basic driving methods of airplanes through flight simulation games. They turned boring training into fun games, which greatly improved the learning efficiency. Although the biggest contribution of serious games in the military field is knowledge promotion, serious games can also be used for the complex training tasks.

Hence, for promoting the development, we should consider the listed aspects. (1) It plays the very important role in strengthening the physical and mental health of the elderly. In addition, the elderly generally have a certain spending ability and are more suitable in price positioning. They must also ensure sufficient game time while ensuring that the elderly can accept and serious games' guiding role for the elderly. (2) In addition to government organs and education departments, there are many broad market industries and social groups in our country. Because of the influence of the historical and traditional ideas and thinking, the serious games can not be recognized in these industries and groups for a while, but these are potential exploitable users of serious games. The present situation of serious games in the future development of our country must be very broad.

Inspired by the above requirement, the VR based game design and development is essential. Today's video games are pursuing better visual effects. The reason is to give players a stronger sense of immersion, so that players can deeply enter the game world and then enjoy the fun of the game. The immersiveness brought by VR technology is by far the best, which is mainly related to the three-dimensional display and three-dimensional virtual sound generation technology.

As the most important VR device component that can give users a strong immersion. The degree of immersion is another big difference between panoramic video and traditional video. As a subjective feeling, immersion is a difficult concept to define. To explain in plain language, that is, the audience's perception of real world situation in the virtual environment and also forgetting the real world situation is a process of alternating positive and negative emotions. A huge motivation for the people to continuously

increase the screen size is the pursuit of immersion. The larger the screen, the stronger the immersion. However, traditional viewing methods limit the improvement of immersion. We cannot imagine that we can personally control the theater during the viewing process. The angle of the screen or lifting the computer monitor shaking the search for the missing protagonist.

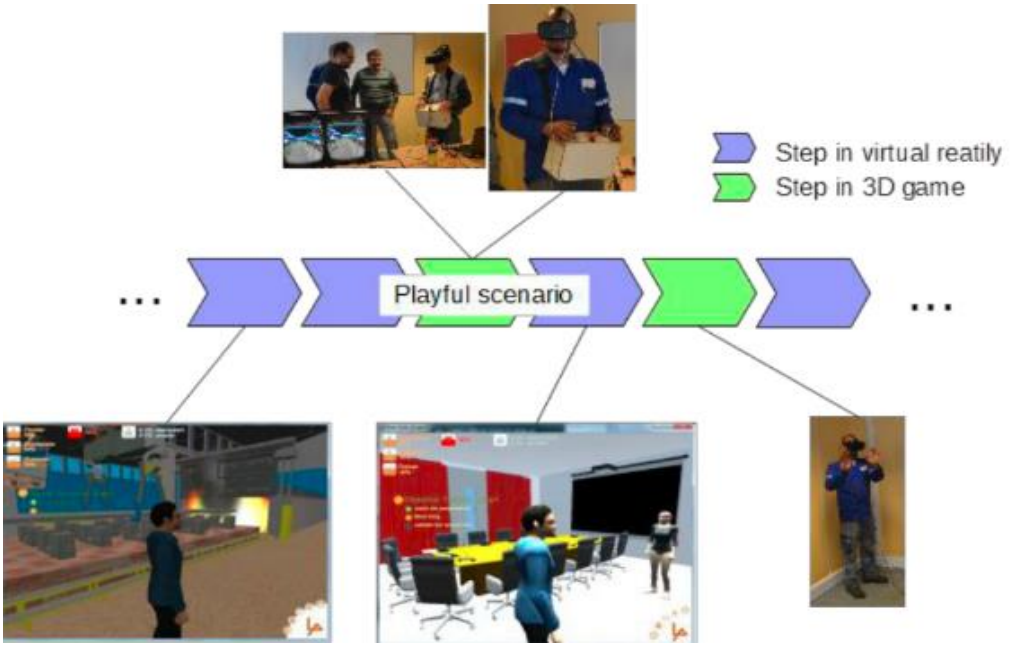

Fig 1:- Sample Demonstration of the VR Technology

II. CHILDREN WITH AUTISM

At present, the United States, Canada and other countries have adopted a completely integrated approach. The integration of ordinary classes is not only mild, but students with moderate to severe disabilities are also admitted to ordinary classes. Many children with disabilities, especially children with the autism, are usually equipped with a teaching assistant. While integrating education, special training institutions for autistic children are also actively participating. In Taiwan, schools for children with disabilities usually have ordinary, resource, and special classes. Mild to moderate autistic children are placed in ordinary classes, and some major courses are taught in the resource classes.

The idea of integrated education runs through the treatment of autistic children, which is of great help and influence to autistic children. However, it is unrealistic to ask for the full integration of American style in our country. Autism is very heterogeneous, with general complex causes, large individual differences, and also the different linguistic and non-verbal characteristics; their verbal and also non-verbal behavior is affected by the factors such as gender, age, intelligence, and intervention status. Therefore, the means of data collection must be reliable and effective. According to characteristics of children, especially children with autism, fully stimulate the children. Children's narrative ability has then become an interesting effective method for assessing the communication ability of normal children and children with language barriers, and also an effective means of language training for children with autism. Design different kinds of narrative tasks, such as listening and retelling stories, reading picture self-description, telling personal stories, etc., to stimulate the language output of autistic children, and build a multi-modal Chinese language and non-verbal corpus for autistic children. After the tagging, extract data, analyze and compare the differences of language characteristics between autistic children and normal children from phonetic, lexical, syntactic, textual and the pragmatic aspects, and reveal the specificity of language characteristics of autistic children which will be the further basis.

III. SERIOUS GAMES BASED ON VIRTUAL REALITY

To begin with, we summarize the application scenarios of the VR as the follows. (1) The application of VR technology in the medical field can help learners better understand the internal organs of the human body through the establishment of virtual human models.At the same time, virtual operating table surgical lights can be established to use virtual surgical tools for the virtual surgery. (2) With the maturity and popularization of VR technology, the application of VR technology in office field can be realized. Currently, there are projects devoted to the use of VR technology to improve work efficiency and reduce physical and also mental stress. After wearing the VR equipment, it can create a different office environment, make the originally depressed and tense office atmosphere become relaxed and comfortable, and in such an environment, employees' thinking is also sharper and more

divergent, which is conducive to the active thinking of employees, and can drive the change of employees' mood through the change of scene, and can even relieve the pressure of employees at work and make them have a better state of being put into work. (3) The most important thing in urban planning is the various types of construction projects. The application of VR technology to all aspects of urban planning can bring tangible and intuitive benefits. For example,VR technology is used in road and bridge construction. With the gradual improvement of 3D virtual reality technology,VR equipment and software are more convenient and powerful in application, with a high degree of visualization.

From market feedback and the actual usage of our school's virtual reality foreign language training center, it can be found that, in addition to the expensive hardware (for mass promotion), the headset is still bulky and depends on the space positioning device, which will not allow users A long, free and flexible VR experience in a limited space. In addition, VR headsets from different companies are not compatible with the same VR application, and the underlying support code needs to be rewritten to be applicable. The HTC Vive headset we currently have is not available to experience with HP's new headset. In addition, the participation of the multiple people requires specific equipment, which is not convenient to use. Inspired by the above discussions, we then demonstrate the core design of the framework as the follows.

The script design of the game is considered to be the soul of the game. The design of the game scene is presented by scrolling the subtitles that appear on the game start interface. The script design of the computational thinking virtual game in this research includes game story background, game plot, vehicle model, NPC dialogue mode, interface design, knowledge base setting, help setting, etc. For the situation of this game case, we first need to design the vehicle model, obstacle model, traffic commander model operated by the player, and then design the action according to the action of accelerating, decelerating, turning, jumping ,(barricade, bomb) obstacle movement, waiting in place, attacking action and the traffic commander NPC intercept, inquire to release action. Game scene design is mainly to design a suitable environment for plot development, scene design should start with the script story plot and real life, as real as possible to reproduce the real life scene, deepen the learner's sense of presence, so that learners better into the game situation. In the game situation, learners' interaction in the core game experience is not only compute. Figure 2 demonstrates the details.

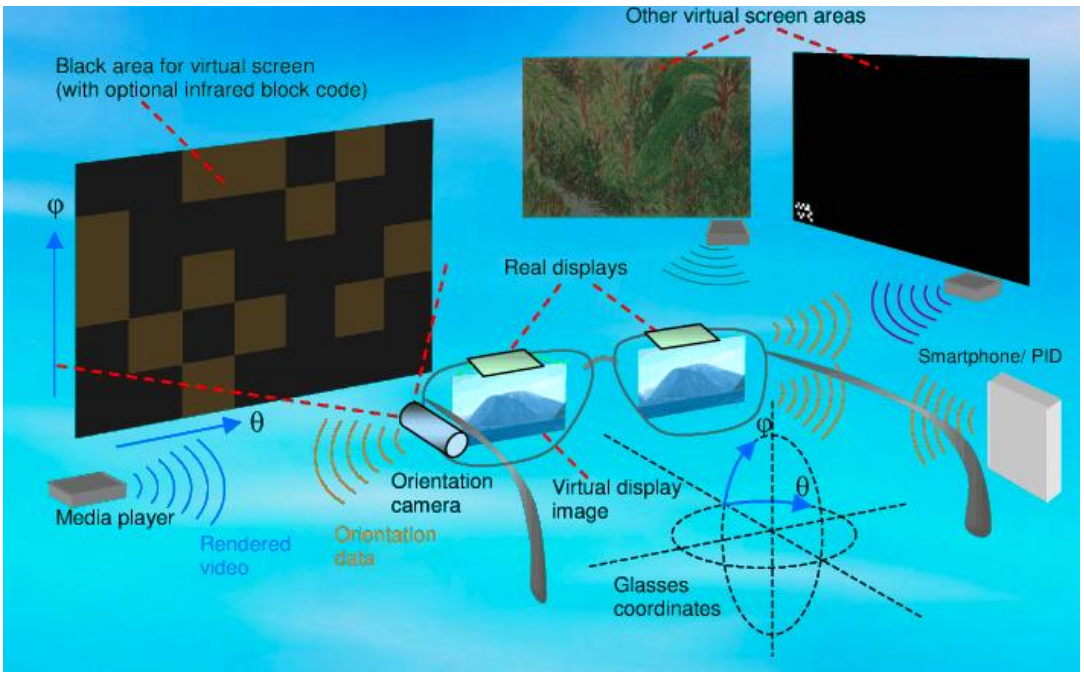

Fig 2:- Virtual Reality Game Design Scenario

IV. FINAL CONCLUSION

Emotional sustenance of autistic Children with the special analysis on the development and study of serious games based on virtual reality is conducted in this paper. The development of information technology makes the application of digital media technology in display design more and more deep, but it also brings some influence to the development of display design. This also requires that the relevant practitioners of display design can correctly handle the relationship between digital media technology and display design artistry, carry out the organic integration of the two, balance the proportion of art and technology, so as to obtain good display design works, and promote the continuous and stable development of the display design industry. With this inspiration, the paper then proposes the novel ideas, in the future, we will test the core application scenarios for verifications.

REFERENCES

[1]. Davies, A.G., Crohn, N.J. and Treadgold, L.A., 2019. Can virtual reality really be used within the lecture theatre?. BMJ Simulation and Technology Enhanced Learning, 5(4), pp.234-235.
[2]. Carl, E., Stein, A.T., Levihn-Coon, A., Pogue, J.R., Rothbaum, B., Emmelkamp, P., Asmundson, G.J., Carlbring, P. and Powers, M.B., 2019. Virtual reality exposure therapy for anxiety and related disorders: A meta-analysis of randomized controlled trials. Journal of anxiety disorders, 61, pp.27-36.
[3]. Beidel, D.C., Frueh, B.C., Neer, S.M., Bowers, C.A., Trachik, B., Uhde, T.W. and Grubaugh, A., 2019. Trauma management therapy with virtual-reality augmented exposure therapy for combat-related PTSD: A randomized controlled trial. Journal of anxiety disorders, 61, pp.64-74.
[4]. Elsey, J.W., van Andel, K., Kater, R.B., Reints, I.M. and Spiering, M., 2019. The impact of virtual reality versus 2D pornography on sexual arousal and presence. Computers in Human Behavior, 97, pp.35-43.
[5]. Deng, X., Unnava, H.R. and Lee, H., 2019. "Too true to be good?" when virtual reality decreases interest in actual reality. Journal of Business Research, 100, pp.561-570.
[6]. He, Z., Sui, X., Jin, G. and Cao, L., 2019. Progress in virtual reality and augmented reality based on holographic display. Applied optics, 58(5), pp.A74-A81.
[7]. Iachini, T., Maffei, L., Masullo, M., Senese, V.P., Rapuano, M., Pascale, A., Sorrentino, F. and Ruggiero, G., 2019. The experience of virtual reality: are individual differences in mental imagery associated with sense of presence?. Cognitive processing, 20(3), pp.291-298.
[8]. Blissing, B., Bruzelius, F. and Eriksson, O., 2019. Driver behavior in mixed and virtual reality–a comparative study. Transportation research part F: traffic psychology and behaviour, 61, pp.229-237.
[9]. Denmark, T., Fish, J., Jansari, A., Tailor, J., Ashkan, K. and Morris, R., 2019. Using virtual reality to investigate multitasking ability in individuals with frontal lobe lesions. Neuropsychological rehabilitation, 29(5), pp.767-788.
[10]. Maggio, M.G., De Luca, R., Molonia, F., Porcari, B., Destro, M., Casella, C., Salvati, R., Bramanti, P. and Calabro, R.S., 2019. Cognitive rehabilitation in patients with traumatic brain injury: A narrative review on the emerging use of virtual reality. Journal of Clinical Neuroscience, 61, pp.1-4.
[11]. Laurent, H.K., LaValle, S.M., Mimnaugh, K.J. and Browning, M.H., 2019. Can Simulated Nature Support Health? Comparing Short, Single-Doses Of 360-Degree Nature Videos in Virtual Reality with the Outdoors. Frontiers in Psychology, 10, p.2667.
[12]. Shirk, J.D., Kwan, L. and Saigal, C., 2019. The use of 3-dimensional, virtual reality models for surgical planning of robotic partial nephrectomy. Urology, 125, pp.92-97.
[13]. Andersen, I.N.S.K., Kraus, A.A., Ritz, C. and Bredie, W.L., 2019. Desires for beverages and liking of skin care product odors in imaginative and immersive virtual reality beach contexts. Food research international, 117, pp.10-18.
[14]. Austin, P.D. and Siddall, P.J., 2019. Virtual reality for the treatment of neuropathic pain in people with spinal cord injuries: A scoping review. The journal of spinal cord medicine, pp.1-11.
[15]. Matsangidou, M., Ang, C.S., Mauger, A.R., Intarasirisawat, J., Otkhmezuri, B. and Avraamides, M.N., 2019. Is your virtual self as sensational as your real? Virtual Reality: The effect of body consciousness on the experience of exercise sensations. Psychology of Sport and Exercise, 41, pp.218-224.