

Employing an Interface Based Interactive Digital Games to the Dementia Research for Rescuing Memory

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Abstract—This work focuses on the people with dementia for rescuing memory research and designs an e-Learning platform. This work also combines with the characteristics of assisting function as well as the user interface mode of the information techniques, the digital interactive games are designed and applied in this work to stimulate the cells of the cerebrum of the people with dementia. The internet is employed as a medium that provides those people with dementia who can play the digital interactive games at home. The goals of prevention and unlimited curing are achieved eventually. Numerous tests have been made to demonstrate the efficiency of the proposed approach.

Index Terms—E-learning, user interface, internet, digital game, dementia.

I. INTRODUCTION

The people with dementia for rescuing memory research is an important research area in the current issue listed [1]-[11]. Today, more and more people are getting older in our society. The populations of old people increases day by day. Combining with huge pressure, many middle-aged persons are facing the problem of losing memory. So, our major object is to activate the older brain and rescue the memory. We also hope those persons' living standard can be improved. Our information system can simplify the medical recovery process.

In the past, people didn't pay attention to the Alzheimer's Disease. There are two reasons: First, the insufficient medical equipments caused people ignored the status of losing memory is a serious disease. Second, Examining the developing process, from the Agricultural Society to the Industrial Society, the information techniques are created rapidly, the material life are uploaded soon. People are urgently pursuing material life. While the people's requirements grow, the pressure increases, too.

Besides the former factors those caused the degenerating of the brain's cells. The eating habits are also a crucial factor. In order to attract the outside food populations, many artificial condiments are added into the dishes. Those artificial condiments not only speed up the maturing of the cells but also invading the the viruses into human body. The writher of the brain forms the tendency of the increasing of Alzheimer's Disease populations. We also hope those people

might not become the weak group of the world.

A. Research Motive

While the behavior of losing memory occurs, it is hard for people to distinguish if it is normal or people are sick. Most people treat the following events as old persons' normal losing memory condition, such as: leave the stuff in wrong place, or forget to buy something. But while the condition becomes serious and affect the daily life of the people himself and family members, You can't treat this condition as a normal condition. 'Mild cognition barrier' is a medicine noun. It is different from the general memory degenerating condition. Its affection is more serious. The average person who are normally degenerating memory may leave stuffs in wrong place, forgetting somebody's name, or forget to buy something. Those who have 'Mild cognition barrier' condition may cause memory damage condition that exceeds the normal standard set by the patient's age and education degree. But the serious condition of the patient's can't be treated as the degree of Alzheimer's disease. Those who have 'Mild cognition barrier' have big difficulties in gaining new information or recalling the knowledge that was learned just now. The frequency of absentminded conditions becomes remarkable.

Have you every seen your relatives or friends losing memory gradually? Have you felt your brain becomes stupid while you're growing? Have you ever seen the old people get lost, forget their grandchildren's names, forgetting the daily activities, such as eating, sleep and shower? Day by day, is the beautiful memory becoming profound or blurred?

People can't help it! There is always something you have to remember but it is gone just like the wind and so quick. People always want to remember many things, but only a few can be memorized. It is always a big problem for people's brain!

B. Research Objective

There are three types of Alzheimer's diseases. Two of them are concerned with the outside man-made factor and the internal body health control factor. There, those people who have the former two factors are not appropriate to use our system.

Our system is limited to provide those patients who are at the initial stage of the Alzheimer's disease. These people belong to the type of degenerating Alzheimer's disease that makes people's brain become older. The object is to activate the writher brain. Inside the complicate brain, the following parts are responsible for the memory: Temporal lobe is for memory exporting, Seahorse area is for memory activating and Temporal lobe is for memory storage.

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Although the brain wouldn't return to the youth after the active programs, but these programs can rescue the brain's degeneracy. Deeply self-reading model, memory training model, self-value achievement become one of our research objectives.

These rescuing memory programs help the families working on the recovery programs with the patients in the future. Family interaction and care do postpone the loss of memory and achieve better result. We believe our research will benefit all the patients' families. Especially our research result will freely support the patients' families. That is also one of our research objectives. This work is organized in the following manner. Section II presents the literature review. The research methodologies are given in Section III. Section IV presents the research results to demonstrate the proposed approach. Finally, a brief conclusion is given in Section V.

II. LITERATURE REVIEW

In this session, we introduce the Memory Training Courses, the Montessori Education Theory and the Music Curing Method.

A. Memory Training Courses

In order to accumulate human various kinds of knowledge, a good memory is quite necessary. Therefore, memory plays an important role for individuals and the entire society. If people can use the useful rescuing memory training to upload self-memory ability, the individual, society fortune, science and commerce will increase day by day. Therefore, in our search, we focus on the rescuing memory training development. Such as, combining with the brain's ability to memorize various kinds of data, simple games, concentration training and special memorizing method are our objectives. We found that good memory training tools appear good effect on rescuing memory. Good professional information ability can help reducing the burden of the attendants [1]-[7].

B. The Montessori Education Theory

Montessori Education Methods were submitted by Maria Montessori. But, after reading Cameron J. Camp's analysis report, we know that Montessori Education Method is not only suitable in pre-school children but also appear an excellent result in Alzheimer's disease patients' learning.

Cameron found that, Montessori Theory applied in Child Education in the beginning and became a very important theory then. The theory tells about if people arrange an environment, just like the real world, and observe the children's activities after demonstration. That will promote the children's automatic study spirit, enhance the children's training in sense, intelligent and daily life. It will also promote the fostering of responsibilities [8].

Cameron also submitted that the Montessori activities help the Alzheimer's disease patients appear obvious improvement and rescue. The ten activities of Montessori Education are Sensory Discrimination Scooping Exercises, Pouring Activities, Squeezing Activities, Fine Motor Activities, Care of The Environment, Care of The Person, Matching Activities, Seriation Activities and Group Activities [8].

C. The Music Curing Method

The memory medical curing process can rescue the complete degeneracy. That appears an obvious help for Alzheimer's disease patients [9], [10].

Shyau-Ting Dwung pointed that the Music Curing Method uses the repeating tempo, tone and timber to relax the behavior of the period of losing the wisdom. The Music Curing Method speeds up the patients' medical curing period and relaxing the patients' mood all the way [11].

During the process of losing the wisdom, the cerebrum loses mass memory rapidly that causes people's satanic feeling and induce the potential sense of insecurity. The patients' might become unstable, heavyhearted and confusing. Few patients will become melancholy and hot-tempered at the stage of losing the wisdom.

III. RESEARCH METHODOLOGIES

In this work, we use an initial questionnaire to investigate if the patient is losing the wisdom. At the first step, we use 'the Mini-Mental State Examination' to gain the initial investigation data. Then, we inquired the medical related persons about the patients' behavior model. Those are used as the extending reference data. After generalizing the analysis data, the patients can use our system platform to compare if the patients are getting improved. The system research flow is shown in Fig. 1.

A. Literature Collection Method

The network game is created by Roy Trubshaw and the research work is based on the professional medical literatures. Those professional medical literatures can be made up for the lack of medical knowledge in our research process. Such as the occurring of the losing the wisdom, the factors of losing the wisdom, the transformation of losing the wisdom and the final conditions. At different point of view, the professionals suggest we can use the research result as the base in developing in this work.

B. Interview Investigation Method

Our research is to design an information system to rescue the Alzheimer's disease patients. Therefore, we must contact the patients and do the interviews.

At the stage of our 'System Requirements Planning', we arranged the case interview plan that appeared actual medical cure result.

The doctors of the Nerve internal medicine department, the patients and their family members are the interview targets. First, the Alzheimer's disease patient uses the 'the Mini-Mental State Examination (MMSE)' to evaluate the patient's degree. Then, combining with our interview questionnaire, the patient's take-care-time, the patient's cure record, the patient's recovery degree and the recovery tools are applied altogether. At 1st, we made an interview with the doctors and find out the connections between our system and medical cure process. We used the computer to record the entire medical cure process.

C. Practical Research Method

At the ending stage of system development, we invited the

Alzheimer's disease patients to join our testing plan. We used different testing methods to create different results those are used to judge if the system reaches the respected objective. We also found out if the systems are suitable in decreasing the pressure of the Alzheimer's disease patients. We asked the hospitals' corporation and assistance in the last testing stage.

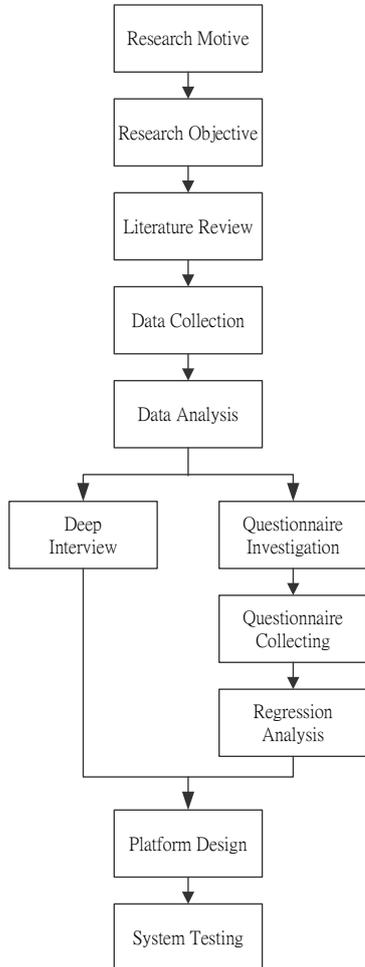


Fig. 1. The research process.

IV. RESEARCH RESULTS

In this session, we introduce the System Function, the System Characteristics, the System Development Tools, the System Environment and the Digital Game Frames.

A. System Function

The system includes the following two functions:

1) Wisdom games

The system is coordinating with the Mengthosouli Education activities. The system uses the feeling recognition, pictures recognition and sequence recognition to produce various kinds of games. These games are different from the general children wisdom games and focuses on the cerebrum function activities.

2) Music broadcasting

After the system starts, the music will be broadcasting. Music will help the patients decrease nervous, worry and

pressure and lead the patients more concentrate on the system.

B. System Characteristics

The system includes the following two characteristics:

1) The system is coordinating with the Mengthosouli Education Method and activating the Alzheimer's disease patients' brain area.

The system is coordinating with the Mengthosouli Education Method and involving the wisdom games into the Mengthosouli activities. The system helps the patients to use the repeating games to activate the brain area. The patients are attracted by the games and continued playing the games then.

2) The system combines with the medical curing process.

The system combines with the medical curing process and more close to the patients' daily lives.

C. System Development Tools

The system includes the following two characteristics:

1) Personal home page tools, PHP

Personal Home Page Tools is one of the tools in developing our system. PHP can be executed in the following operation system: Windows, Unix and Linux. PHP support many Web servers, such as Apache, IIS, PWS and AOL Server.

2) Apache server

Apache is one of the tools in developing our system. Apache is a open source source and free. Apache is stable and can be used in multi-platform. Apache becomes the best Web server in executing PHP.

3) Adobe flash CS3

Flash is the product of Adobe Company. Its specific purpose is to design interactive multi-animation software. The strength of Flash is its bright image animation and interactive operation those bring a real feeling for the users. Flash owns the back-end data development and data display ability. Flash can handle the development of small-size and middle-size website.

D. System Environment

The system usage environment is shown in Table I.

TABLE I: SYSTEM USAGE ENVIRONMENT

Usage Environment	
Developing Environment	Windows XP
Platform	PC · NB · UMPC
Software	Browser with Adobe Flash Player version 10.0.32.18 Browser with Webkit core and Trident.
Hardware	UMPC

E. Digital Game Frames

Some of the game frames are introduced in this session. The begin page of the games is shown in Fig. 2. The frame of the game instruction is shown in Fig. 3. The frame of game hints is shown in Fig. 4. We also add the envouraging words in the system. The encouraging words are to strengthen the Alzheimer's confidence. The shape recognition function is

designed in Fig. 2, Fig. 3 and Fig. 4. The living environment recognition function is designed in Fig. 5 and Fig. 6.

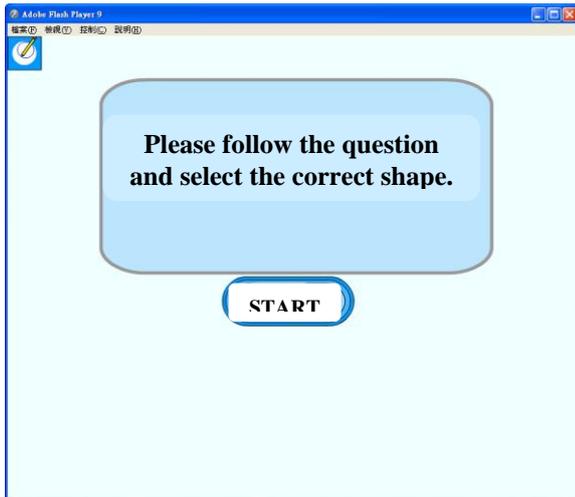


Fig. 2. The begin page of the games.

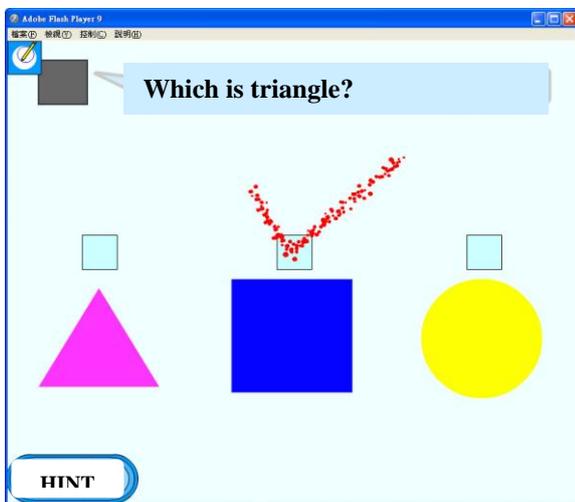


Fig. 3. The frame of the game instruction.

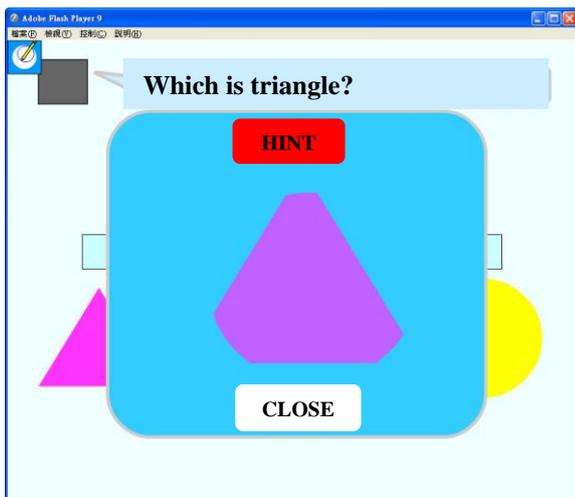


Fig. 4. The frame of game hints.

V. CONCLUSION

This paper focused on the people with dementia for rescuing memory research and designed an e-Learning platform. This paper combined with the characteristics of

assisting function as well as the user interface mode of the information techniques, the digital interactive games were designed and applied in this paper to stimulate the cells of the cerebrum of the people with dementia. The internet is employed as a medium that provides those people with dementia who can play the digital interactive games at home. The object of prevention and unlimited curing are achieved eventually. Numerous tests have been made to demonstrate the efficiency of the proposed approach.



Fig. 5. The menu of games.

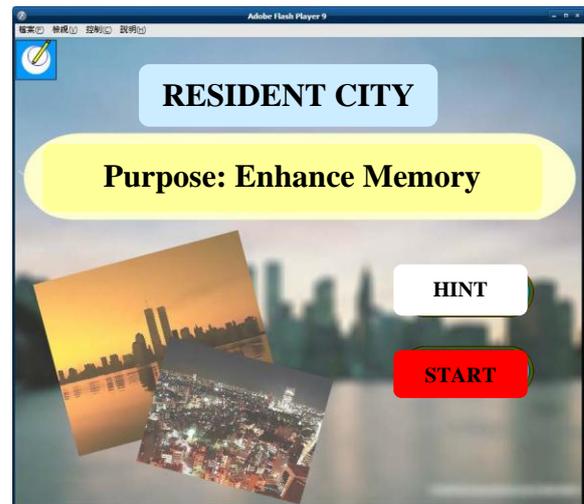


Fig. 6. Game: Resident City.

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