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Research Paper

Computer Aided Baking Course for People with Moderate and Severe Mental Retardation

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ABSTRACT:- In order to reduce the use of illegal software, Free Software Steering Committee was established in 2002, in Taiwan, and in 2003 was actively promoted and integrated into the computer teaching at schools at all levels including special education. The characteristic of free software was to reduce the economic burden of teachers. Also, the free learning activities promoted by the Ministry of Education reduced the cost of teacher learning. In this article, through the hands-on experience of a special teacher, it is found that using free software to make up educational materials is free from time and economic constraints. Teachers can easily follow needs of the student and curriculum at any time to design multimedia teaching materials by themselves; students can simultaneously use teaching media, reducing costs on teaching tools. Self-designed interactive game teaching software can not only effectively enhance the concentration, memory and procedural knowledge of students with moderate and severe mental retardation, but also improve the classroom learning atmosphere. What is worthy of consideration in the future for teachers who are engaged in special education should be how to apply free software to teaching and how to act on its effect.

Keywords:- free software; procedural knowledge; people with moderate and severe mental retardation; interactive game software; computer assisted instruction

I. INTRODUCTION

People with moderate and severe mental retardation have IQ ranging from 35 to 55, less than 2 standard deviation than the average [1]. They are dependent in self-care and self-living, and they need rely on others for long-term care. Such kind of students shows characteristics of no fixed concentration, bad memory, poor identifying, thinking and reasoning ability, and they are also not good at organize learning materials[2][3][4][5]. Poor learning ability makes their learning motivation low. Thus in the face of challenging study or work, they are easily to withdraw or impose reliance on others for assistance. Therefore, considering the physical and mental development of people with mental retardation, the material design should be plain, understandable and lively to adapt their physical and mental development. Combined with daily life and work experience, the selection of materials should be based on students' interest and ability in learning. As to teaching strategies, they must be designed and operated in sequence systematically. For analysis of teaching materials, detailed performance analysis is employed to suit individual needs, which is conducive to carry out teaching activities. Systematic instructional strategies are used to give guidance on students' learning.[6].

With the rapid development of information technology, the application of information technology has already become the trend in all sectors, without exception of education. Integrating information technology into teaching has become a teaching trend in the world. Information technology can provide text, sound, graphics, animation, video and other media channels to transmit varieties of teaching media materials and offer interesting learning experience for learners, which helps to improve their learning motivation and concentration[7][8][9][10]. Since students with moderate and severe mental retardation have poor abstract thinking skills. Computer assisted teaching can help students to extract information in encoding memory and future memory [11].

II. BACKGROUND

Interactive games are the most popular form in computer assisted instruction. Combining learning and game fun highly enhances users' attention span and develops their logic of knowledge and motor skills (such as: hand-eye coordination)[8][12]. The concept of Game-based teaching design oriented at interaction gradually gets more and more attention from teachers. The vivid content increases students' interest in learning.

As to teaching in special education, due to the overlarge inter-individual difference of special students, the teaching materials mostly are designed by teachers engaged in special education according to their students' needs. Varieties of interactive learning softwares on sale are too abstract or difficult for students with moderate and severe mental retardation. However, it is difficult for the field expert to develop related interactive teaching software which is oriented to the field of special education.

In terms of the field standard, the participator in the production of interactive multimedia materials include: project manager, curriculum planning and designing personnel, engineer in software program, art designer, animator, music procedures. For teachers engaged in special education who have not received any professional training, the production of interactive multimedia materials is extremely difficult. Furthermore, the common commercial production of interactive game software is private in copyright and the selling price is beyond what an ordinary teacher can afford (such as: flash).

The concept of free software was put forward by Richard Stallman from the Massachusetts Institute, he believed that free software was the common wealth of mankind and should be free to spread. Free software can be freely performed, reproduced, distributed, studied, modified and improved. Free Software Steering Committee was established in 2002 in Taiwan for the funding promotion of free software. The Ministry of Education helped schools at all levels to promote free software under the instruction of the project designed by the Ministry of Education from year 2003 (the project was called as OSSACC, OSS Application Consulting Center)[14]. The free softwares promoted include:

1. Word processing type (Open office etc.)
2. Image processing type (GIMP、 PHOTOCAP etc.)
3. Animation software type (UNFREEZ、SCRATCH etc.)
4. Website setting type (APACE etc.)
5. Database type (MYSQL etc.)
6. Browser type (Firefox etc.)
7. Programming language type (PERL etc.)

The software has the unique feature of reducing the economic burden of teachers. The free learning activities promoted by the Ministry of Education also can reduce the cost of teachers' learning. In this article, the hands-on experience of a teacher in special education and the effects in practice which are obtained by interview, are considered as reference for the future promotion of free software at campus.

III. CASE REPORTS

In Taiwan, the course with high position in the centralized special learning can be divided into three areas: Professional life ability, family/personal life ability and community life ability. The teaching contents in any field develop with the professional courses as the core. The cognitive ability that Professional courses necessarily possess is to understand what to do and how to do. That is accumulated by the procedural knowledge. Procedural knowledge is also a kind of illustrative knowledge, is a kind of knowledge about the relation between the stimulus and reaction, and is the foundation to learn the skills and behavior programmed. This paper took the baking course as a core curriculum, used interactive games for teaching and constructed the related procedural knowledge.

The teachers taking part in designing this teaching unit have already finished 40 professional special education points, have not yet received any professional information courses(e.g.procedural design),and have already received the 24-hours research about the free software Scratch. The average age of the teaching subjects is 17-year-old, and the average IQ is between 35 and 50. All of them are people with moderate mental retardation.

The Framework of Baking Course

This course totally has four sub-units, each of which can be further developed to course materials in three fields (figure 1). This paper taking the first unit for example constructed the game script for every field by adopting the free software Scratch. The teaching goals and the learning effects in every field of this teaching unit are just shown in the below table.(table 1)

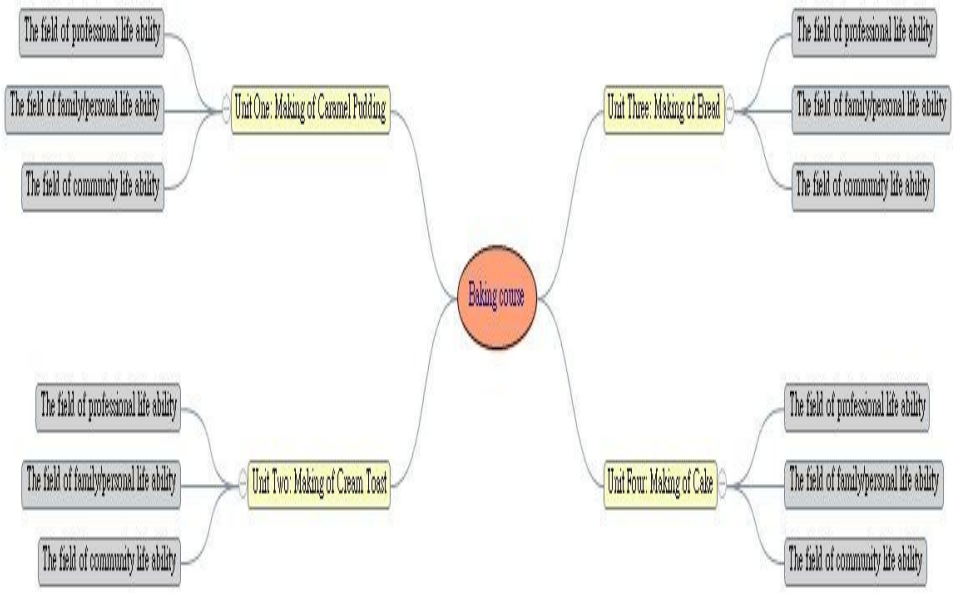


Figure 1: the structure of baking course

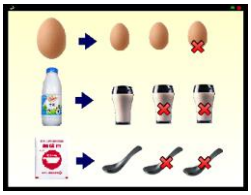
Table1.teaching goals and learning effects of the teaching unit

fields	**teaching goals**	**Students' learning effects**
professional life ability	Be able to understand the designing process	The students can orderly finish the work obeying the designing process and steps
family/personal life ability	Be able to prepare the dosage of the materials	The students can correctly prepare the dosage of the materials
community life ability	Be able to purchase the materials	The students can choose the proper materials

The Application of Free Software Scratch

Scratch is a new procedural language developed by MIT (Massachusetts Institute of Technology), which can be used to create interactive stories, cartoons, games, music and art. This unit adopts the free software Scratch to design and construct the procedural knowledge related with the students and courses so as to achieve the students' learning effects. The designing of interactive game scripts in the teaching unit is as follows.(table 2)

Table 2: the game scripts of the teaching unit

fields	professional life ability	family/personal life ability	community life ability
Game scripts			
The instruction of game	Students can put the making steps in the correct digital card. Get full marks if they are absolutely right.	Students can judge the dosage of materials correctly. Get full marks if they are absolutely right.	Students can catch the needed materials with the basket correctly. Get full marks if they are absolutely right.
The goals of game	The students can orderly finish the work obeying the designing process and steps	The students can correctly prepare the dosage of the materials	The students can choose the proper materials

IV. RESULTS

The implementation effects of the teaching unit are as follows.

1. It is not limited by time, space, and economy: it needs at least several months for the teachers to learn a set of professional cartoon software in daily life. Besides because the copyright of the business software is owned privately and the teachers' economic conditions are limited, using free software to design textbooks can reduce the teachers' learning cost.
2. It reduces the time on preparing for the lessons: the traditional special education in the past mainly used the picture cards and material object. Its designing process was to purchase, take photos, design cards, and then make teaching tools. Teachers wasted much time. Teachers' pictures can be reused through CAI so as to reduce the time on remaking.
3. It lowers the making cost of the traditional teaching tools: it was difficult for teachers to make pictures and material objects for every student. Through CAI, students can use the teaching media making by teachers at the same time, and the making cost of the teaching tools can also be lowered.
4. It meets the requirements of students, teachers, and courses: teachers can easily design interactive games (figure2) with moderate difficulties for different students according to each unit. If teachers develop the free software by themselves, it is not necessary to rely on the professional development assisted by the manufacturers or pander to the teaching software in the market.

5. Favorable class management: it uses interactive games to improve student's ability of solving problems and enlighten student's ability of thinking and creativity. And also it helps to improve students' interest on learning and the learning circumstance in the classroom.

6. Campus teaching is tidied as a whole (shared through cross-plateform): every teacher can store self-designed media textbooks through the unity of network resource. Out of the control of time and space, it achieves the communication of the teaching resource and the goal of sharing and creates the learning circumstance without any obstacles.

Figure 2: students' actual operation situation

V. CONCLUSION

Teaching media using interactive games helps to improve the teaching quality, diversity enlightening, and the study of unity and autonomy. It's more helpful for the people with moderate mental retardation to focus attention and promote learning motivation. It is worth for the special education teachersconsiderating how to apply it in the teaching and realize its effects. The process of making up the media teaching materials is to provide for students, improve the teaching quality and avoid causing puzzle for the designers. Free software solved the former problem of business copyright, lowered the teachers' economic burden, and also realized that information technologies were implied into teaching.

That information technologies were implied into special education does not mean that it replaces the traditional education. Teachers can add more chances to the students through the media materials, and promote students' interest in learning.

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BIOGRAPHICAL NOTE

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