Digital Contents Apply to E-learning on Physical Education

Chun-Hong Huang[1, 2] Su-Li Chin, Chun-Yeh Liu[3], and Yi-Pei Yu[1]

[1] Dept. of Computer Information and Network Engineering,
Lunghwa University of Science and Technology
ch.huang@mail.lhu.edu.tw
[2] Dept. of Physical Education,
Tamkang University
[3] Physical Education Office,
Fu Jen Catholic University

Abstract

Digital contents can be applied to applications such as Digital Archives, 2D/3D animation, Entertainments, Mobile content and Network service, digital publishing, Contents software, and E-learning. Digital contents of teaching material can increase the learning efficient and interesting, especially for the Physical Education learning. In this paper, we shoot the films of sports actions, and they are described by editing video into some desired clips for teaching and learning. The actions after post-production would be stored into the action database. We utilize multi-videos to display the sports action clips with three angle views which include in the front, the right front side and the left front side. Besides, the learning of the rules of sports is also considered in this paper, since the morality of sports is based on the rules of sports. The design concept of our work is based on ADDIE model. As a result, players or users can learn various sports skill within the shortest period of time by looking at the actions from our system repeatedly. When players or users pursue the skill of perfection, they also can know and understand the rules of sports. The system is expected to become a computerized education aid to sports action teaching and training, and to be the scientific and un-stereotyped system in Physical Education.

Keywords: Multi-videos, E-learning, Physical Education, ADDIE, sports skill, rules of sports

1. INTRODUCTION

Digital content has the capability to represent something which may exit in a real world or is the abstract thinking. It can be applied to applications such as Digital arts, Digital Archives, 2D/3D animation, Entertainments, Mobile content and Network service, Digital publishing, Contents software, and E-learning.

In 2008, according to the investigation of Digital Content Industry Promotion Office in Taiwan[1], the growth rate of E-Learning is 8%, Contents software is 11%, and Mobile application is 25%. 2D/3D animation had the greatest growth rate, and its growth rate is 32%. E-Learning is a trend of education, although it can assistant teacher and reduces the loading on teaching, the most E-Learning systems focus on general subjects such as linguistics, mathematics, management, or science. Since sports activities are placed importance on our daily lives progressively, the E-learning should try to lay more stress on physical education.

In this paper, we aim to develop an E-learning system on Physical education which integrates some applications of digital contents such as 2D/3D animation, digital video or contents software. Because Physical education has the distinguishing characteristic to other study areas, the applications of digital content are suitable for E-learning on physical education deeply. In our work, besides the development of learning system, we also design the teaching materials which include the digital video and Flash animation. We integrate the system with these digital contents to support the interface which allows the users to learn the kinematical movements via different angle views with the continuous frames. One issue of the system focuses on the training of basic kinematical movements, the most video clips present the basic kinematical movements which include the correct and wrong actions. For some action types, the player merges the basic movements to represent the continuous actions. The basic kinematical movements and the continuous movements are stored into database after post-production. Our system can display the basic actions as well as the continuous action.

Another import issue in this paper is to learn the rules of different sports. Since the implementation of the morality of sports is based on cognition, the player should know and understand the rules of sports. Therefore, we try to use the animations to represent the rules of sports.

2. RELATIVE WORKS

Supplying the diversiform learning method and viewing the action skill repeatedly is quality importance when students learn the sports skill [2][3][4][5]. Because the specific features of media, teaching materials which are created based on computer multimedia can satisfy the demands of teaching and learning. Therefore, a learning application which integrates digital media contents can apply to Physical education and supply the sense effect and increase learners' learning motivation and desire. It also plays an assistant role to help teacher to teach students when students get out of class. Katz, L. believed that the integration with the strong capability, plasticity, and the information management policy of computer can produce the distant prospect to the combination with scientific technology and physical education. Knudson, D., and Kluka indicated that the action demonstration in the media is an efficient and appreciative guidance for sports action learning. It can strengthen learners' realization, cognition and study.

In [6], authors tried to find the content information of movement tracks of players in a basketball game video sequence and record the location of the defensive motions as well as tracking players' offensive motions. After extracting the contents of locations in continuous frames, spatial relationships are utilized to define the players' relationships for evaluating basketball local defensive strategies. A dynamic programming method is adopted to compare the offensive trajectories that had been transformed into serial coordinates. The system can retrieve the similar defensive and offensive strategies efficiently based on the content information which is extracted from players' motion tracks. It will help coaches and players to learn how to carry out the tactics via continuous frames without marker pens and colored magnets that are used to demonstrate specific tactics.

In recent year, a very popular area of computing is Virtual Reality. The purposes of Virtual Reality are to describe methods of interaction and simulation with the 3D environment. VR can be thought of Human-Computer Interface to 3D simulation model which allows the user to enter, interact and grope for the real world that concerning to the system[7] [8]. NICE [9] is a very power and realistic simulation that allows a direct participation of the users. It is an interactive virtual learning environment for children. With the interaction to this virtual environment, children can plant a garden and create the stories as a result of their activities collaboratively.

With regarding to the features of VR, VR is very suitable to be applied to E-Learning system especially in physical education. However, the production cost of VR is higher, and it needs not only the hardware within the high performance but also the professional technology of 2D/3D Graphic design.

3. SYSTEM DESIGN

3.1 Design concept

The construction procedure of our system and teaching material are based on the concept of ADDIE model [10][11] which includes several tasks in our works as the following:
(1) Analysis:

In the Analysis phase, it includes two tasks- **Demand Analysis and Content Analysis**.
(1-1)Demand Analysis:
　　It carries out the analysis of demand to specific subject of physical education. Therefore, the first question is who is the audience? Obviously, the answer is the sports player and coaches. The second question is what do they need to learn? According the Physical education Professors' ideal, sports skill and rules of sports are suitable to learn for players.
　　A. We also should consider the delivery options which should be included in the E-learning system. The system must display teaching contents with professional, interesting and funny way to attach players and coaches to use.
(1-2)Content Analysis:
　　This task focuses on the kernel of material and correction, and the suitability of content. Besides carrying out the content analysis of

network data, scientific or technical literature, and teaching media, it also needs to invite the specialists of sports to analyze the contents, and institute the teaching framework and learning policy. At last, it analyzes the contents that will supply to learners.

(2) Design

To represent the logicality of teaching material clearly and systematically, it is necessary to draw the script with matching up the Human-Computer Interface. The mechanism of interaction and feedback evaluation of the application should be designed. The video, image, voice, text, and effect are needed to pre-process for the production of teaching material and development of application. Next, carry out the design of system architecture and the production of teaching material.

(3) Development:

Depending on the output of Design and Implementation, a programmer starts to develop the system and integrate with the teaching material.

(4) Implementation:

In the implementation phase, a plan has been developed. The plan should conclude the timeline of implementation, and establishes the procedures for training the players or the learner. And the procedures for delivering the final product also should be established. The final system is developed based on needs, testing and modifying of system while utilizing a prototype system with members of the target audience.

(5) Evaluation:

During the period of testing and modifying of system, learners and coaches start to use and evaluate the system. They may propose their suggestions which will be the reference for modification the system or the teaching material. Next task is to carry out the testing and evaluation by specialists whose research areas are in Human-Computer Interface, educational technology, and physical education. Finally, the correct teaching material will apply to the implementation of teaching, and try to find the problems and correct it by carrying out the entire evaluation to system.

According the concept of ADDIE model, the procedure of our E-learning system on physical education is shown as figure 1.
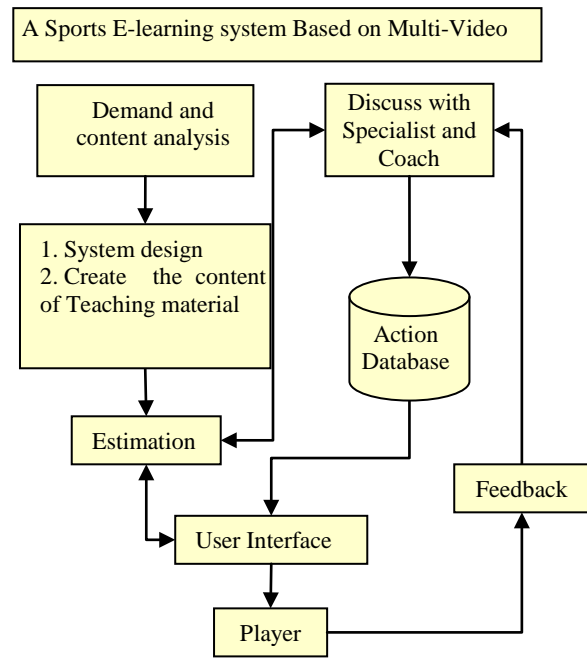

Figure 1. The procedure of our E-learning system on physical education.

3.2 The Content Design of Teaching Material

Many professors of physical education consider that the traditional teaching method of sports should be digitized, and need more Computer Assisted Learning system to help the players to learn key points of sports skill in the developed era. Regarding to the notion of these professors, we plan to construct a Sports E-learning system that will integrate some types of teaching materials. And the teaching materials shall combine the multimedia factors of video and speech at least.
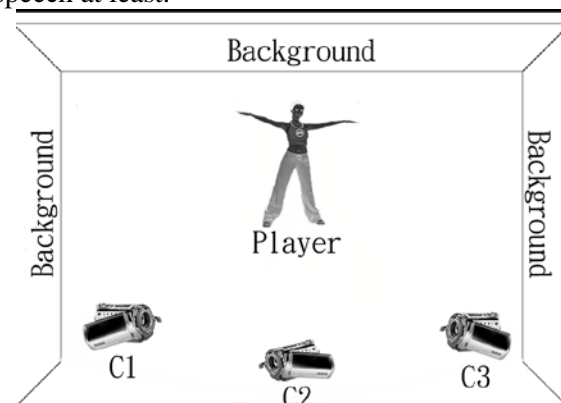

Figure 2. The placement of the cameras in the studio.

In our work, we develop a Physical E-learning system which integrates the digital contents of

Multi-View Video and 2D animation. Therefore, we need to shoot the sports actions first for sports skill learning. The types of sports actions include kickboxing, tennis, badminton, Chinese martial art, basketball, and physical fitness and etc.. Each sports type includes several basic actions, and some of the types have the continuous actions. Three video cameras are used to shoot the actions synchronously, and the video cameras are placed in three different directions which are put up in three orientations as shown as figure 2.

After the task of film shooting was finished, t to carry out the post-production for video clips is the next work. We use the video editing application to extract the appropriate clips that we want. The clips need to be edited further, and the effect of slow motion will blend into the clips. Then, the clip with the effect of slow motion will be connected within to its relative clip. Next, we ask the specialists and coaches to evaluate the actions. According to their sufficient and professional knowledge, the actions are discriminated into standard actions and non-standard actions. All of the action will be reprocessed with combining the speech guidance, and no matter the standard actions or the non-standard actions will be stored into the database. A player can see the actions with the three different angle views via the user interface. With the comparison between the correct and the wrong actions, he/she may find the mistake of the non-standard action, and takes care that the mistake can not be made when he/she practices the action or in sports tournament. Players or users may supply the feedback or suggestion about teaching materials or system, and these comments can be the reference to modification.

Another work for learning is to learn the rules of sports. In order to raise the interest in learning of users, the learning contents should be displayed with a vivid and vigorous way. Therefore, we use animations to represent the rules of sports. Adobe Flash is a powerful tool that is quite suitable to create the learning content of rules of sports.

4.   DEVELOPMENT

The works of development include fabrication of teaching materials and system development. We must spent much time in fabrication of teaching materials, since the pre-work of teaching materials that are based on multiple-video includes the shooting, editing, post-production, and needs to evaluate the discrimination between good and bad. To create the animation for represent the rules of sports also needs to spend much time.

4.1 Development of teaching materials

For sports skill learning, each action is shot in three different angles synchronously, and we use the video editing application to edit the video as figure 3 shows.

Figure 3. The editing application is used to edit the action video and the voice of action guidance.

The speech guidance will integrate with the video, since the voice is also an important factor for learning and teaching. Therefore, the voice of action guidance from specialists is recorded and combined with the video. Now, our action database stores 107 actions which include standard and non-standard actions, and we increase more actions continuously.

Figure 4. Using Flash animation to represents the rules of sports.

The learning contents of sports rules are created by Flash animation development tool. The tool is not difficult to use, but producer needs more originality to fabricate the interesting, vivid and vigorous animations. Figure 4 shows the

Flash animation that represents the rules of sports with a vivid and vigorous way.

4.2 System development

In the work of System development, we also use the development tool of Adobe Flash to develop the learning platform as figure 5 shows.

Figure 5(a). The same action is displayed with three different angle views in three media players simultaneously.

Figure 5(b). The same action is displayed with two different angle views in two media players simultaneously.

As figure 5 shows, the media players display the same action with three different angle views via the user interface. A user can interact with the system via this interface. One action which has three different orientations can be displayed in three Flash media players simultaneously, or only two of three Flash media players display the action simultaneously. Certainly, the user also can control any one of them. As the reason that mentioned in[4][5], learning the sports skill with diversiform and repeated way yields twice the result with half the effort. Therefore, the user can learn the sports action with the repeated clip via this learning platform, and the clip integrates the slow-motion effect and voice of guidance.

At present, we have demonstrated the system to four professors and forty students of physical education, and most of them thought that it is helpful in learning phase of some specific sports. Some of them gave the suggestion on increasing one view on the top. According to their comments, our system is feasible on E-learning of Physical education. Here, we must emphasize that the system only plays the role as auxiliary, and teachers or coaches are still the most important roles on teaching and learning sports actions.

5. CONCLUSION

In this paper, we designed an E-learning system for Physical Education that are based on the concept of ADDIE model and produced the teaching materials with the multimedia factors –video and animation. Users can view a sports action clip with three different angle views. He/she can only control the one seek bar of any Flash media players of the user interface, and any one or two or all of Flash media players will display the synchronic actions. For students, the learning contents that our system supplies is not only used to improve the sports skill but also to establish the cognition of sports morality. Maybe we should consider the humane and cultural cerebration when we want to create some computer systems.

Here, we do not emphasize on the complex technology for system development, but on the contrary we use the easy technology to fabricate the teaching materials and develop the Physical education E-learning system. We hope that E-Learning on Physical education can be attached great importance since people pay close attention to their body healthiness and many sports activities have became the professional job.

Now, our system only supplies the teaching material for learning, it will integrate with the Assessment in the future. To achieve the better learning efficiency, assessment system must be integrated with this learning platform. We will also demonstrate the system to the more professors and students of physical education, and ask them to give us more suggestions for verifying the degree of feasibility, and improving the system and learning contents.

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