Scheme Design of Health Management Course in Metaverse

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Abstract. Based on the emerging concept of metaverse, combined with the existing educational meta-verse, launched the meta-verse migration exploration of health management curriculum, relying on the existing laboratory and hardware equipment resources of the college, put forward the construction ideas and objectives of the curriculum. At the same time, according to the particularity of the motion state under the virtual reality scenario, a motion state sensing and monitoring system based on the wearable sensor is developed, which has an important application and reference value for the course teaching, meta-universe fitness game development and other scenarios.

Keywords: metaverse · health management · physical fitness

1 Introduction

The metaverse is not exactly defined, the term was originally derived from the science fiction novel Avalanche, and the concept has been used in several science fiction films. In film and television works, people live in a three-dimensional digital space with virtual images and interact with various software. Today, the more widely recognized metaverse is built through digital twin, cloud computing, big data and other advanced means, a virtual space parallel to the real world. In this space, users can participate in a series of activities such as games, social networking, and trading, as well as participate in creating value [1, 2].

Although the metaverse has a strong game color since its birth, and is considered by the public as an entertainment space to make up for the shortcomings of the real world. In fact, the metaverse has great potential in the field of education and training. Article [3] combines science and technology and humanities, put forward a complete system for metaverse knowledge teaching from the perspective of environmental construction; The [4] not only designed a complete architecture for metaverse distance teaching, but also demonstrated the promotion effect of metaverse teaching on students' cognitive learning through experiments.

As an emerging vocational education course, health management course has been basically promoted in State Grid Zhejiang Company, serving tens of thousands of

Z. Zhan et al. (Eds.): ICBDIE 2022, AHCS 5, pp. 1106–1112, 2023.
https://doi.org/10.2991/978-94-6463-034-3_113

employees. With the rise of the concept of metaverse, the problems of scattered personnel, few class hours and lack of guidance in the original teaching process of health management will be solved.

2 The Health Management Class in the Metaverse

Health management and as a complex and practical interdisciplinary, not only need to train students provide enough cognitive theory knowledge education, but also need to afford students exercise intensity, load state, posture, personal safety aspects, more need to face improve students self-discipline and heteronomy spirit, stimulate interest. With the rise of the metaverse concept, this online platform based on virtual reality, big data, Internet of Things technology has given health management courses an opportunity to develop rapidly.

First, in the aspect of curriculum, the original two general theoretical and practical course modules are adjusted to advanced learning, with comprehensive health and quantitative consideration for health state, sub-health indicators and physiological conditions. The phased teaching and assessment content with the learning content, focusing on the task orientation, result orientation and time orientation, the results, providing a reference scheme for the personalized generation of characters in the Metaverse.

Secondly, it is the deepening combination of teaching and multimedia means. The abstract concepts in the teaching process can be interpreted by multimedia to enjoy. Take the course "Hazards of Obesity" as an example, which is part of health management, the traditional teaching process is mainly through the list of diseases caused by obesity and some pictures. After the introduction of metaverse course, through the numerical simulation and modeling filter, students can experience the difficulties of the theoretical teaching mode.

Finally, the optimization of the training process. In addition to the intelligent correction of sensors, treadmill, power equipment and other equipment, metaverse can also learn from the advanced experience of game manufacturers, with plot design as the key, interspersed with sports training. Create points and value system to improve the attractiveness of training content (Fig. 1).

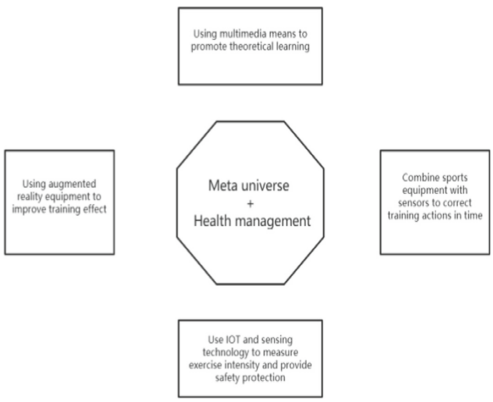

Fig. 1. Health Management course in the context of metaverse (Drawn by the author)

3 Health Management Metaverse Technology Architecture

Relying on the existing AR/VR laboratory hardware of State Grid Zhejiang Electric Power Training Center and the cloud service equipment of State Grid School, we plan to complete the content of the health management course within three years. Its main technical architecture is planned as follows:

The device layer includes cloud servers, edge computing brains, mobile terminal devices, augmented reality devices, and wearable IoT motion sensors;

Communication layer: terminal server adopts gPRC protocol, edge computing and metachocosmic link interaction adopts gossip protocol, wireless LAN through WiFi, and distributed sensor adopts ZigBee protocol;

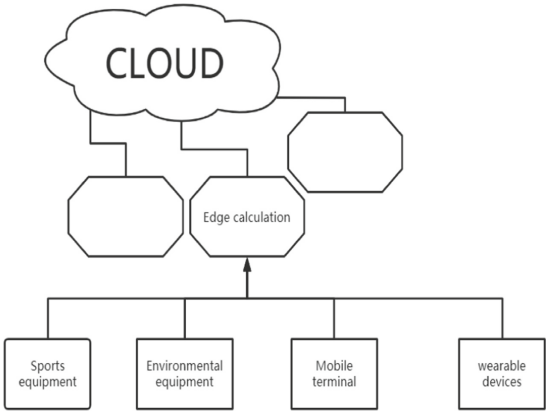

Fig. 2. System link Architecture (Drawn by the author)

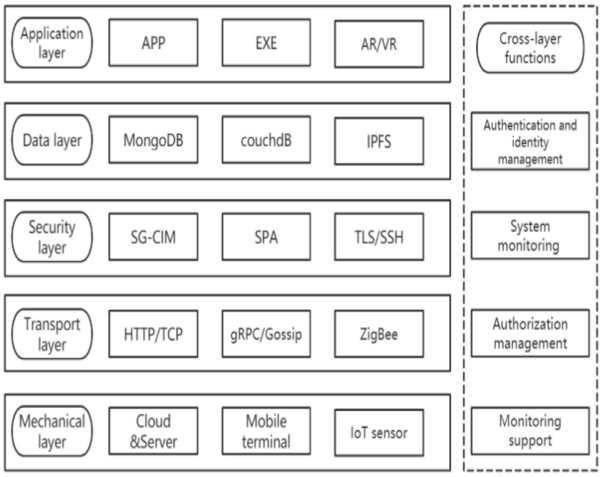

Fig. 3. System Technical Architecture (Drawn by the author)

Security layer: the equipment is mainly operated in the internal network of the state grid system, and is coupled with the external network and the mobile terminal through the SG-CIM;

Data layer: Based on the great complexity of the system link and data flow, select the distributed document repository MongoDB and the interstellar file system (IFPS);

Application layer: includes the mobile side APP and the network side (Figs. 2 and 3).

4 Model of Health Management in the Metastrosmos Context

Compared with the fitness games on the market, health management courses have more stringent requirements for students' exercise intensity monitoring and exercise amount calculation.

To better measure the motion effect, it is necessary to design a wearable motion sensor device based on distributed IoT and build a new motion effect measurement system.

As shown in the Figs. 4 and 5, four groups of limb sensors, two groups of trunk sensors and a group of heart rate & blood oxygen sensors are networked through the ZigBee protocol, and the motion monitoring software is built in the upper computer to analyze and monitor the activity status of the subjects. The concept of exercise intensity and physical fitness was introduced as [5, 6], and the exercise medium exercise intensity target and target MET were constructed and analyzed combined with numerical examples.

Invite a volunteer to perform functional validation in the lab. The athlete wears the sensor and performs aerobic training non-stop for half an hour. Use software to perform operations on the data returned by the sensor to obtain the results shown in Fig. 6.

Through Fig. 6, we can obtain the movement intensity of the athlete's limbs and trunk. Based on this, we can analyze the energy consumption and physiological metabolic

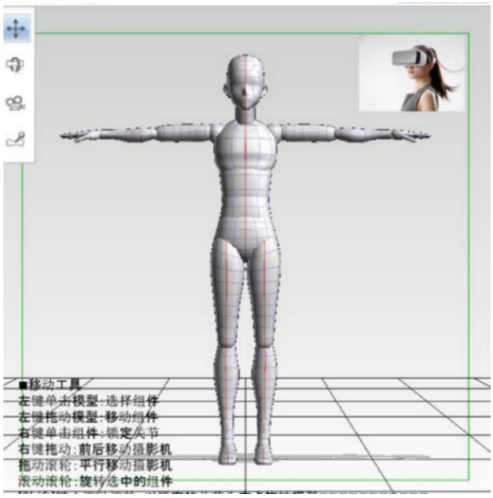

Fig. 4. Software pose capture

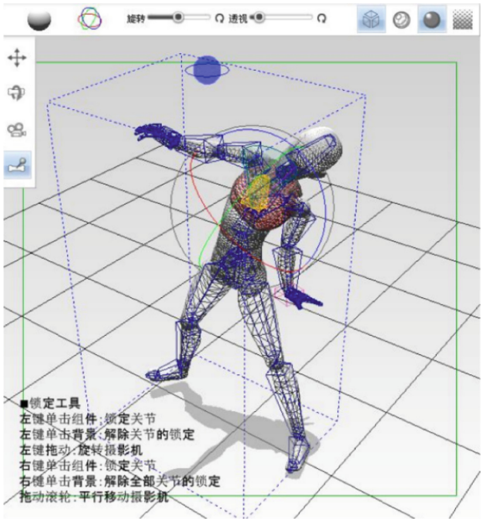

Fig. 5. Software motion state analysis interface

process of the limbs in the process of athletes participating in the metaverse game. Using the exercise prescription provided by ACSM can better complete the planning of game exercise volume and rhythm [6–8].

Figure 6 shows the fluctuations in the heart rate of an athlete during aerobic exercise. On the one hand, by comparing the target heart rate and the heart rate curve, the exercise intensity can be adjusted in time through the system. On the other hand, real-time heart rate monitoring can ensure the safety of athletes and avoid excessive exercise and accidents.

Comprehensive analysis of the movement of various parts of the body and the data of heart rate and oxygen consumption can more accurately obtain the intensity of the exercise process. Figure 6 shows that the better exercise in the first half of the subject was in moderate exercise intensity, and the exercise intensity fluctuated greatly in the second half.

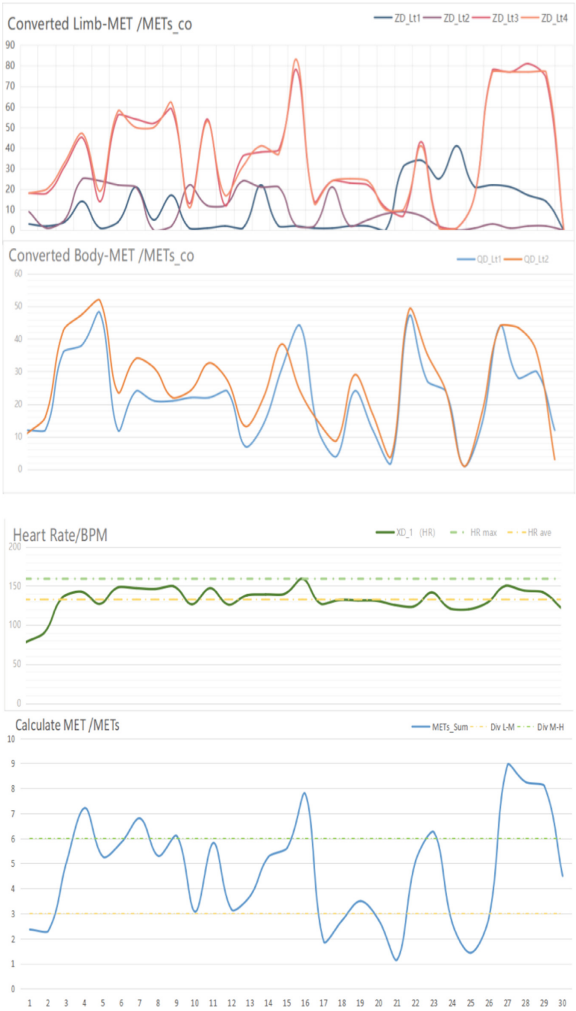

Fig. 6. Example data and analysis results

5 Conclusions

Based on the existing traditional health management curriculum, this paper further deepens the metaverse online education architecture and takes the first step on the road. In the face of many difficulties of metastrosmological teaching, this paper designs and innovates from three dimensions of curriculum design, architecture analysis and health management model. In the follow-up course development, it has played a role in linking the past and the future.

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