A Study on the Application of VR Technology in Personnel Quality Assessment

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Abstract

VR technology, a brand new technology developed in the 20th century, is a mutual combination of virtual and reality. Its implementation is a computer simulation of virtual scenarios thus giving people a sense of scene immersion. With the continuous development of social productivity and the continuous innovation of Internet technology, VR technology is gradually applied to all walks of life. In recent years, VR technology has been gradually applied to the field of personnel quality assessment in enterprise human resource management, but the combination of VR technology and personnel quality assessment is still in the preliminary exploration stage. Therefore, this paper researches VR personnel quality assessment in this context to provide help for further effective combination of VR technology and personnel quality assessment in the future.

Keywords: VR technology; personnel evaluation; human resources; quality

1. INTRODUCTION

Virtual reality technology is the latest computer simulation to build a virtual world, is a hot topic in today's technology research, application prospects are very broad, and gradually applied to the field of personnel quality assessment, but the research in the field of personnel quality assessment is only in the theoretical exploration stage, the future needs more experiments and data research. This paper introduces the conceptual characteristics of VR technology and its research status in the field of personnel quality assessment, and compares it with the traditional personnel quality assessment tools, based on the theoretical basis of leadership behavior formula and iceberg quality model, with the help of "potential model" developed by Beijing Institute of Potential Big Data Science, and with my experiments in VR personnel quality assessment. Based on the theoretical basis of the leadership behavior formula and the iceberg quality model, and with the help of the "latent quality model" developed by the Beijing Institute of Latent Data Science, and taking my behavior in the VR personnel quality assessment experiment as an example, we propose suggestions for the further integration of VR technology and personnel quality assessment according to the current problems of VR personnel quality assessment.

2. VIRTUAL REALITY

2.1. Concepts related to virtual reality

VR, or Virtual Reality, also known as the Spiritual Realm, is a computer simulation system that allows people to be immersed in a virtual scenario, mainly by using computers to generate a simulated scenario that immerses people in that scenario. VR technology uses our real-life experiences to be transformed into a virtual scenario through electronic signals generated by computer technology, and the various phenomena in the scenario may be what we often seen, or may be invisible to our naked eyes [1].

2.2. Characteristics of virtual reality technology

Xu Yifu summarizes the characteristics of VR technology as "3I", namely immersion, interactivity and conceptualization. He believes that immersion is a kind of "deception" of the human senses by VR scenarios, which gives the experiencer a strong sense of presence in many aspects such as sight, sound, smell, taste and touch; interactivity means that VR scenarios can provide the experiencer with a human interface and natural feedback. When the evaluator enters the virtual scenario, the evaluator and the virtual scenario interact, and when the

evaluator performs a certain operation, the surrounding environment will also make a certain response; conceptualization refers to the fact that under the support of immersion and interactivity, the changes in the state of the scenario and interactive behavior lead the participants to conceptualize the future. Xu Yifu also pointed out that, with the progress of big data on the Internet, the means of modeling in colleges and universities, which is derived from the learning of images and videos, has become a hot topic, and "intelligence" may become an important feature to guide future VR technology research [2].

Scholar Gala Minhao, on the other hand, believes that VR technology is multi-perceptual in addition to being immersive, interactive and conceptual. He believes that the immersiveness of virtual reality technology depends on the user's perceptual system when the user perceives the stimulus of the virtual world, it will resonate with the mind and cause psychological immersion, feeling like entering the real world. The ideal virtual reality technology should have all the perceptual functions that people have[3]. Scholar Xuan Cao also proposed that VR technology has autonomy, which refers to the degree to which objects in the virtual environment act according to the laws of physics. For example, when pushed by a force, the object will move in the direction of the force, or topple over, or fall from the tabletop to the ground, etc. [4].

2.3. The current state of development of virtual reality

With the progress of productivity and the needs of the times, there is a growing demand for scientific methods and technologies that can simulate nature and better adapt and utilize it. In this context, virtual reality technology was born. VR technology is closely related to simulation technology, and its origin can be traced back to the ancient Chinese talking kites. In Mozi-Lu Wen, it is recorded that "Gongluo Ban made a magpie out of bamboo and wood, and flew it for three days." The realistic and interactive behavior of kites is an example of the application of simulation technology in people's life. After a long history, in 1929, Edward Link designed a simulator for training pilots to enable riders to achieve a sensory experience of flight; in 1956, Morton Heilig developed Sensorama, a multi-channel simulation experience system[5].

Since the 21st century, VR technology has been developed at a high speed, and the software development system has been improved, and 2016 is called the "first year of VR". At present, the basic research in this field in developed countries, led by the United States, is mainly focused on perception, user interface, background software and hardware. Although China started late and developed slowly in the research of virtual reality technology, it has also achieved initial development. In recent years, relevant departments have begun to pay attention to the practical application of VR technology, and a series of research plans have been formulated. In addition, some domestic universities and enterprises are also conducting research in different fields and have achieved good research results. Nowadays, virtual reality technology is developing rapidly, and the methods of personnel quality assessment in human resource management of enterprises are also being updated, and the relevant fields have found that the characteristics of virtual reality technology can better compensate for the shortcomings of traditional talent assessment tools. Therefore, the combination of virtual reality technology and personnel quality assessment will create greater practical value.

3. THEORIES RELATED TO THE ASSESSMENT OF THE QUALITY OF PERSONNEL

VR personnel quality assessment is a comprehensive use of virtual reality, artificial intelligence, big data and other cutting-edge technology methods, with the help of high immersion, high interactivity, high multi-sensory VR experience way, the workplace potential big data assessment teaching experiment. The experiment uses the scene building function of virtual reality technology to build a virtual immersion scene as the data collection end according to the VR assessment system on the PC side, and adds various scenes of interaction in the virtual scene, through the organic combination of language, behavior, physiology, emotion and other multi-dimensional data, and the scientific analysis and calculation of intelligent algorithms based on the expert system, so as to analyze the performance of the assessor in the virtual environment and finally get the assessment results. The assessment results are finally obtained by analyzing the performance of the assessor in the virtual environment.

The application of VR technology to human resource management is beneficial for enterprises to conduct career quality assessment in order to maximize organizational utility. Enterprises use big data, artificial intelligence, virtual reality and other cutting-edge technology methods, with the help of high immersion, high interactivity, high multi-sensory VR experience, subvert the traditional questionnaire, scale, interview and other assessment forms, effectively solve the traditional assessment experiments in a single scenario, the process is boring or poor experience, easy to cheat and other shortcomings, to create a multi-disciplinary integration, big data support, multi-dimensional scenarios, immersive It creates a new mode of personnel quality assessment with multidisciplinary integration, big data support, multidimensional scenarios and immersion.

In addition, in order to help high school candidates make more accurate college major choices and fresh graduates make more effective career development plans,

many universities and VR companies have also cooperated deeply to create VR-based, personnel quality assessment courses based on "person-job matching", "Individual differences", McClelland quality iceberg model and other theories as a guide to the big data modernization of virtual simulation teaching experiments. The experiment integrates virtual reality, artificial intelligence, big data and other high-tech means, with the help of high immersion, high interactivity, high multi-sensory VR experience, intelligent analysis of the collected voice, behavior, text, physiology and other multi-source heterogeneous real data, to achieve accurate assessment. This has an important role and far-reaching significance in enhancing the development of human resources disciplines, the progress of scientific research strength, the improvement of student quality, and the enhancement of comprehensive competitiveness of graduates:

3.1. Leadership behavior formula

Psychologist Kurt Lewin proposed the famous formula B=F(P,E) about behavior, which he considered as the display of individual traits in the environment. The potential is relatively stable, but will unfold in a particular environment. The environment, i.e., the VR scenario, has a stimulating, stimulating effect on the latent. In addition, latent traits require a certain amount of time before they can be externalized into stable behaviors. Without the role of environment and time, it is difficult for latent to be transformed into stable behavior, so latent speaks of a trend and possibility.

3.2. Iceberg Quality Model

David   McClelland,   the   famous   American psychologist and the famous "father of quality", divided human quality into six levels: knowledge, skills, social roles, self-concept, traits and motivation. The famous "iceberg model" is based on this to divide the different performance of individual quality into "above the iceberg" and "below the iceberg". Among them, the "surface part of the iceberg" includes knowledge and skills, which are easy to understand and measure, and belong to the external performance, and are also easier to change and develop through training.

The "below the iceberg" includes social roles, self-image, traits and motivation, also known as latent qualities, which are internal to the person and difficult to measure. They are less susceptible to change through external influences, but play a key role in the behaviour and performance of people.

3.3. Three Forces Model

Beijing Institute of Latent Data Science is an authoritative scientific research institution engaged in theoretical and practical specialization research on latent

qualities. In recent years, after comprehensive analysis and research, the institute has built a potential model, namely "3E Model", based on the "Quality Iceberg Model" and survey data in related fields at home and abroad, and developed the world's first product for assessing potential based on this potential model. Based on this potential model, we developed the world's first product for assessing potential.

The "3E Model", or the "Three Forces Model", the 3Es stand for "Exploration", "Empathy" and "Enlightenment" respectively. Empathy" and "Enlightenment", which stand for "Exploration", "Empathy" and "Enlightenment".

4. VR AND PERSONNEL QUALITY ASSESSMENT

4.1. Existing talent assessment tools

Talent assessment tool refers to the activity of measuring and rating the basic qualities and performance of people through a series of scientific instruments and methods. Talent assessment refers to the activity of measuring and evaluating the basic human qualities, abilities, personality and other dimensions through a series of systematic and scientific means and methods. We commonly use the traditional personnel quality assessment methods such as psychometric tests, situational simulations, 360-degree assessment methods, interview methods and curriculum vitae screening methods, among which the situational simulation methods include document basket work, leaderless group discussions, role plays and so on. These methods are widely used in HR personnel quality assessment work, to a certain extent to solve the enterprise staff quality assessment problems, but these traditional personnel quality assessment methods generally have a strong subjective color, the lack of objective criteria, but also has a high cost of assessment, long time, low efficiency and other shortcomings, making the progress of personnel quality assessment has great limitations. Therefore, the relevant departments need to find a more complete, systematic and scientific set of assessment methods to achieve the optimal principle of "matching people with jobs", and VR personnel quality assessment is created in this context.

4.2. Experimental process of VR measurement

In the process of VR personnel quality assessment, the assessor needs to wear VR glasses throughout the process, holding the VR handle, in a closed and quiet environment for assessment alone, without any interference.

During the behavioral test, there were three main scenarios, the first of which involved the assessor changing his or her identity to that of a journalist and entering the Eco-Pavilion, where the assessor was free to

move around, visit, take pictures, record audio, etc. In the second scenario, the assessor interacts with the basketball players in the basketball court by passing the ball. The third scenario is the anchovy catching session, where the assessor needs to get as many anchovies as possible within 200s of time, and also select the container to hold the anchovies and the fruit picking tool according to the system prompt.

Although the scenario provides the same environment and automatic instructions for each rater, the rater may be influenced by multiple factors and choose different action trajectories. Figure 1 shows the trajectory of my actions during the assessment.
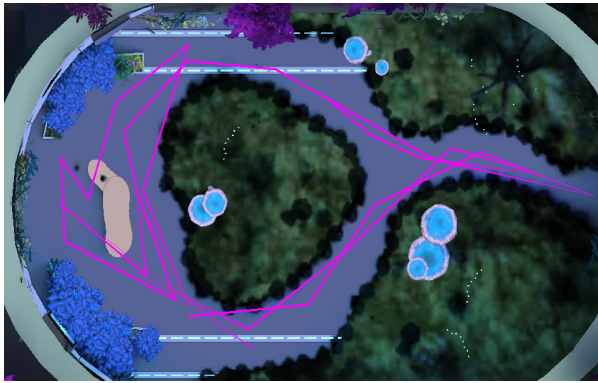

Figure 1. Map of rater movement trajectories

Generally speaking, the longer the movement route, the more curious the assessor is about an unfamiliar environment and the more he or she wants to actively experience something new, while the more repetitive parts of the assessor's movement track represent the more carefully the assessor observes information related to something new. This scenario-based test brings a sense of novelty to the assessors, stimulates their curiosity, enables them to explore more actively and enjoyably, and makes the assessment process more interesting, while allowing the assessors to forget the purpose of the test, thus increasing the validity of the assessment [6].

During the tour, the assessor will trigger tasks at each stage and answer questions based on their choices. For example, in "hands-on" tasks such as catching a rhinoceros cat, administering medicine to an injured person, catching an anchovy, picking fruit, etc., the assessor can zoom in and out of the virtual object, or can actively pick up the virtual object and try different things. This can expand the cognitive tools and domains of the assessor.

TABLE 1. COMPARISON OF YOUR DISPENSING
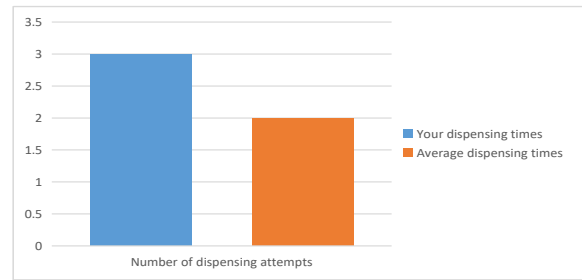
As shown in Table 1, the number of times I dispensed the antidote to the wounded man in the experiment is compared. The number of times the antidote was dispensed reflects the degree of perseverance of the assessor in the face of difficulties, and the use of different leaf combinations presents the assessor's attention to details of information and corresponding logical thinking and reasoning ability, and attention to details of information and corresponding logical thinking and reasoning ability.

In the last scene of the VR evaluation, one of the main aspects is to use the crane to catch anchovies, the number of fish caught reflects not only the testers' proficiency in operation, but also the discovery and mastery of the distribution and movement pattern of anchovies, which is also a reflection of being able to solve problems through the use of laws.

At the end of the assessment, the system generates an overall assessment of each test taker's "three abilities" (empathy, creativity, and exploration), and according to the results, specific analysis is given in each dimension to analyze the test taker's developmental potential and situations.

**TABLE 2.** NUMERICAL SIMULATION OF "3E MODEL" FOR SUBJECTS

Sample survey of "3E model"			
subjects	Exploration force (0-10)	Empathy force (0-10)	Creative force (0-10)
1	3	4	5
2	3	8	3
3	5	9	5
4	7	2	5
5	6	2	7
6	5	4	6
7	3	7	6
8	4	8	7
9	4	3	5
10	3	8	5
11	4	7	5
12	7	5	3
13	4	4	8
14	4	5	5
15	5	4	6
16	3	8	6

17	2	5	4
18	5	6	6
19	4	7	3
20	2	7	8

Table 2 shows the values of subjects in three dimensions of exploration force, empathy force and creative force. From this, we can see that the level of empathy of most subjects is significantly higher than that of exploration and creativity. Among them, exploration is generally low, occasionally high, and the average value will not exceed eight points. It shows that the overall level of empathy is high, and the level of creativity and exploration need to be improved.

Table 3 shows the average values of the sub dimensions of the subjects in terms of exploration, empathy and creativity. It can be seen from the figure that the indicators are unevenly distributed, indicating that there are differences in the dimension of leadership potential among different individuals.

TABLE 3. AVERAGE VALUE OF EACH SUB DIMENSION OF SUBJECTS' 3E MODEL
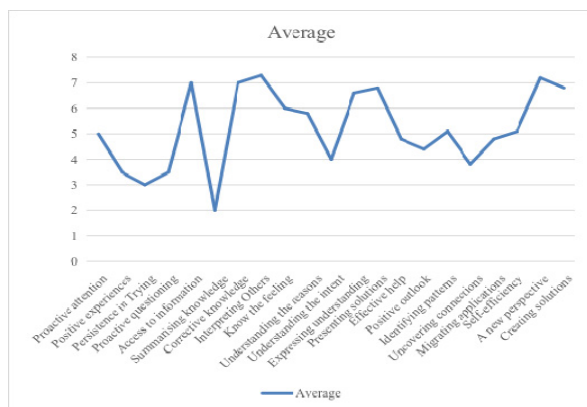
5. CONCLUSION

The application of virtual reality technology will become more and more extensive with the development of science and technology, and the combination of VR technology and personnel quality assessment in human resource management is also a general trend. As we are still in the primary exploration stage of VR personnel quality assessment, the relevant research is still in the theoretical research, the practical application of this area is relatively small, whether in the technical application, professional personnel training, cost control or promotion is not mature, still need a lot of research.

5.1. technology is the productivity of VR personnel quality assessment virtual platform scenario building

Even though there have been tremendous advances in VR personnel quality assessment technology, there is still a need for technological innovation. First of all, there

is instability in the connection of glasses and handles of VR experience equipment, and there are problems of low efficiency in the construction of virtual scenarios and platform lag caused by poor computing power of computer systems. In addition, the evaluators do not receive their own evaluation results report immediately after the evaluation, and there is a certain time lag from the end of the evaluation to the receipt of the evaluation results will also affect the evaluators' experience. Finally, the VR scene is relatively single, with only a few big scenes, and the image technology and sound technology of the virtual scene cannot support the more complex scenes.

5.2. professionals are the driving force behind the virtual platform scenario building for VR personnel quality assessment

The current virtual reality technology is still in the preliminary research stage, the technical talent reserve is insufficient, and the technical companies that study the application of virtual reality technology to personnel quality assessment are relatively few. In addition, there are too few after-sales reserves of VR personnel quality assessment, we need professional talents with targeted interpretation and analysis of the assessor's report, for example, universities can open relevant career planning courses to help students to conduct personality analysis and make career choices, so as to help assessors to explore their potential for better career planning. It needs more professional team and support from enterprises and universities to form a more complete, systematic and scientific assessment method, which can be more efficiently used in enterprise human resource management.

In addition, because of the high cost of VR personnel quality assessment, it is only used in large cities or large enterprises, and the joint venture with universities is only in the exploration stage, which needs a lot of publicity and promotion in the future development.

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REFERENCES

[1] Y.H.Shi. An introduction to the development status and application of virtual reality. Chinese information, vol. 1, pp.20,2019.

[2] Y.F. Xu. A brief discussion on the development of virtual reality technology. Science and technology communication, vol. 10,pp.122-123,130,2018.

[3] M.Gala. Research on the application of virtual reality technology. Computer Fan,vol. 1, pp.53,2019.

[4] C.Xuan. Technical bottleneck of virtual reality. Science and Technology Herald, vol.34,pp.94-103,2016.

[5] P.Tang, H.Zhang. An introduction to virtual reality technology]. Seeking knowledge guide,vol.3,pp.19-20,2019.

[6] Q.Hai, Y.X.Liang, S.Q. Wang, etal. Exploring the value of talent assessment methods based on VR technology. China Market, vol.16,pp.121-122,140,2021.