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Virtual reality technology to enhance the publishing of science and technology journals construction path exploration

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Abstract

The application practice of virtual reality technology in enhanced publishing of sci-tech periodicals is explored by case analysis and comprehensive analysis with the introduction of virtual reality technology as forerunner to promote the innovation of mechanism of sci-tech periodicals. comprehensive analysis with the introduction of virtual reality technology as forerunner to promote the innovation of mechanism of sci-tech periodicals, and the extension of industry chain of Chinese academic periodicals and the upgrading of Chinese academic publications. periodicals, and the extension of industry chain of Chinese academic periodicals and the upgrading of platform intellectualization. The research on The research on the application of virtual reality technology in enhanced publishing of sci-tech journals is still in its infancy at home and abroad, and there are many The research on the application of virtual reality technology in enhanced publishing of sci-tech journals is still in its infancy at home and abroad, and there are many obstacles in the application of virtual reality technology. technology, and proposes that the construction of augmented publishing of scientific journals by virtual re ality technology should be carried out from three aspects: content production, operation and management. three aspects: content production, operation and communication, so as to realize the deep integration of virtual reality technology and scientific journals. The construction of augmented publishing of scientific journals by virtual ality technology should be carried out from three aspects: content production, operation and communication, so as to realize the deep integration of virtual reality technology and scientific journals.

Keywords

media evolution; virtual reality technology; scientific journals; enhanced publishing; construction path

1. Introduction

Although virtual reality technology has been developed for many years, it was previously limited by the external network infrastructure is not enough to support its own technology as well as cost bottlenecks, and only began to be rapidly applied after 2016. At present, virtual reality technology has been applied to a variety of fields such as film and television, games, education, military, journalism, publishing, etc., and academic research has also focused on interdisciplinary disciplines such as journalism and communication, publishing, visual interaction design, and computers. There have been cases of applying virtual reality technology in some popular science journals and science journals, for example, the editorial board of Journal of Trauma and

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Emergency Medicine cooperates with the neurosurgery team of Fujian Provincial Hospital and the School of Mechanical Engineering and Automation of Fuzhou University, applying AR technology to innovate the form of reading interaction and boosting the homogenization of clinical teaching[1] ; Popular science journals such as Aeronautical Knowledge, We Love Science, and Little Copernicus, Museums, etc. Utilizing virtual reality technology to display flora and fauna, military equipment and scientific and technological products, etc.[2] .

Virtual reality technology brings new opportunities for the development of augmented publishing in science journals.In 2009, the URF Foundation introduced the concept of augmented publications (WOUTERSEN, 2009). Enhanced publications are publications that add more information such as research data, additional materials, post-publication data, and database records by linking to the official published content (VAN, 2009). Whereas, virtual reality enhanced publications are a fusion and upgrade of virtual journals and enhanced publications. Augmented publication can structure and visualize the content of the paper, improve the expression and dissemination form of the paper[3] , and it is also a semantically augmented form of publication, which enriches the expression form and knowledge content of the publication through semantic markup, provides the deep mining of knowledge and correlation analysis, and then forms the knowledge system to help the user to discover or validate the new knowledge, so as to improve the operability of the publication information, interactivity and relevance, and ultimately realize intelligent publishing[4] . Enhanced Publishing can also increase the added value of publications in multiple dimensions, thus generating economic benefits[5] . Large academic publishing groups such as Elsevier have widely used enhanced publishing technology, forming an intelligent, visualized and standardized mode of encapsulating papers and related dispersed academic resource information into composite digital products[3] , and international first-class journals such as Nature have also linked news and commentaries, audio and video, editorial summaries, and recommendations of related literature to the papers. 2017 China Knowledge launched enhanced publishing service function for the papers, and some academic journals launched enhanced publishing service function for the papers, and some academic journals launched enhanced publishing service function for the papers. Publishing service function, some academic journals actively try to use QR code and other new technologies to realize the enhanced publication of thesis content, but China's scientific and popular periodicals thesis has not yet realized the enhanced publication on a large scale, and the participation of the main bodies is not strong due to the problems of the system, technology, and academic evaluation mechanism[6] . Therefore, this study is based on the current development of virtual reality technology, to explore the construction path of virtual reality technology to enhance the publication of popular science journals, and to improve the publication value chain.

2. Tertiary Transmutation of Virtual Reality Technology

Paul Levinson proposes three stages in the evolution of the individual medium: "toy", "mirror" and "art". [7]At the beginning of a media technology, it is just a kind of entertainment, and in the development of the technology, it gradually becomes a kind of mirror reflecting the reality, and with the combination of new media, it is recreated into a rare artwork. Paul Levinson believes that not all media will go through these three stages, and that the media need to realize reinvention and transcend reality in order to reach the third stage. Nowadays, the meta-universe based on virtual reality technology is the best evidence of transcending reality, and virtual reality technology has gone through the transmutation of the above three stages.

2.1 Technology-centered "toy" phase

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The earliest virtual reality technology can be traced back to the 1960s and 1970s, the United States Morton Heilig invented Sensorama is regarded as the prototype of virtual reality technology, relying on bulky equipment through the three displays to let people feel the sense of space. Later, the first head-mounted display called "Sword of Damocles" was developed by Sutherland, a computer scientist at Harvard University in the U.S. Although it had a stronger sense of spatial experience compared to Sensorama, it still remained huge in size and was very clumsy to use. At this stage, although the user can use virtual technology to carry out the experience of virtual space, but this experience is one-way, only one-way to carry out the feeling of virtual space, and can not interact with it, virtual reality technology acts as a toy role, with the help of equipment tools to stimulate the senses so as to obtain the virtual experience.

2.2 Reality-centered "mirror" phase

The 1980s to 2010 is the second stage of the development of virtual reality technology, this stage, virtual reality technology has been developed, virtual reality is more used to reflect the reality of the current situation, become the reality of the "mirror". 1985, the National Aeronautics and Space Administration (NASA) belongs to the research and development personnel S. S. Fisher responsible for the virtual environment workstation (VIEW) project is to use the key technology to simulate the real space to realize the remote operation of the space station. (S. S. Fisher) responsible for the Virtual Interactive Environment Workstation (VIEW) project is the key technology to simulate the real space so as to realize the remote operation of the space station.[8] In 1987, "the father of virtual reality In 1987, the "father of virtual reality" Garon Lanier put forward the concept of virtual reality,[9] makes people pay more attention to the development of virtual reality technology. The application field of virtual reality technology has also been greatly expanded, military, entertainment, medicine and so on have begun the application of this technology, virtual reality technology has also entered the commercial field, Google, Sony and other commercial companies to join the development and application of related technology has greatly promoted, for example, Google launched a 3D simulation of the street view image in 2010, the integration of the street view and 3D technology, which can provide users with a realistic browsing experience.

2.3 The "art" phase centered on reconstruction

Around 2012 to date is the third stage of the development of virtual reality technology, in this stage, virtual reality technology has been a breakthrough development, the Internet company's accession to make the virtual reality technology gradually developed into a mature industrial application, the use of value is maximized by the excavation. Accompanied by the meta-universe concept of the fire, virtual reality technology once again ushered in a new industrial opportunity, according to IDC and other organizations, in 2020 the global virtual reality market size of about 90 billion yuan, of which 62 billion yuan in the VR market. Internet technology companies have made efforts in the virtual reality track, Facebook announced that it had changed its name to Meta, and said at the 2021 investment day that it had sold 10 million VR helmets Oculus Quest 2. Domestic byte jump also acquired Pico, which focuses on the mobile VR all-in-one market, and merged it into its related VR business. Unlike previous developments, at this stage, virtual reality technology is no longer a simulation of the real world alone, but is committed to reconstructing the real world and creating a new world of higher dimensions, so as to realize the disappearance of the boundaries between the real world and the virtual world and seamless integration, and the conception of the meta-universe has become an important direction for the development of virtual reality technology.

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3. The Combination of Virtual Reality Technology and Popular Science Journals

In recent years, the in-depth application of virtual reality technology in various industries has become a new issue of concern for researchers. At present, the application of virtual reality technology in the field of publishing is still in its infancy, and there are fewer cases of industry application, but the effect of existing cases on knowledge dissemination and cultural dissemination is very significant. Under the guidance of the Opinions on Promoting the Prosperity and Development of Academic Journals issued by the state, through the development of augmented publishing of virtual reality technology, we can build a platform for scientific and technological resources sharing and publishing, and promote the construction of first-class journals in China. Therefore, the study of virtual reality technology in science journals augmented publishing path problems is conducive to the enhancement of the value chain of the journal industry, innovation and knowledge dissemination, and accelerate the construction of scientific and technological power and cultural power.

The current research on the application of virtual reality technology in the enhanced publication of popular science journals mainly includes the following three aspects. First, in terms of content presentation, virtual reality technology can be based on the traditional academic paper publication, the experimental process, scientific research focus, research material, research data, auxiliary information, post-publication evaluation and database records and other rich supporting content in the form of visualization embedded in the paper, forming a new form of enhanced publication, enhancing the scientificity and rationality of the paper, which can satisfy the reader's multi-sensory experience, and help to Enhance the dissemination effect[10] . Secondly, in terms of academic content dissemination, virtual reality technology can help science journals achieve accurate delivery of papers through the reader information statistics of virtual reality service platform, and it can also play a positive role in organizing authors, optimizing the selection of manuscripts, and promoting academic exchanges, etc.[11] . Thirdly, in terms of operational profitability, it can be explored from the models of bundled sales model, value-added digital content model, hardware integration model, crowdfunding model, financialization model, commercial advertisement model and funding model[12] .

For the problems of the application of virtual reality technology, the former mainly mentioned copyright issues, institutional obstacles, lack of technology, lack of team, lack of innovation consciousness, unclear profit model, insufficient production power, lack of financial support, etc. However, the current research emphasizes more on content production and ignores the dissemination effect, and how to promote the dissemination of the work and obtain user feedback also needs to be explored in depth. In addition, the lack of research on the profit model, how to make virtual reality technology become the intermediary and catalyst for integrating the periodical industry chain, promoting the transformation and upgrading of the industry chain, promoting the augmented publishing products of virtual reality technology to produce economic and social benefits, and creating a benign development business model, which is worth in-depth study.

China's science journals integrating virtual reality technology is also in urgent need of development, especially science and technology and medical science journals, etc. The images, texts and images related to the thesis can be processed in a diversified content structure to realize multi-dimensional expression, so as to enhance the explanatory ability and activity of scientific and technological information resources, which is more helpful for the acceptance of users and enhances the user's viscosity. For different experiments in medical journals require a variety of different animal disease models, which can be constructed in the virtual scene,

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and through the dissection of the animal intuitive understanding of the animal body internal organs and tissues morphology of the intuitive changes, etc., readers can also be completed through the virtual way of animal modeling, the experiments are repeated. the emergence of VR technology has made the depth of mining the contents of science journals appear new possibilities, and the readers' sense of experience has been The reader's sense of experience has been upgraded, the limitations of the medium have been transcended, and the integration with the scenario has been realized, and the application scene has been completely changed. Virtual reality technology gives readers a brand-new "reading" experience, bringing them into the realm of "seeing is believing".

In terms of journal publishing content, virtual reality-related technologies can be used to support digital content for journal publishing. When journals publish content about science and technology, these technologies can provide readers with more intuitive visualization support. In addition, the model of Sports Illustrated in the United States can be used to publish multiple editions of the paper version of the journal, where one edition includes virtual reality video and the other does not, with different pricing. As a result, the online virtual reality video content will also boost sales of offline paper magazines, which will also drive users to the online application. Of course, there is also a need for innovative products related to popular science journal publishing, i.e., journal-reading wearables, which are helmets that support the digitization of journal publishing content.

4. The Constructive Path of Virtual Reality Technology on the Enhanced Publication of Science Journals

In the context of digital innovation of journals and integration of the journal industry chain, around the three major elements in the content production of augmented publishing of popular science journals based on virtual reality technology: data, semantics, and presentation, the two major elements in the operation: team organization, process management, and the two major elements in the dissemination: dissemination media and audience, the path of augmented publishing of popular science journals can be classified into three paths: content, operation, and dissemination.

4.1 Pathways to content production in popular science journals

The content production of different popular science journals should firstly analyze the knowledge material and data characteristics of popular science journals, carry out data mining and sorting, screen the knowledge content applicable to virtual reality technology through quantitative and qualitative research, and excavate the knowledge material and data that can produce social value and economic value. The instrument and equipment display, experimental process display, and experimental result expression of popular science journals are categorized and sorted out, on the basis of which the "virtual reality technology application knowledge map" is categorized and the semantic association strategy of different types of journal articles is carried out on the basis of the categorization. In the process of reading journal papers, users need to search widely for external resources such as cited literature, relevant background knowledge, patents, audio and video tutorials, etc., and build a semantic association system between papers and theses, papers and books, and papers and online data. Therefore, virtual reality technology can associate external resources through multiple channels to help users realize in-depth understanding of the content of the paper, and construct the framework of knowledge linking service functions such as knowledge navigation and knowledge evaluation by analyzing the strategies

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of semantic association of different types of journal papers. Finally, we should carry out virtual reality content editing planning and presentation, and analyze different editing planning and presentation strategies according to different types of virtual reality technologies, including the technical characteristics and data content requirements of VR technology (panoramic photography, special effects design), AR technology (3D stereoscopic multi-dimensional content presentation), MR technology (interactive presentation strategy), and at the same time, we need to analyze the presentation strategies of literature data visualization, literature architecture visualization, and dense data visualization. At the same time, it is necessary to analyze the presentation strategy of literature data visualization, literature architecture visualization, and intensive data visualization, etc.

4.2 Operational paths for virtual reality technology-enhanced publishing

Focuses on answering the question of how the digital platforms and personnel of virtual reality technology can be used in the digital platforms and editorial staff of science journals for team-based co-production. It is developed from two elements of team organization and process management. For the team organization of virtual reality technology-enhanced publishing, it is necessary to research relevant virtual reality enterprises and popular science journals applying virtual reality technology, and study the team organization strategy from the perspective of engineering management and based on the work characteristics of each profession. Including: leadership organization form, personnel size requirements, personnel skill requirements (panoramic photography technology, text mining technology, semantic annotation technology), training strategy, production drive mode, etc. Secondly, for virtual reality augmented publishing operations standardize the collaborative production process of virtual reality augmented publishing. Research on shooting requirements, post-production, version control, technical architecture, task allocation and handover, time schedule management, key link control, cost control, quality management, storage of augmented data and other issues. Among them, copyright management is the most complicated issue, and it is necessary to draw up standards for defining the copyright of virtual reality augmented publishing, study the copyright protection system of augmented publishing, and strengthen the copyright protection.

4.3 Virtual Reality Enhanced Publishing Distribution Paths

The dissemination path of science journal enhancement publishing of virtual reality technology can be divided into the dissemination medium of the product, the dissemination effect, the profit model, the author incentive mechanism and other aspects. At present, the communication media and communication channels of virtual augmented publishing content can be divided into two categories, one of which is to realize the publication of popular science journals with the help of mobile media and virtual reality equipment, etc. It should be noted that the presentation of the content should be in line with the characteristics of these media, so as to make the presentation of the content and the media integrate with each other. The other type is to utilize new foreign academic communication and paper sharing platforms to realize authors' self-propagation, for example, to utilize Trend MD to realize cross-platform article precise recommendation, or to utilize Altmetric to promote article social media dissemination, etc., so as to establish "operation manuals" for the dissemination of different media and different channels. In addition, in the process of dissemination, we pay attention to the analysis of the power mechanism of sharing, analyze the sociological characteristics of the audience and the feedback of virtual reality content, so as to analyze the personalized recommendation and accurate push strategy of the augmented publishing paper. At the same time, through the virtual reality one-stop service

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platform, reader behavior data analysis should be carried out at the back-end to study the strategy of forwarding and sharing of enhanced publication papers and the strategy of data citation guidance. Thus enhancing the citation rate of journal papers and further improving the level of publication.

The establishment of dissemination path cannot be separated from the participation of authors and journals, which requires the establishment of corresponding incentive mechanisms. Firstly, it is necessary to establish evaluation standards for the quality of enhanced publication papers, analyze the influence of reading and sharing data of enhanced publication papers on the evaluation of paper quality and the transformation of scientific research achievements through practice and research, and explore the use of enhanced publication papers as an important basis for the evaluation of scientific research achievements and the formulation of corresponding evaluation standards. Secondly, it is necessary to establish evaluation standards for the quality of enhanced publication journals, analyze the download and citation rate of enhanced data, the percentage of disciplines of enhanced papers, and the comparison of download and citation rate with traditional papers, etc., and explore the evaluation of enhanced publication journals into the evaluation system of first-class journals as well as the government's various subsidy programs, so as to motivate journals to enhance the production and dissemination of publication. Finally, it is necessary to establish a revolutionary peer review strategy, based on the discussion of readers' journals, to study the use of enhanced data as an important basis for peer review, to improve the efficiency of paper review and shorten the publication cycle of journals. In addition, we can also invite and organize authors and manuscripts through directional invitation, with the help of virtual reality technology, hold academic seminars in virtual space, organize and mobilize authors to carry out richer and deeper academic exchanges, so as to motivate the authors to actively provide augmented data in the future scientific research results, and to form a good cycle of augmented publishing.

5. Conclusion

Virtual reality technology can make the digital publication of journals built on top of a good knowledge link service system, forming a digital integrated service platform based on knowledge links, establishing a unified publishing and educational resource platform, which is more conducive to the innovative mode of knowledge service and achieving good social and economic benefits. With the related technology and the need for transformation and development of science journals, virtual reality technology will become the key to the future development of science journals, but it should be noted that the fundamental essence of science journals is the dissemination of academic knowledge, and the application of any technology is for the purpose of better dissemination of academic knowledge, so it is necessary to always take the dissemination of academic knowledge as the fundamental, so that the technology serves the need for the dissemination of knowledge.

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