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On the Application of Digital Media Technology in Science Popularization Content Creation (Postprint)

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Abstract

With the development of Internet technology, audience reading demands have become increasingly complex, choices more diverse, reading scope broader, and reading channels more intelligent. Particularly with the popularization and promotion of mobile Internet technology, rich media information has become the mainstream of communication, and single-form paper-based reading can no longer satisfy audience information acquisition needs; consequently, the application of digital media technology in science popularization content creation is becoming increasingly widespread. Digital media technology not only expands the three-dimensionality, diversity, and vividness of science popularization content in terms of form, but also enhances artistry, interactivity, and appeal in content dissemination. Through processing, integration, and innovation of science popularization content, digital media technology can continuously improve the readability of the content itself, while also innovating dissemination channels and expanding the reach of communication, thereby establishing itself as an inevitable trend in science popularization content creation. Finally, this paper analyzes and discusses the application and impact of digital media technology on science popularization content creation, using “Popular Science China: A-You Learns Science” as a case study.

Full Text

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With the development of Internet technology, audience reading demands have become increasingly complex, choices more diverse, reading scope broader, and

reading channels smarter. Particularly with the popularization of mobile Internet technology, rich media information has become the mainstream of communication, and single-format paper reading can no longer satisfy audience information acquisition needs. Consequently, the application of digital media technology in science popularization content creation has become increasingly widespread. Digital media technology not only expands the three-dimensionality, diversity, and vividness of science popularization content in form, but also enhances artistry, interactivity, and interest in content dissemination. The processing, integration, and innovation of science popularization content through digital media technology can continuously improve the readability of the content itself while innovating dissemination channels and expanding communication reach, making it an inevitable trend in science popularization content creation. This paper finally analyzes and discusses the application and impact of digital media technology on science popularization content creation using *Popular Science China: A You Learn Science* as a case study.

Keywords: digital media technology; science popularization content creation; integrated innovation

With the development of Internet technology, audience reading demands have become increasingly complex, choices more diverse, reading scope broader, and reading channels smarter. Particularly with the popularization of mobile Internet technology, rich media information has become the mainstream of communication, and single-format paper reading can no longer satisfy audience information acquisition needs. Consequently, the application of digital media technology in science popularization content creation has become increasingly widespread.

1. Definition of Digital Media Technology

Digital media technology is a technical means based on computers that has developed alongside the Internet. It is an emerging discipline with broad application prospects and a typical interdisciplinary field, primarily encompassing multimedia databases, digital signal processing, data structures, algorithm design and analysis, scene design, introduction to digital media technology, programming fundamentals, database design, webpage design and production, computer graphics and image processing, human-computer interaction technology, character design, game programming, multimedia post-processing, and human-computer interaction techniques. Digital media technology plays a very important role in numerous industries in society.

With the development of the times, digital media technology has become an inevitable means for science popularization content creation. Science popularization content utilizes digital media technology for processing, forming various new forms of popular science knowledge that combine text and images, sound

and vision, thereby encouraging broader public reading and participation and making science popularization informatization a trend.

2. Characteristics of Digital Media Technology

2.1 Multimedia Nature

As an effective combination of digital technology and media characteristics, multimedia nature is its important manifestation and most obvious feature. Applying digital media technology to effectively combine text, sound, and images creates multi-dimensional audio-visual experiences, allowing users to achieve immersive experiences. Simultaneously, content can be customized and presented in different expressive forms according to different needs, media channels, and communication effects to satisfy user information acquisition.

2.2 Interactivity

In modern society, with increasingly widespread application of the Internet, particularly mobile Internet, people acquire diverse knowledge through networks, and the information continuously pushed by various terminals has become increasingly redundant. Digital media technology can help people achieve effective interaction through various terminals, enabling long-distance interaction between people and adapting to modern diversified communication methods, such as online education and AR/VR technology.

2.3 Engagement

The greatest characteristic of digital media technology is its ability to integrate multiple technical means to achieve the best reading experience. The singularity of traditional communication often leads people to acquire knowledge through only one channel or medium. With the development of Internet technology, digital media technology can combine audio and video, processing content into video format and forming various methods such as digital books, digital news, digital audio, video, and games, making originally dry content interesting and thus maximizing satisfaction of personalized needs of different groups.

2.4 Convenience

Digital media technology not only enriches content expression means but also greatly refines the core communication elements of content. Through different technical means of expression, it can break the limitations of temporal-spatial communication and physical mass, facilitating people to acquire information anytime and anywhere through different channels, greatly satisfying people's service demands.

3. Application Characteristics of Digital Media Technology in Science Popularization Creation

With the arrival of the third technological revolution, science and technology have developed explosively, and humanity has made tremendous breakthroughs in various scientific fields. New technologies are continuously applied to various areas of social life. Although the impact of technology on society has greatly improved human living standards, the complexity of science and technology has increasingly exceeded people's daily understanding and learning capabilities. Science popularization communication aims to enable the public to understand scientific knowledge more fully and rapidly, and the use of digital media technology can effectively arouse public interest. Through effective technical means, complex and obscure scientific knowledge can be presented to the public more three-dimensionally and vividly, building a bridge of communication and disseminating necessary scientific knowledge and scientific spirit to the public.

3.1 Visualization Aligning with Audience Cognition

Graphics and images are a processing means of digital media technology that can enrich information content and intuitively convey and present information appearance. Visualization of science popularization content can use images and graphics to help people understand obscure scientific concepts and complex scientific principles. With the development of Internet technology, visualization has become a popular science communication form favored by the public. Traditional pictures plus text can no longer satisfy audience reading demands. Processing through digital media technology such as video, audio, animation, and games can display comprehensively, making science popularization content more intuitive and vivid. For example, the 2016 gravitational wave science communication: the concept of "gravitational waves" was basically impossible for ordinary audiences to understand, and even for people with certain scientific literacy, understanding this obscure concept was very difficult. However, in early 2016, almost everyone in social media circles was sharing related popular science videos about gravitational waves, and almost everyone knew the potential applications of gravitational waves in life. This professional scientific knowledge was able to trigger national attention because many media used multimedia technical means to easily interpret this obscure scientific principle through video and animation. In fact, the practical application of science and its wide promotion are not contradictory. Scientists are the ones who deeply understand and research, while for ordinary audiences, only their interest needs to be aroused, as interest is the key to all learning.

3.2 Engagement Stimulating Audience Interest

Digital media technology can enhance the attractiveness and appeal of science popularization content through video, pictures, and other vivid forms of expression. Technical processing can compensate for the singularity, complexity, and dryness of text. In traditional communication processes, books were one of the

main media for people to acquire information. However, for different readers, editors needed to strictly control the usage of specialized technical terms and adopt more life-oriented and colloquial expressions to explain some professional terms, thereby enabling the public to understand. With the development of digital media technology, new science popularization content such as science comics and science videos has greatly enhanced the effect of science communication, facilitating audiences to quickly absorb scientific knowledge. Through visual reading, reading efficiency is improved, and better and more direct reading experiences are obtained. For example, the *A U Talks about Nobel Prize Winner Tu Youyou and Artemisinin* published by China Science and Technology Press in 2016 was a science comic specifically for teenagers. The book combined current hot topics and vividly told the growth path of Nobel Prize winner Tu Youyou and the invention process of artemisinin through animation. Different from the professional and obscure adult version, the comic version used vivid scene reproduction and interesting storytelling to tell children about the scientist's growth path and the process of malaria generation and pathological changes. Among them, professional knowledge about plasmodium and malaria was presented in a fun way using comic form and anthropomorphic expressions, allowing children to intuitively understand the damage plasmodium causes to the body. Especially with audio and simple animation videos accompanying the book, diversified performance methods can better bridge the gap between children and science.

3.3 Popularization Guiding Audience Understanding

Science popularization content creation originates from life, but science popularization topics generally have high cognitive thresholds, are affected by external environments, have difficulty in topic setting, and professional explanations are obscure. Moreover, influenced by the general online environment, science popularization communication has become increasingly life-oriented, making it difficult to focus, interpret, and popularize. Particularly, the lack of scientificity and authority has led to the generation of online rumors. Digital media technology can effectively connect scientific terminology with popular language using technical means. Through assessment of audience needs, professional interpretations by scientists can be processed through digital media technology to visually reproduce scientific scenes and three-dimensionally present scientific concepts, effectively reshaping scientific topics into life-oriented scenarios to achieve better communication effects. For example, the 2019 5G topic: through technical reconstruction and processing, it no longer focused on introducing the engineering technical principles of 5G or ignored professional explanations at the technical level, but instead emphasized its application in life. Through animation videos reproducing the speed of information transmission under 5G, it demonstrated how 5G can improve the convenience of public life, enabling the public to better understand the significance of 5G research.

3.4 Diversification Serving Audience Needs

Popularization of science communication has become a trend. Traditional one-way communication has changed, and diversified, personalized, interactive, globalized, and open communication has become inevitable. With the application of digital media technology, communication subjects have gradually enriched, communication means have gradually diversified, and communication content has become increasingly comprehensive. Since the China Association for Science and Technology implemented the “Science Popularization Informatization Project” in 2016, it has built the “Popular Science China” mass communication stage, pushing scientists to the public and attracting a large audience through authoritative and scientific science popularization content. At the same time, to better serve audiences, Popular Science China has built and gathered a large amount of science popularization content, including science videos, audio, electronic posters, science comics, science games, etc., not only bringing major media platforms into “Popular Science China” but also aggregating diversified content to it. In 2017, through channel construction, Popular Science China established more than 300 online and offline communication channels, not only disseminating content through terminal screens of local science associations and societies, but also establishing communication channels on cable TV, IPTV, major websites, Xiaomi, Hisense TV and other new media terminals, as well as subways and airports. Among them, the *Popular Science China: A You Learn Science* popular science animation video later achieved over 1 billion views through Popular Science China’s online and offline channels. Diversified product forms satisfied diversified channel communication, truly achieving a new model of “one-time R&D, multiple generation, and diversified communication.”

4. Product Characteristics of Digital Media Technology in Science Popularization Creation

On May 30, 2016, at the National Conference on Science and Technology Innovation, the 18th Academician Conference of the Chinese Academy of Sciences, the 13th Academician Conference of the Chinese Academy of Engineering (the “Three Science and Technology Conferences”), and the Ninth National Congress of the China Association for Science and Technology, General Secretary Xi Jinping emphasized that scientific and technological innovation and science popularization are the two wings of innovative development, and that science popularization should be placed on an equally important position as scientific and technological innovation. This also pointed out the general direction for informatized science popularization re-creation. Effectively applying digital media technology to science popularization creation can revitalize science popularization content and communication.

Seizing this opportunity, the China Association for Science and Technology launched the “Citizen Science Literacy Reader Micro-video Project.” This project utilizes the “digital media technology + science popularization” approach, em-

ploying various technical means such as animation videos, animation games, e-book production, and database construction to make science popularization content interesting, life-oriented, video-based, and digital, sending it through multiple channels to meet the diverse information acquisition needs of different audiences. Among them, *Popular Science China: A You Learn Science* has become an excellent creative example.

4.1 Digital Media Technology Visualizes Science Popularization Content

Science popularization books are important means of disseminating scientific knowledge, and providing excellent science popularization books is the mission of every publisher. Science popularization books are also important ways to improve citizens' scientific literacy. With the popularization of new media, traditional model books can no longer satisfy reader needs, and diversification, engagement, vividness, and informatization of science popularization content have become inevitable trends.

Popular Science China: A You Learn Science effectively combines book content with the anime character “A You,” artistically and digitally processing serious and dry scientific knowledge through dialogue-based popular interpretation, making it a bond for establishing emotional connections with the public. For example, “How many wonderful lives are in a drop of water” involves knowledge about microbial populations in biology. If explained in book form, it would be difficult and dry for elementary school students to understand. Using a dialogue between “A You” and his mother about not being able to directly drink tap water, various biological groups are concretized and interestingly interpreted, allowing children to intuitively understand the proportions of various organisms in a drop of water, their harms and benefits, and bridging the gap between children and science through immersive learning.

4.2 Digital Media Technology Popularizes Science Popularization Content

The *Citizen Science Literacy Reader* focuses on five major themes: “Life and Health, Earth and Environment, Mathematics and Information, Matter and Energy, Science and Technology and Society,” dedicated to cultivating public scientific literacy. Although the content is relatively simple, it still involves professional knowledge in related disciplines. For example, in *Popular Science China: A You Learn Science*, the episode “Can robots also have temper tantrums?” selects professional knowledge on the hottest application fields of robots and the development of artificial intelligence. The book content is relatively niche and difficult for children to understand. The micro-video animation uses Optimus Prime as an entry point, adopting a question-and-answer format between children and their father to explain the emotions and feelings generated by the human brain, step by step providing popularized and 通俗化 explanations of the development history and current development level of robots, allowing chil-

dren to understand the application of artificial intelligence development in life and the progress achieved in world science and technology development through details in daily life.

4.3 Digital Media Technology Diversifies Science Popularization Creation

Science popularization content enhances citizens' scientific quality through the interactive integration of science and humanities. However, compared with the rigor and professionalism of science, single text can no longer attract and satisfy user needs. To solve the problem of outdated expression means and lack of attractiveness, using digital media technology can enable science popularization creation to present increasingly diversified forms. *Popular Science China: A You Learn Science* uses the friendly and approachable anime image of "A You" and his warm and loving family as units, radiating stories to his life and school, making serious and abstract scientific knowledge lively and interesting, achieving a transformation from "I have to learn" to "I want to learn." Later, as the *Popular Science China: A You Learn Science* videos gradually became popular, with integrated development as the concept, the animation videos were adapted into picture books, audio, and electronic posters, and simple science popularization games were developed, truly achieving a transformation from single communication to diversified communication. The *A You Learn Science* converged media picture book also won the 2018 National Excellent Science Popularization Works Award from the Ministry of Science and Technology.

Conclusion

In summary, as an emerging technology, digital media technology, due to its unique characteristics, has created new opportunities for science popularization content creation, while also enriching the creation subjects, themes, and forms of science popularization content. Effectively integrating appropriate digital media technology means with science popularization content creation makes science popularization content more scientific, interesting, and vivid, truly achieving a transformation in science communication from "indifference to active attention, from niche to mass, from having to learn to wanting to learn, from single communication to diversified communication," breaking the bottleneck of high-quality development in science popularization creation and communication.

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Note: Figure translations are in progress. See original paper for figures.

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