Preliminary Study on the Integrated Publishing for Further Medical Education

Rong Zhang*

Technical Documentation Press Co., Ltd., Beijing 100038, China

Corresponding author: Rong Zhang, zhangrong130402@163.com

Abstract: The "14th Five-Year Plan for the Development of the Publishing Industry" highlights the role of scientific and technological innovation in promoting the digital transformation and upgrading of the publishing industry. The plan advocates for the application of 5G, big data, cloud computing, artificial intelligence, blockchain, Internet of Things, virtual reality, and augmented reality in the publishing field. Besides, it also promotes the application of the national public service platform for the publishing and distribution of information. It can be seen that the publishing industry has been integrated into the new technological development and industrial transformation. During the "13th Five-Year Plan" period, the scale of digital publishing for education and training has been continuously expanded, the products have been continuously diversified, and the industrial chain has become increasingly mature. Furthermore, the policy system has been continuously improved, the pace of transformation has been steadily advancing, and development has become increasingly integrated. Taking the integrated publishing of education and training in the ultrasound medical industry as an example, this paper expounds the practice of the Scientific and Technical Literature Press in the construction of knowledge system, the exploration of knowledge service mode, and the construction of online/offline learning platform in the field of education and training.

Keywords: Medical education; Publishing; Integration; Model

1. Introduction

It is imperative to integrate the publication of continuing medical education. Vocational education has become increasingly highlighted as the demand for vocational skills has been increasing. In continuing education, vocational skills education is a crucial link, which plays a key role in the selection and evaluation of professional talents. Integrated publishing is also of great value for the development of vocational education [1]. First of all, the integration of publishing improves the quality of vocational reeducation. Integrated publishing integrates all kinds of teaching resources to form an all-round, three-dimensional, and multi-dimensional teaching system to better meet the learning needs of professional talents and improve vocational skills. Secondly, integrated publishing can promote the innovation and development of vocational skills in further

education. In the information age, integrated publishing adopts a variety of media means and technical means to create a richer, more diverse, and more interesting way of learning, helping professional talents to better grasp and improve their professional skills.

In recent years, ultrasound has become more and more widely used in the medical field. This is because ultrasound is safe, non-invasive, economical, and portable. Its application has extended from abdominal, obstetrics, and gynecology diagnoses to cardiovascular, neurological, musculoskeletal, and other clinical diagnoses. Over time, it gradually permeated non-diagnostic fields such as ultrasound-guided intervention.

After years of development, China has become the leading country in terms of ultrasound diagnosis, with the largest number of beneficiaries. According to statistics, there is currently a shortage of at least 100,000 ultrasound medical professionals in China. Therefore, it is urgent to cultivate a large number of talents in ultrasound and strengthen the construction of talent teams in primary medical institutions. Unlike other imaging methods, ultrasonography requires a high level of skills, experience, and image discrimination. As ultrasound imaging provides real-time imaging, technique becomes paramount. If the device is not placed in the right section, the lesion cannot be displayed clearly, making diagnosis difficult. Therefore, sonographers need to improve their skills continuously. Therefore, especially in recent years, doctors in the ultrasound department and related departments have been enthusiastic and in demand for learning ultrasound technology.

2. Role of artificial intelligence in the digital transformation of the publishing industry

2.1. Forming knowledge graph from books

The role of publishing units is shifting from publishing books to providing knowledge services. By revitalizing stock resources, integrating incremental resources, and using knowledge graphs to build a knowledge system of the industry, knowledge service products for different fields can be created. For example, professional databases, characteristic databases, forums, digital libraries, mobile apps, WeChat applications, and other multi-terminal applications provide multi-form knowledge service products for institutions and the public. The knowledge graph of the publishing industry will be based on information collected using big data technology and the knowledge system. Automatic knowledge indexing and computing engine will be the key to building an industry knowledge service platform.

2.2. Knowledge graph technology allows for the platformization of book content

Knowledge graph technology is widely used in the construction of knowledge bases and knowledge service product innovation. Knowledge graph technology, natural language processing, speech, vision, and other artificial intelligence technologies can be used to build domain knowledge graphs, event graphs, and multimodal knowledge graphs of the industry. By plotting knowledge graphs, publishers can efficiently apply knowledge through search, recommendation, Q&A, reasoning, visualization, etc. With the development of technology, overcoming the limitations of traditional publications in terms of the form of content (text, images, videos, VR/AR, and other forms) has become crucial, and multimodal content provides users with a more intriguing experience.

Over the past 45 years, our company has sorted out and excavated a large number of ultrasound medical paper books, paper journals, electronic books, electronic journals, and other content resources. These materials have been processed through fragmentation processing using Internet technology. We have also planned, filmed, edited, and published more than 300 pieces of work related to ultrasound medical disciplines, totaling more than 3,500 segments (approximately 1,750 hours) by discipline/disease (over 1,000 types). of massive famous video

series courses according to disciplines/diseases (more than 1000 kinds)/sonographers at all levels. These form a massive collection of high-quality video series courses for ultrasound physicians at all levels. This knowledge base of ultrasound medicine is sectioned, incorporating various forms of knowledge such as celebrity video courses, conference live streams, traditional books, e-books, and offline training courses.

2.3. Current situation of artificial intelligence in other countries and publishing integration

Many publishers in other countries have applied artificial intelligence to content production and dissemination. Springer Nature actively explores the application of artificial intelligence and published the first machine-generated book in 2019, titled *Lithium-ion Batteries*, which is a summary of the outstanding research outcomes in the field of lithium-ion batteries in the past 3 years. This summary was created using artificial intelligence, outlining the latest research progress in the field of lithium-ion batteries. In 2021, Springer Nature published a new book using artificial intelligence, titled *Climate, Planetary, and Evolutionary Sciences: A Review of the Machine-Generated Literature Overview*. Elsevier also uses learning and natural language processing to facilitate scientists and engineers in finding relevant content.

3. Case study of China Ultrasound Medical Network

3.1. Platform-based knowledge services diversify medical education

Traditional education is often standardized and does not cater to the individual needs of each student. Intelligent education can provide each student with a unique learning experience according to their individual needs and learning characteristics [2]. Below are some characteristics of intelligent education.

3.1.1. Personalized teaching

Intelligent education can provide personalized learning solutions for each student according to their learning characteristics and needs. For example, it can analyze students' learning data and behaviors to recommend courses and learning materials that best suit their needs.

3.1.2. Intelligent learning

Artificial intelligence allows for intelligent learning. For example, speech recognition technology and natural language processing technology can be used to interact with the students and perform Q & A functions, helping students better grasp knowledge points. In the simulation training of sonographers, the AI system can help medical students improve their scanning skills by modeling and simulating the operation process, providing real-time feedback and guidance.

3.1.3. Intelligent examination

Exams can be scored and scored intelligently through artificial intelligence. For example, artificial intelligence technology can be used to automatically score students' answers, thereby reducing the workload and time of manual scoring. Besides, it can also ensure impartiality in scoring.

3.1.4. Intelligent learning management

Intelligent learning management can help teachers better grasp students' learning status and feedback, so as to improve their teaching methods and quality. Artificial intelligence algorithms and data analysis techniques can also be used to optimize curriculum design. Intelligent education is one of the development directions of

education, and its advancement requires the joint efforts and support of educational and technological experts, and the government [3].

3.1.5. Better learning experience

Artificial intelligence can provide a better learning experience. Through technologies such as virtual reality and augmented reality, real-world medical scenarios can be simulated, where students can conduct hands-on training in a virtual environment. This way of learning can greatly improve students' practical skills and ability to respond to emergencies, reducing the risks and costs in a real environment.

The educational content on our platform includes videos, books, e-books, knowledge bases, and more. Leveraging 45 years' worth of accumulated resources such as a vast array of medical imaging books, videos, journals, and more, we aim to aggregate content and questions into topics, themes, and sections to form a comprehensive knowledge base. This initiative is geared towards establishing an online learning and service platform for medical imaging, facilitating academic exchange and intellectual interaction in the field of ultrasound medicine, and innovating new models for clinical research and book publishing distribution.

By using WeChat, the online education content of our platform realizes personalized teaching and intelligent learning, examination, and management. Additionally, the offline training courses provide manual exercises for sonographers, so there is room for development and a good market prospect.

At present, there are domestic enterprises have developed intelligent learning software suitable for practical lessons for sonographers. After the sonographer inserts the probe into a certain part of the human body, the corresponding ultrasound image and human anatomy diagram will appear, and tips on the operating procedure will be provided.

The "Clinical Musculoskeletal Ultrasound Practical Quality Training Course" (offline education project of our platform) began in July 2019 and 14 sessions have been held, with a total of nearly 500 trainees. The sessions involved ultrasound, pain treatment, rehabilitation, orthopedics, traditional Chinese medicine and acupuncture, etc., of which more than 80% of the educators are directors of ultrasound departments. The trainees come from all regions of China, and most of the trainees have applied relevant technologies to clinical practice, which has greatly promoted the large-scale development of ultrasound-guided musculoskeletal precision diagnosis and treatment in China.

3.2. Intelligentization of promotion channels

With the rapid development of information technology, sales technology is constantly being innovated and upgraded. However, the application of sales technology remains a challenge for sales experts.

Digital sales channels are the foundation for digital, intelligent, and precise sales. Sales staff can use a variety of digital tools and technical means to establish diversified sales channels, such as e-commerce platforms, WeChat official accounts, online exhibitions, etc., to achieve rapid customer reach and information sharing.

Through the application of artificial intelligence, WeChat can recommend personalized content and services for users according to their preferences. Among them, WeChat bots have become one of the necessary marketing tools for modern enterprises, which can greatly enhance corporate brand exposure and user engagement. WeChat bots can help businesses automate daily customer service work, automatically reply to frequently asked questions, and shorten customer waiting times. In addition, WeChat bots can automatically recommend promotional information to its users, which can effectively improve marketing efficiency. WeChat bots can automatically generate interactive activities such as Q&A, voting, and lucky draws to enhance user

engagement and stickiness. Through these interactive activities, businesses can better understand user needs and feedback, which can lead to better marketing strategies.

Our platform is built upon the WeChat ecosystem for marketing purposes, aiming to create new sales and promotion channels for the dissemination of educational and book-related information. Our platform's official WeChat account boasts over 200,000 followers, with live broadcasts accumulating over 10 million views on educational content and over 500 private community groups established. We primarily leverage the existing intelligent marketing tools provided by WeChat to promote educational content (videos/training courses) to our followers. As a result, the conversion rate for book purchases on our platform exceeds that of traditional market shares.

3.3. The value of integrated publishing in further education in the medical field

Through the development of this platform, a relatively mature operating system and profit model have been formulated, which provides a demonstration for the integrated development of publishing houses and promotes the transformation and upgrading of user-oriented publishing [4].

This platform understands the rules of information sharing in the era of all media, adapting to trends like dataization, fragmentation, and audio-visual communication. We capitalize on the strengths of content and experts from publishing houses, focusing deeply on the education sector. This approach holds valuable lessons for the integrated growth of traditional publishing. In the past 8 years, a total of about 300,000 doctors have been trained online and more than 500 people have been trained offline, which has greatly promoted the development of ultrasound diagnosis and treatment across the country.

The successful launch of this platform, featuring recording and broadcasting, live courses, e-books, live conferences, and training courses, holds significant relevance for other platforms within the industry. The platform's profit model consists of revenue streams from content payments, advertising, and e-commerce [5]. The existing content product forms of this platform include five product forms: big coffee courses, conference live broadcasts, e-books, paper books, and offline training courses. The cumulative income reached more than ¥15, 000 000.

4. Problems in the integration of the publishing industry

4.1. Lack of integration

In 2020, the total scale of China's digital publishing industry reached 1,178.167 billion yuan, about 11 times that of 105.179 billion yuan in 2010. Currently, the types of products and services in China's digital publishing industry are becoming more and more abundant, the ability to meet the spiritual and cultural needs of the people is constantly enhanced, and the models are more diversified. According to data from the China Academy of Press and Publication, although the industrial scale of digital products in the traditional publishing industry, such as e-books and digital periodicals has also increased significantly, it has increased less than that of online literature, online games, digital education, etc. Meanwhile, digital newspapers have not only not grown, but have shown a downward trend. As a result, the proportion of digital revenue from books and periodicals in the total digital publishing revenue has been decreasing year by year. Therefore, it is not only imperative to integrate emerging businesses within the publishing industry with traditional ones, but there is also considerable potential for deep integration between the publishing sector and other economic and social fields such as education, science and technology, and tourism.

4.2. Increasing investment in the research and development of relevant technologies

Viewed through the lens of China's digital publishing industry's development trajectory, technological advancement emerges as the primary driver facilitating the integrated evolution of publishing. Online game publishing stands out as a significant milestone in publishing innovation propelled by technology. Game technology, distinguished by its interactivity, high fidelity simulation, immersive experience, and real-time rendering capabilities, has become a vital technical tool promoting the convergence of digital and real realms across economic and social development, as well as in cultural, educational, and tourism sectors. To a certain extent, the solidity of the technical groundwork and infrastructure is crucial for the integrated development of traditional publishing businesses. Therefore, establishing a robust mechanism for investment in technology research and development is pivotal.

Disclosure statement

The author declares no conflict of interest.

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