

# RESEARCH ON THE SERVICE MODEL OF INTELLIGENT READING PROMOTION OF RED LITERATURE IN THE METAVERSE PERSPECTIVE

Yan Tang, Tian Hao, Qi Lu, YunPei Cheng\*

*School of Management, Tianjin University of Technology, Tianjin 300384, China.*

*Corresponding Author: YunPei Cheng, Email: yunpei\_c@stud.tjut.edu.cn*

**Abstract:** Exploring the service model of red literature reading promotion in the metaverse perspective, and promoting new development of intelligent reading promotion. The logic of integration between the metaverse and red literature is analyzed, and four aspects of ‘Digital and Intellectual Fusion’ are proposed to enable smart reading promotion, including promotion technology, promotion content, promotion services and reading experience. Smart reading promotion has changed from the traditional resource-based content-based to demand-based openness, driving the evolution of reading methods into autonomy, precision and adaptiveness. In the context of the metaverse, based on the analysis and excavation of promotion subjects, reading carriers and platforms, and reading ecosystem promotion elements, four promotion service models are proposed to provide countermeasures and guidelines for the promotion of intelligent reading.

**Keywords:** Metaverse; Red Literature; Reading promotion; Service model

## 1 INTRODUCTION

Red literature is an important carrier for passing on the red gene was raised in the 19th National Congress report explaining cultural self-confidence. In the new era, the reading and promotion of red literature is of great significance in enhancing the people's sense of national historical identity, spreading the advanced theories of the CPC, passing on and carrying forward the spirit of the revolution, and fostering socialist core values [1].

Under the technological wave of the new round of information revolution, metaverse as an emerging concept and cutting-edge technology has received extensive attention. The development of metaverse is both an opportunity and a challenge for the promotion of reading. The reason is that on the one hand, technological changes have brought innovations and promoted the development of digital economy and industrial upgrading, but on the other hand, the fusion, reform and reorganization of many technologies have led to the dilemma that reading promotion is faced with the difficulties of adapting the promotion methods, technologies and environments to today's technological pattern and the whole reading ecology. Therefore, what academics need to pay attention to is how to accelerate the intelligent upgrading of the information service industry through the integration of metaverse technology and reading promotion so as to stimulate readers' interest in reading and guarantee their basic ability to read and obtain information [2].

## 2 CURRENT STATUS OF DOMESTIC AND INTERNATIONAL RESEARCH ON THE PROMOTION OF READING OF RED LITERATURE

Intelligent reading and promotion of red literature plays a vital role in spreading the Chinese spirit, Chinese values and passing on the red spirit, and to a certain extent, it also promotes the development of the cultural industry. The reading promotion of red literature has attracted extensive attention from scholars at home and abroad, but due to the special characteristics of red literature, foreign scholars have relatively few research results on it. The research on the promotion of reading red literature in China mainly focuses on the following three aspects: ① the practice and thinking of regional libraries in promoting the reading of local characteristic red culture. The construction of red reading promotion system in college libraries. ③ Research on the promotion strategy of red literature under specific background. The research on the promotion of foreign translation of red literature is divided into three periods: germination, exploration and surge. The research content is mainly from the translation science, based on multiple perspectives to explore the translation strategy of the red text: ① red culture and translation science ② red culture translation and the ideological and political construction of the curriculum ③ translation science perspective of the red culture and tourism external promotion. Through combing the research results in the field of red literature, it is found that, whether it is internal promotion or external translation, there is a relative lack of attention to the reading and promotion service mode of red literature based on the metaverse background and led by new technology, and there are fewer related research results, and the breadth and depth of the research are insufficient. In view of this, this paper summarizes the logic of integration of red literature and metaverse based on the attributes of red literature and metaverse, analyses how “Digital and Intellectual Fusion” empowers the realization of reading promotion of red literature in the perspective of metaverse, and designs a service model of intelligent reading promotion, so as to accelerate the construction of an ecosystem of intelligent reading [3].

### 3 LOGICAL EXTRAPOLATION OF THE PROMOTION OF INTELLIGENT READING OF RED LITERATURE IN A METAVERSE CONTEXT

The purpose of combining the metaverse and red literature reading promotion is to try to create a new knowledge creation, management and service ecosystem that integrates reality and reality. This ecosystem is a form of reading promotion service that is mainly characterized by immersive interactive experience, multifaceted collaborative content production, spatial interaction between the real and virtual worlds, and intelligent reading of 'Red Literature-Knowledge-People'[4].

#### 3.1 The Driving Force of the Metaverse is Similar to That of the Red Literature Reading Promotion

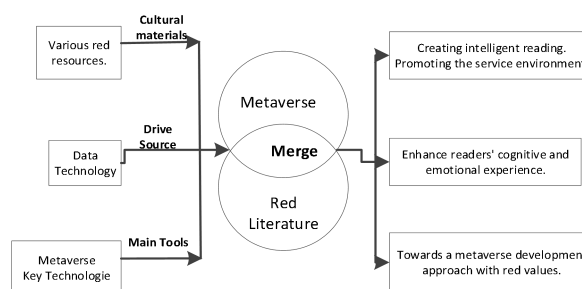
The metaverse has a huge information ecology. This is mainly reflected in the fact that cloud computing lays a solid foundation of arithmetic power and data mining supports the transformation of information value. Cloud computing with dynamic distribution of arithmetic power is the basic guarantee of the metaverse [5]. The red literature reading promotion service also follows the data-driven research paradigm. Red literature reading promotion service is based on different nationalities, cultures and social backgrounds to analyze the readers' behavioral data and feedback data from the perspective of geo-analysis, and discover the potential reading needs and preferences. And accordingly push the corresponding potential resources for them [6]. Metaverse and reading promotion share the same driving force ,that is 'data'. This enables the two to continuously integrate and intersect, and will create an intelligent reading promotion service environment where everything is intelligent [7].

#### 3.2 Metaverse Cracking the Red Literature Reading Promotion Attribute Puzzle

The metaverse will inherit and develop the characteristics of the electronic communication era, and time and space will no longer be the main elements [8]. This cracks the attribute problem of inconvenient access to articles due to the dispersion and disorder of red literature. At the same time, it will further extend the identification of readers' needs and their experiences, making their knowledge acquisition methods richer and their information dissemination capabilities more efficient. Metaverse technology enjoys the immersive experience of spatiotemporal interactivity through immersive experience devices with visual, auditory, and tactile senses, allowing readers to freely choose interaction objects and communication methods in real and virtual scenes [9]. This makes the problem of red literature being highly theoretical, obscure and difficult to read, and lacking in interestingness solved, bringing readers psychological and physiological immersion [10], and obtaining a different cognitive and emotional experience.

#### 3.3 The Spirit of Red Literature Gives Soul to the Development of the Metaverse

The era of the metaverse has irreversibly come, its future as a new social form and way of life, through the extended reality technology for us to bring a convenient and real sense of interactive experience, but the development of science and technology is always human-centered as a starting point, and more need to be in the content level, the spirit of the level of the construction and improvement. As the great spirit of the recorders of the red literature, for the motherland and the people's cause to make selfless contributions to the great revolutionary spirit for the reality of the foundation, relying on the red literature entity for its injection of the source [11]. Realization of virtual reality interaction, red literature will certainly bring excellent content and reality bearing and excellent spiritual culture for the metaverse, forming a way of development with Chinese cultural values [12].



**Figure 1** Mechanism of convergence between metaverse and red literature reading promotion

### 4 THE REALIZATION OF INTELLIGENT READING PROMOTION OF RED LITERATURE IN METAVERSE PERSPECTIVE BY 'DIGITAL AND INTELLECTUAL FUSION'

The purpose of "Digital and Intellectual Fusion" in the field of reading promotion is to learn red ideas and enhance the spirit of patriotism [13]. Based on the fusion of red big data and artificial intelligence, using data mining, language processing and other advanced technologies, to build a dynamic virtual model that maps the physical space and digital space of the red literature in both directions, so that readers and translators can enter into an immersive experience through their personal identity attributes. 'Digital and Intellectual Fusion' is a new development concept for

future-oriented reading promotion, the core of which lies in the fusion and application of various “Intelligent Technologies” [14]. ‘Digital and Intellectual Fusion’ inspires ‘Reader Intelligence’ with ‘Technical Intelligence’, fuses digital space with intelligent space, breaks the traditional purely physical reading space, and builds an intelligent reading service model [15].

#### 4.1 Technology First, Enjoy the Feast of Technology for Promoting Intelligent Reading

Specifically, the reading promotion of red literature in the era of metaverse relies on various kinds of equipment such as cloud computing center, edge computing center and cloud-based architecture to order and visualize the key data of red literature, and process, repair, transform and integrate them [16]. At the same time, special red semantics and scenarios are processed, which are no longer unfolded in the form of text, pictures, sounds, etc., but promote the interaction of information in the metaverse by establishing a direct communication and control channel between the brain and the external devices, and bring the readers a new experience of intelligent reading [17].

#### 4.2 Content-Based, Customized Reading Promotion Personalized Service Content

Due to the long time, the content of red literature is detached from the times, thus it is difficult for readers to get emotional resonance [18]. Intelligent reading, on the other hand, is based on digital, informational and intelligent information technology, with interconnection, efficiency and convenience as the main features, based on reading behavior and reading cloud data with algorithms repeatedly calculated and matched. It not only mines behavioral data, cleans, classifies and filters reading preferences, duration, scenes and readers' beliefs and values, cultural background and social psychology, etc., but also mines the connotative value of red literature and produces content according to demand by using metaverse technology, which truly realizes personalized and customized reading.

#### 4.3 Service Oriented, Building a New Intelligent Reading Promotion Ecology

The association and sharing of red resources is an important guarantee that reading promotion can be maximized. Red literature presents such characteristics as dispersion and fragmentation, and readers need to read a large number of literature if they want to obtain comprehensive information [19]. Under the environment of metaverse technology, different kinds of resources are classified and processed through semantic analysis technology and corresponding category labels are generated, so as to establish the connection between resources and achieve the structured processing of red information. Eventually, the corresponding literature extension service is provided to help readers establish the knowledge service system and achieve the optimization of reading experience. At the same time, the access to red resources becomes more diversified, a virtual network communication space is established, and readers are able to collide with each other based on their own knowledge stock, break through the constraints of traditional reading, and build a reading ecology of value, rationality, and practical intelligent reading [20].

#### 4.4 Experience-Focused, Immersive Reading Promotion

Intelligent reading promotion is not only the dissemination of information, but also a service driven by readers' reading experience. Based on readers' personal experience, it puts them in the reading situation, and uses metaverse technology to fully mobilize readers' sensory stimulation and emotional stimulation, so that they can produce emotional resonance [21]. At the same time, it promotes readers to form a new understanding of red literature, and proceeds to make red culture related products, establishes the association with red literature, and finally makes red culture integrated into readers' life.

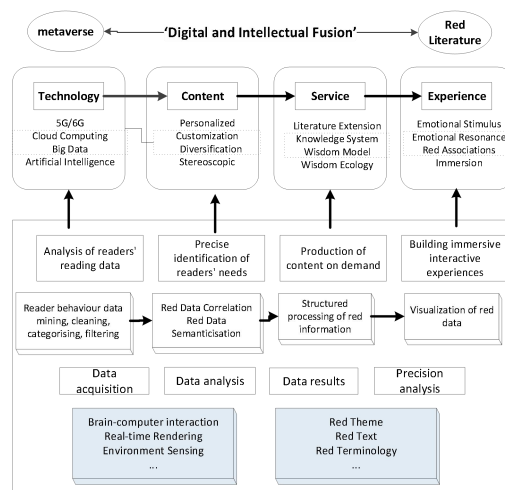


Figure 2 ‘Digital and Intellectual Fusion’ Empowerment Model of Red Literature Reading Promotion Service

## 5 RED LITERATURE INTELLIGENT READING PROMOTION SERVICE MODEL IN METAVERSE PERSPECTIVE

Intelligent reading promotion of red literature in the context of metaverse has changed the fragmented reading mode of readers, inherited and updated e-reading, and paid more attention to emotional and social reading, and the intelligent reading promotion service should also be improved in various aspects such as reading carriers, promotional subjects, and the creation and learning of knowledge [22].

### 5.1 Enhancing the Efficiency of Reading Carriers and Broadening the Horizons of Global Promotion of Red Literature

With the help of new technology, we should fully mobilize the tools of new carriers, improve the efficiency of reading carriers, and make good use of both internal promotion and external translation, so as to make the dissemination of red culture smoother.

**Internal promotion.** Red literature intelligent reading as a new type of reading to promote the spirit of the revolution, according to the characteristics of red literature attributes, the use of new technology will red literature content and scenarios reproduced, so that the red culture live-up [23]. Let the reading form from plane to three-dimensional, so that the reader immersive experience to feel the red spirit. At the same time, based on the encryption algorithm of blockchain technology, using its asymmetric encryption advantage to identify and meet the personalized knowledge needs of different groups of users, so that the reading of red literature is more in line with the big data era.

**External translation.** With the wide application of new technologies and modes of metaverse oriented to 5G+IoT in reading promotion, the translator is placed in a specific spatial and temporal situation, selectively adopts the original text information, deconstructs the original text scenarios and narrative perspectives by means of reconstruction, and carries out the scenario selection and setup, so as to deepen the readers' understanding of the red literature. At the same time, relying on cloud computing technology, we can rapidly build a customized machine translation system for red literature, achieve offline access across devices and systems, and obtain translations of red literature in various languages through data computing and provide them to readers [24].

### 5.2 Creating a Dual Mutual Knowledge Co-creation Community, Crossing the Boundary of Intelligent Reading of Red Literature

There will be a great breakthrough in the way of knowledge exchange in the context of the metaverse. Readers of existing virtual exchange communities can generally communicate only through the form of text, with a low sense of spatial immersion and a single mode of interaction [25]. Under the role of metaverse, the virtual communication platform will become a real sense of "community".

**Space sharing.** Under the background of the metaverse, a red digital reading community is built based on high technology to help readers understand red culture in multiple ways and in all directions [26]. Everyone in the community has a 'private area', readers can freely choose and obtain the corresponding knowledge, and there is a corresponding public space outside the private area. In the public space can be held in the red virtual classroom, red academic conferences and other activities, providing community users with a variety of knowledge interaction space.

**Resource sharing.** Using metaverse technology to reconstruct knowledge to reduce the loss and deviation in the process of knowledge integration, users enter the community and immerse themselves in the scenario in the form of three-dimensional unfolding, experiencing the most complete process of knowledge generation, and absorbing their spiritual culture in a precise and immersive way.

**Knowledge co-creation.** The value of reading focuses on the creation and production of knowledge. Each participant in the community is not only a reader but also a creator. Breaking down the barriers between different industries, technologies and cultures, this learning method forms a decentralized, multi-dimensional, shared "embedded" cognitive network [27]. Subverting the traditional way of knowledge production, gradually evolving the interconnection of human ideas, to ensure the effective dissemination of knowledge of red literature.

### 5.3 Cross-Border Co-operation for Intelligent Reading Promotion and Establishment of Multi-Channel Dissemination Mechanism for Red Literature

The main body of reading promotion in the context of the metaverse is gradually becoming more three-dimensional, with greater emphasis on the synergistic promotion of multiple subjects.

**"Family" linkage.** The influence of family education has a deep impact on the reading promotion of red literature. Driven by the family community, the construction of red literature immersive experience physical space, equipped with the necessary equipment, with the help of metaverse technology to form "online + offline" intelligent reading promotion mode, activate the red spirit inherited from the red literature, to strengthen the function of ideological education, breaking through the traditional cross-border mode [28].

**"Celebrity" driven.** Reading promotion is not only through digital dissemination, but also the establishment of government funding, cultural promotion and celebrity effect. The importance of cultural communication with the help of celebrity effect is becoming increasingly obvious. Interpretation of the red story in the form of celebrity

interpretation, presented in the form of short videos to cater for the public's habit of receiving information in the metaverse era, to understand the spirit of China at any time and any place.

### 5.4 Improving the Intelligent Reading Ecosystem and Forming a Closed Loop of National Reading of Red Literature

Smart technology should also focus on humanistic feelings. The intelligent reading ecosystem embodies the equality of all people, and at the same time contains humanistic feelings. Intelligent reading can not only focus on the mapping relationship between technology and reading, humanistic values and emotional transmission is also an important part of the promotion of intelligent reading [29].

“Meta-reading+”. Breaking down the reading hierarchy to achieve true universal reading. The metaverse intelligent reading scene enhances the presence and identification of the original red literature, uses hyperlink technology, sets up linking channels between different levels, and according to the reader's own cognitive level and comprehension ability, helps the reader to find the most suitable way to read, and can really internalize the red spirit in the heart.

“Barrier-free Reading”. On the basis of enriching the reading promotion service for ordinary people, it also pays attention to the promotion service for special people. Relying on the interactive intelligence capability of Metaverse, integrating multi-modal interaction technology, using machine translation, voice recognition and natural language understanding and other technologies, the red literature and red scenes are shared through the immersive resources of Metaverse, multi-sensory experience, transforming visualization into perceptibility, opening up the “reading blind alley” for people with disabilities, creating a barrier-free reading space, and providing a barrier-free reading space for people with disabilities. The Centre will open up the “blind reading path” for the disabled, create a barrier-free reading space, and facilitate the reading of the disabled [30].

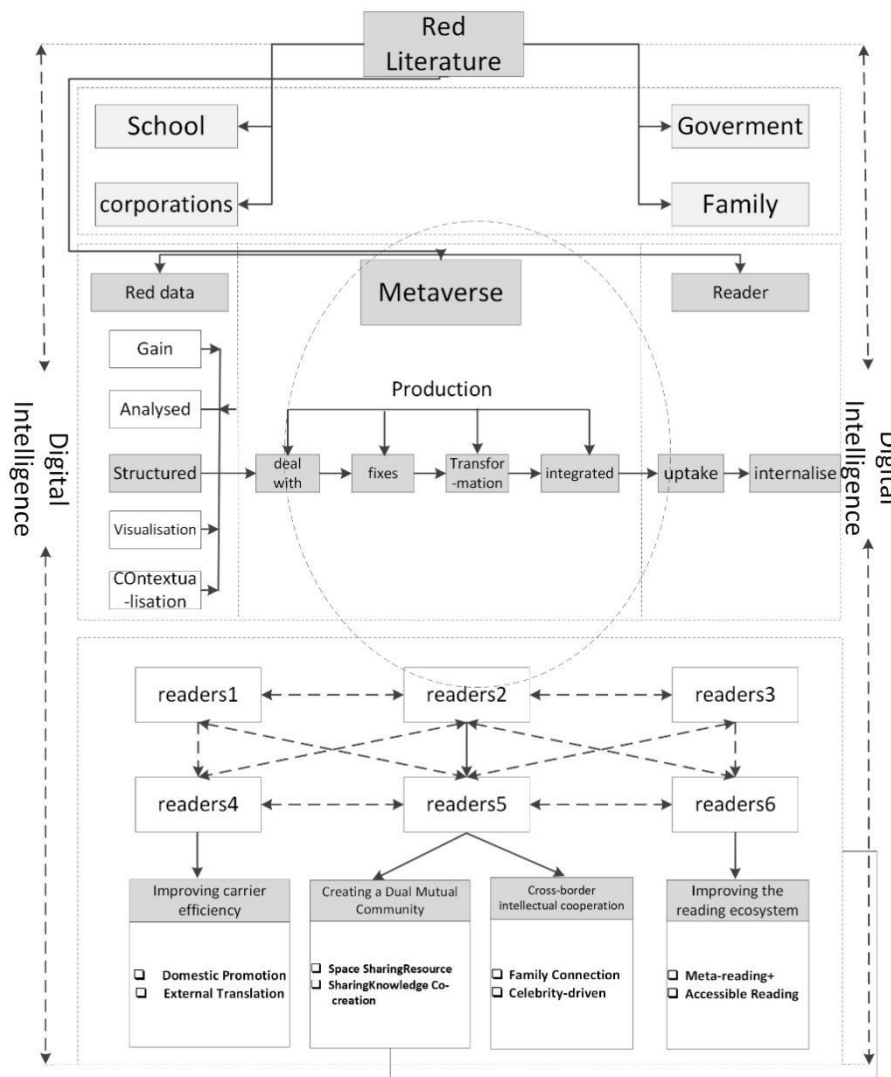


Figure 3 Red literature intelligent reading promotion service model under the metaverse perspective

## 6 CONCLUSION

The emergence of the metaverse has brought new ideas for the change of intelligent reading promotion. Although the application of metaverse technology is not common at this stage, with the continuous progress of science and

technology and the continuous development of people's thinking concepts, the metaverse will exist in the form of a mature digital network and gradually integrate into people's daily life [31]. Metaverse technology is integrated into the promotion of intelligent reading, and "Digital and Intellectual Fusion" empowers it to eventually form an intelligent reading ecosystem for red literature, and to achieve this goal, it is necessary to explore and study the whole system, rules, processes and other aspects of the metaverse.

## FUNDING

This study was supported by "Tianjin Art Science Planning Project" (Grant No. D20002).

## COMPETING INTEREST

The authors have no relevant financial or non-financial interests to disclose.

## REFERENCES

- [1] Rezk, E, Haggag, M, Eltorki, M, et al. A comprehensive review of artificial intelligence methods and applications in skin cancer diagnosis and treatment: Emerging trends and challenges. *Healthcare Analytics*, 2023, 4, 100259. DOI: <https://doi.org/10.1016/j.health.2023.100259>.
- [2] Gandhi, M, Gaur, A, Kar, AK, et al. Crafting user experiences in the metaverse: A design science study. *Technological Forecasting and Social Change*, 2024, 209, 123759. DOI: <https://doi.org/10.1016/j.techfore.2024.123759>.
- [3] Wang, L, Shi, X, Liu, C, et al. Innovation and Effect Evaluation Algorithm of Library's Refined Reading Promotion Activities in the 5G Era. *Frontiers in Educational Research*, 2024, 7(5). DOI: 10.25236/FER.2024.070525.
- [4] Claire, L, Luke, T. Libraries and the metaverse: The rise of augmented and virtual realities. *Business Information Review*, 2023, 40(4): 156-157. DOI: 10.1177/02663821231216772.
- [5] Ayodeji YA, Tega RE, David, BO, et al. Reincarnation of libraries via metaverse: A pathway for a sustainable knowledge system in the digital age. *Business Information Review*, 2023, 40(12): 191-197. DOI: 10.1177/02663821231208044.
- [6] Tella A, Ajani AY, Ailaku VU. Libraries in the metaverse: the need for metaliteracy for digital librarians and digital age library users. *Library Hi Tech News*, 2023, 40(8): 14-18. DOI: 10.1108/LHTN-06-2023-0094.
- [7] Anna VEN, Harisanty D, Ismail N. Libraries on metaverse, do they exist? *Library Hi Tech News*, 2023, 40(6): 1-2. DOI: 10.1108/LHTN-02-2023-0019.
- [8] Adigun OG, Ajani AY, Enakrire TR. The Intelligent Libraries: Innovation for a Sustainable Knowledge System in the Fifth (5th) Industrial Revolution. *Libri*, 2024, 74(3): 211-223. DOI: 10.1515/LIBRI-2023-0111.
- [9] Kalbande D, Yuvaraj M, Verma KM, et al. Exploring the Integration of Artificial Intelligence in Academic Libraries: A Study on Librarians' Perspectives in India. *Open Information Science*, 2024, 8(1): 20240006. DOI: 10.1515/OPIS-2024-0006.
- [10] Peipei C, Lin Y. Research on Strategies for the Aging Population in the Intelligent Digital Library of Wenzhou City under the All-Age Friendly Concept. *Scientific and Social Research*, 2024, 6(8): 1-8. DOI: 10.26689/SSR.V6I8.7653.
- [11] Peter F. "Through the looking glass: envisioning new library technologies" musing on artificial intelligence and accessibility. *Library Hi Tech News*, 2024, 41(6): 1-5. DOI: 10.1108/LHTN-06-2024-0095.
- [12] Yang G. Research on the Strategy of Building Intelligent Services in College Libraries under the Background of Big Data. *Probe - Media and Communication Studies*, 2024, 6(2). DOI: 10.59429/PMCS.V6I2.6491.
- [13] Adigun OG, Ajani AY, Enakrire TR. The Intelligent Libraries: Innovation for a Sustainable Knowledge System in the Fifth (5th) Industrial Revolution. *Libri*, 2024, 74(3): 211-223. DOI: 10.1515/LIBRI-2023-0111.
- [14] Baek, J, Hwang, Y. Old tales, new tools: How AI chatbots and the metaverse are transforming premodern classical literature reading activities. *International Journal of Educational Research*, 2024, 128, 102461. DOI: <https://doi.org/10.1016/j.ijer.2024.102461>.
- [15] Adeleke, AA, Durodolu, OO. Trends in Library and Information Services. In *Reference Module in Social Sciences*. Elsevier. 2024. DOI: <https://doi.org/10.1016/B978-0-323-95689-5.00157-7>.
- [16] Han, Qing-Long. The era of quality and metaverse. *IEEE/CAA Journal of Automatica Sinica*, 2023, 10(1): 1-2. DOI: <https://doi.org/10.1016/j.asoc.2024.111906>.
- [17] Miccoli, L, Arias, MAP, Santiago, J. A network analysis on digital media use, reading enjoyment, and orthography precision in a highly educated sample. *Computers & Education*, 2023, 207, 104932. DOI: <https://doi.org/10.1016/j.compedu.2023.104932>.
- [18] Smith, C. Smart Libraries and Library 3.0. In *Reference Module in Social Sciences*. Elsevier. 2024. DOI: <https://doi.org/10.1016/B978-0-323-95689-5.00017-1>.
- [19] Jadhav, D, Shenoy, D. Measuring the smartness of a library. *Library & Information Science Research*, 2020, 42(3): 101036. DOI: <https://doi.org/10.1016/j.lisr.2020.101036>.
- [20] Ramirez, EM. The Future of Reading and its Promotion. In *Reference Module in Social Sciences*. Elsevier. 2024.

- DOI: <https://doi.org/10.1016/B978-0-323-95689-5.00082-1>.
- [21] Kristensen, MM, Simonsen, P, Lei Pihl, ME, et al. "We're opening 20 doors!": Exploring the collective dimensions of Shared Reading as mental health promotion among newly retired men in Denmark. *Social Sciences & Humanities Open*, 2023, 8(1): 100639. DOI: <https://doi.org/10.1016/j.ssaho.2023.100639>.
- [22] Ylipulli, J, Pouke, M, Ehrenberg, N, et al. Public libraries as a partner in digital innovation project: Designing a virtual reality experience to support digital literacy. *Future Generation Computer Systems*, 2023, 149, 594-605. DOI: <https://doi.org/10.1016/j.future.2023.08.001>.
- [23] Ihekwoaba, EC, Okwor, RN, Uzowulu, OO. Access Provision for Students with Reading Disabilities (SRDs) in Nigerian University Libraries. *The Journal of Academic Librarianship*, 2023, 49, 102622. DOI: <https://doi.org/10.1016/j.acalib.2022.102622>.
- [24] Donovan, JM. Keep the books on the shelves: Library space as intrinsic facilitator of the reading experience. *The Journal of Academic Librarianship*, 2020, 46, 102104. DOI: <https://doi.org/10.1016/j.acalib.2019.102104>.
- [25] F Wilfrid Lancaster, Warner AJ. *Intelligent Technologies in Library and Information Service Applications*. Information Today, 2001. DOI: [https://doi.org/10.1016/S0098-7913\(01\)00163-0](https://doi.org/10.1016/S0098-7913(01)00163-0).
- [26] Chen, H. Application of E-Learning entertainment learning based on intelligent interactive experience in English reading assistance mode. *Entertainment Computing*, 2025, 52, 100762. DOI: <https://doi.org/10.1016/j.entcom.2024.100762>.
- [27] Smith, C. *Smart Libraries and Library 3.0*. In Reference Module in Social Sciences. Elsevier. 2024. DOI: <https://doi.org/10.1016/B978-0-323-95689-5.00017-1>.
- [28] Tella, A, Ukwoma, SC, Kayode, AI. A two models modification for determining cloud computing adoption for web-based services in academic libraries in Nigeria. *The Journal of Academic Librarianship*, 2020, 46, 102255. DOI: <https://doi.org/10.1016/j.acalib.2020.102255>.
- [29] Khatib, MME, Opulencia, MJC. The Effects of Cloud Computing (IaaS) on E- Libraries in United Arab Emirates. *Procedia Economics and Finance*, 2015, 23, 1354-1357. DOI: [https://doi.org/10.1016/S2212-5671\(15\)00521-3](https://doi.org/10.1016/S2212-5671(15)00521-3).
- [30] Yin, Z, Zhang, Z, Ren, T. Beyond surface: Chinese youth's digital reading motivation explored via laddering and the interpretative structural modeling method (ISM). *Library & Information Science Research*, 2024, 46, 101314. DOI: <https://doi.org/10.1016/j.lisr.2024.101314>.
- [31] Chen, X, Xiao, Y. Pathways to digital reading literacy among secondary school students: A multilevel analysis using data from 31 economies. *Computers & Education*, 2024, 218, 105090. DOI: <https://doi.org/10.1016/j.compedu.2024.105090>.