Innovation and Practice of Integrated Public Service System for Digitally Enabled Lifelong Learning for All People

Yufan Lin

Information Centre, Zhejiang Open University

Hangzhou, China

Tel: 086-177-9456-1560   E-mail: LYF19930811@126.com

Jianming Lin (Corresponding author)

Department of Organization, Zhejiang Open University

Hangzhou, China

Tel: 086-177-5717-0527   E-mail: Linjm@zou.edu.cn

Binli Xu (Corresponding author)

Information Centre, Zhejiang Open University

Hangzhou, China

Tel: 086-181-5713-7705   E-mail: Xubl@zou.edu.cn

Abstract

Lifelong learning for all has gradually become a norm in developing education policies in various countries. Innovation and Practice of Integrated Public Service System for Digitally Enabled Lifelong Learning for All People attempts to analyze and address the issues above from the data continuous development and improvement perspective. These issues include Unequal distribution of resources, Rapid technological upgrading, Lack of appropriate platforms, and An urgent need for personalized learning, Data security and privacy. China has made some progress in promoting the construction of a digitally empowered learning society

while facing some challenges and problems. The solutions include:

●Strengthen the overall planning of the platform.

●Integration of crucial application scenarios.

●Implementing data governance to build a lifelong learning data warehouse.

●Using platforms to strengthen the application of learning outcomes.

●Construction of platform network security guarantee system.

Keywords: Lifelong learning, Integrated public service system, Data security, Digitally empowered learning society

1. Background

Lifelong learning for all has gradually become a norm in developing education policies in various countries (He & He, 2019). The 2019 China Education Modernization 2035 states that "a modern education system serving lifelong learning for all will be built by 2035" (Cheng & Li, 2023); the 2010 Outline of the National Medium and Long-Term Education Reform and Development Plan (2010-2020) states that (the lifelong education system will be improved, a learning society will be built, and an open and flexible public service platform for education resources will be established) (Qiao, 2013). In 2010, the Outline of the National Medium and Long-Term Education Reform and Development Plan (2010-2020) pointed out that (the lifelong education system should be improved, a learning society should be built, and an open and flexible public service platform for education resources should be established) (Li & Wu, 2024). In line with the Provincial Party Committee's "accelerate the construction of open university system with Zhejiang characteristics, explore the lifelong learning society of the Zhejiang model" deployment and the Provincial Party Congress "take the lead in realizing the universal human capital improvement" requirements, Zhejiang Open University under the unified leadership of the provincial education department, efforts to build a public service platform for lifelong learning for all, and continue to build the open and flexible education resources public service platform. Under the unified leadership of the provincial education department, Zhejiang Open University has made great efforts to build a public service platform for lifelong learning for all people. It has continuously promoted digital reform and application. The construction of the platform follows the general framework of "Learning in Zhejiang," integrates the digital application scenarios (of academic upgrading, skills training, quality of life, and the transformation of learning achievement certification), and creates a "lifelong learning track, teaching support throughout the whole process, full coverage of teaching types, all-around teaching services, and open platform standards" for all social learners. The platform is open to all standards. Currently, the "Internet+Education" model created by "Learning in Zhejiang," which combines online and offline, provides online learning services to nearly 150,000 adult junior and senior high school students and 150,000 social open education learners in the province. With more than 4 million registered users and more than 5,000 institutions, ZJET has conducted more than 110,000 activities and recorded more than 40 million hours of learning achievements. The "credit bank" has built 11 city branches, 99 county-level sub-centers, and more than 2,000 acceptance points, opened accounts for more than 17 million learners, and stored more than 70 million pieces of information on various learning achievements. At the same time, the school promotes the construction of a public service platform for lifelong learning for all people in Zhejiang Province. By the requirements of "one network, one integration, and one chessboard," it has strengthened the integration and docking with the national wisdom education platform, ZJET, the credit bank, and other platforms, and promoted the integration of systems, the pooling of functions and the clustering of resources.

2. Research Methodology

Following are the Research stages and Research methods and Research tools used at these stages:

2.1 Research Stages

●Preparation phase: Define the project's objectives and develop a plan for the project. This includes the scope, budget, time, cost, and resources of the project. Research and analyze the technical support and correlations related to Digitally Enabled Lifelong Learning; form matching theoretical methods and long-term development plans.

●Implementation phase: The project team carries out the tasks according to the plan and builds an Integrated Public Service System for Digitally Enabled Lifelong Learning for all people, constructing an online & offline service model that integrates and complements each other.

●Summarization phase: Summarize and evaluate the implementation process of the project, and write relevant reports and papers. Propose theoretical countermeasures for the application of Digitally Enabled Lifelong Learning for all people in colleges & and universities create Integrated Public Service, and provide practical measures and suggestions.

2.2 Research Methods

●Literature research method: the general process consists of five basic parts proposing a topic or hypothesis, research design, collecting literature, organizing literature, and conducting a literature review. With the support of digital technology, supported by data, a unified format is used to store Lifelong learning-related information and establish corresponding search methods, aiming at grasping the timeliness of information.

●Design research method: To solve the dilemma of divorcing research from practice, the Design research method is introduced in this study. As a repetitive and iterative research process, real and reliable data from educational scenarios are obtained and constantly revised. Interactive scenarios are designed based on focusing on the main elements and lifelong learning period.

●Questionnaire survey method: After the construction of a sufficient theoretical foundation is completed, appropriate questionnaires are designed on this basis to analyze the problems in the process of building an Integrated Public Service System and the personal information of the users that need to be focused on that are encountered in the process of data collection from a micro perspective qualitative research, so that the authenticity of the users' profiles can be more comprehensively taken into account at the beginning of the model construction.

2.3 Research Tools

●Data collection tools: e.g. questionnaires (Zotero, Paperpile, Dovetail, EndNote), interview guides, observation forms, and experimental equipment.

●Data analysis tools: e.g. statistical software (SPSS, R, SAS), content analysis software, qualitative analysis software (NVivo, Atlas. ti).

●Literature management tools: e.g. Zotero, EndNote to help researchers organize and cite literature.

●Research tools: e.g. SurveyMonkey, Typeform, for designing and distributing online surveys.

3. Problems

The innovation and practice of the integrated public service system for digitally-enabled lifelong learning for all is a process of continuous development and improvement. China has made some progress in promoting the construction of a digitally empowered learning society (Kottmeyer, 2021) while facing some challenges and problems. The following are some of the possible issues:

3.1 Unequal Distribution of Resources

While digitization has facilitated lifelong learning for all, there is still a digital divide between different regions and groups, and some remote areas and older people may find it difficult to reap the benefits of digitization: (a) High-quality educational resources may be concentrated in urban and developed areas. In contrast, rural and less-developed areas may need more resources, leading to inequalities in educational opportunities. (b) There are differences in the level of development of digital infrastructure in different regions, resulting in some areas having better access to digital resources. In contrast, others enjoy a different level of digital learning resources and services due to inadequate infrastructure. (c) There are inequalities in access to and use of digital learning resources between groups of various ages, occupations, and socioeconomic status. For example, older people may find it challenging to fully use digital learning resources due to lower levels of digital literacy. At the same time, younger generations may be more receptive to and able to use these resources.

3.2 Rapid Technological Upgrading

With the rapid development of technology, education systems need to be constantly updated to adapt to the new technological environment, which places higher demands on education administrators and teachers (Jiang, Yang, & Yu, 2020). Teachers need to continuously improve their digital literacy and teaching skills to adapt to digital teaching and learning demands. Despite the convenience offered by digitalization, how cultivating a culture of lifelong learning throughout society and making learning a way of life is still a direction that requires long-term efforts. The accelerating pace of technological change and the need for users to constantly adapt to new tools and platforms can be challenging for some users, especially older users. Keeping up with technological developments requires a continuous investment of resources to update hardware and software and train users, which can be a financial burden for some districts or organizations. As technology is updated, educational content must also be updated to remain relevant, which can be challenging for educational content providers. Some technologies can quickly become obsolete, rendering previously invested resources and efforts ineffective.

3.3 Lack of Appropriate Platforms

At present, there is no mature and complete platform on the Internet to serve lifelong learning for all, and the offline support system for lifelong learning for all has not been built and

perfected; how to make an ecosystem that meets the requirements of the Twentieth National Congress on the Learning Society, (which can adapt to the development of society and continuous innovation and development), and can continue to meet the basic needs of social groups and continue to balance income and expenditure; sustainable development must take into account the requirements of the State, the requirements of the State, social benefits, the interests of enterprises and the needs of users; sustainable development must maintain the balanced development of the interests of the four parties and create a sound ecology for the four parties. Quality digital learning resources and platforms may be concentrated in specific regions or institutions, making them inaccessible to other areas or groups. For example, (a) Existing digital learning platforms may not be able to meet the diverse needs of different user groups, especially for specific age groups or subject areas, (b) Some platforms may be technically complex or challenging, making access and use difficult for some users, (c) Some platforms may lack long-term operation and maintenance capacity, leading to service disruption or degradation and (d) Existing platforms may lack personalized learning experiences and not fully meet users' personalized learning needs. Data sharing and interoperability between different platforms are inadequate, affecting the effective integration and use of resources.

3.4 An Urgent Need for Personalized Learning

Each learner has different needs and preferences, and providing a personalized learning experience through digital means is challenging. Personalized services are not just about innovations in the hardware environment but also about providing flexible, targeted, emergent, and differentiated services to meet the individual needs of different users. How to plan learners' most appropriate learning path by accurately mapping learner profiles and customizing personalized learning solutions on demand. Learners of different backgrounds, ages, and occupations have different learning needs and preferences, and existing services may struggle to meet this diversity. Some learners may need help entirely using digital learning resources (because of technological barriers), especially older groups, and less information-literate users. In the personalized learning model, the role of the teacher changes from knowledge provider to learning guide and facilitator, placing new demands on their professional development and teaching methods. Although digital platforms can provide many resources, it is challenging to provide personalized resource recommendations and learning path planning (according to learners' specific conditions).

3.5 Data Security and Privacy

With increasing digitization, the security of learners' data and privacy protection have become vital concerns (Suryanarayana & Prasad, 2024). Policies and regulations are needed to support and regulate the development of digitally-enabled lifelong learning for all (and ensure that it occurs healthily and orderly). With the collection of large amounts of (personal information and learning data), ensuring data security and preventing data leakage has become an important issue. Users usually lack sufficient understanding (of how data is collected, stored, and used), which can lead to the risk of data leakage. Advanced technological tools (such as encryption & access control) are needed to protect user data from

unauthorized access & misuse.

4. Recommendations

4.1 Strengthen the Overall Planning of the Platform

To firmly promote the construction of the platform, the school in Zhejiang has set up a special team for the public service platform of lifelong learning for all and introduced the technical strength of large state-owned enterprises (such as China Telecom, China Unicom & Huaji Media), which is directly responsible for the leadership of the school, (to strengthen the synergistic work of business & technology). By the general requirements of "one network, one integration, one body" of the Ministry of Education, the top-level structure of the platform was studied. After discussion, the top-level structure of "1152+N" of the public service platform for lifelong learning was formed (as one technical base, one data warehouse, five centers: (a) User center, (b) Application center, (c) Message center, (d) Data sharing center, and (e) Competence center. Two middle stages (Curriculum middle Stage, Examination middle stage), and N business applications. Following the principle of integrated planning and step-by-step implementation, a three-stage implementation plan has been clearly defined. From the year 2023 to 2024, it established the technical standards of the platform base, built the core modules (such as the User Center and Application Center), integrated the three major scenario applications of learning in Zhejiang & Credit Bank, and created the portal space of the public service platform for lifelong learning. From the year 2024 to 2025, it will promote the integration & construction (of the Data sharing center & the Message center), build a full-process, full-business service model for social personnel academic qualification improvement, realize the effective articulation of the province's teaching, and learning services & management, improve the experience of teachers & students, and support the reform of talent cultivation mode. Deepen the application of the platform in social personnel education, elderly education, future community education, etc. After 2025, it will build the Platform competence center, strengthen the platform operation ability, provide technical support for the platform ecology construction, and continuously develop the highly integrated, intensive, and concentrated digital application of education. Establish a unified operation and service mechanism (for the public service platform) and standardize the learning support service process. For social learners, including the province's colleges & universities, community education, education for older adults, and other teachers & students stationed on the platform, it provides unified platform operation support and technical services, avoids fragmentation of service entry points, eliminates supply chain security risks, and improves service quality & satisfaction.

4.2 Integration of Crucial Application Scenarios

In the first half of the year, through application integration & resource aggregation, the platform deepened the effective integration of application scenarios (such as academic upgrading, skills training, quality of life, and learning outcomes), and the platform portal was opened and launched, integrating course resources from adult junior & senior high school (to higher education, live courses, and non-degree online learning resources). The platform is open to the public, (with more than 6,000 academic courses of various types and more than

50,000 non-academic learning resources). It constantly promotes the diversification of resources & personalized services with the learner (as the center to realize "teaching according to need,") serving lifelong learning for all people and making every effort to meet the diverse learning needs of the people. Through the creation of the "Zhejiang Learning Map" to facilitate local learning, the relevant resources (for lifelong learning all are unified and integrated) from the supply side of the service and oriented to the needs of learners; the intuitive map form is used to display and locate the online learning resources and offline learning activities, (to make it convenient for learners to quickly find the learning institutions, learning professions, learning resources and learning activities they need). "Zhelearn Map" is the core application of the platform, and all functional modules are linked together in the form of a map, (which is convenient for users to find and improve their experience). Promote the integration & docking of Zhejiang Learning Pass, promote the integration of application scenarios, centralize the data of the independently deployed Learning Pass series platforms in Hangzhou, Zhoushan, and other municipal levels, and realize real-time data synchronization in total volume. Provide development and docking at the functional level, (including (a) User authentication, (b) Section setting, (c) Training information, (d) Peripheral activities, (e) learning clubs, (f) gold medal lecturers, and (g) other applications & adaptation modifications, and support the homologation and interoperability of published content.

4.3 Implementing Data Governance to Build a Lifelong Learning Data Warehouse

Following the general idea of integrated data governance of "convergence, governance, and enjoyment," focusing on combing & analyzing the vast data on academic upgrading, skills training, quality of life, and learning achievements, and by mapping the existing 40 or so business application systems and about 1,800 tables, we have continuously improved & optimized the data standards of lifelong education and formed a set of data governance standards and management norms. Management norms. A total of 729 data tables from 22 business systems have been accessed, with a daily increase of 7GB of data, and the current total data volume is 1.25TB. An in-depth understanding of the commonality and differentiation of the original platform and the existing platform business needs requires the account after migration to retain (appropriate roles, menus, and data permissions) to ensure a smooth business transition and regular operation of use. A lifelong learning business data model has been developed, divided into ten significant data domains: (a) Enrolment, (b) Teaching, (c) Instruction, (d) Learning, (e) Resources, and (f) Scientific research, etc., A sizeable lifelong learning data warehouse has been built first. It focuses on sorting & cleaning institutional data, gradually forming a unique organizational "institutional tree", encapsulating data exchange interfaces for each business system, and realizing dynamic convergence (of data at different levels, real-time sharing, controllable & traceable data application).

4.4 Using Platforms to Strengthen the Application of Learning Outcomes

Focusing on the convergence of different learning outcomes at all levels, it has explored the transformation, mutual recognition, and application of different learning outcomes: (a) It has established a four-tier credit bank service system (with a provincial management center), 11

municipal branches, 94 county-level sub-centers, 1575 township & street community acceptance points, thus achieving full coverage of the province's community education and adult education service system. (b) It has set up 106 credit bank branches in colleges & universities to promote the inter-college credit conversion of online open courses (and to serve the "Internet+" teaching performance evaluation in colleges & universities). (c) In addition, it collects and analyses data on social education in adult schools and prepares operational analysis reports annually, providing data support for the provincial education department's evaluation (of the performance of municipal & county education offices). The total number of credit bank accounts has exceeded 18.76 million, and the number of learning outcomes deposited has exceeded 98.79 million (Li, Lv, & Wu, 2023).

4.5 Construction of Platform Network Security Guarantee System

Following the three-way synchronization of information system construction, operation, and security, an all-around information security guarantee system has been established at various levels, (including technology, management, and operation), to ensure stable system operation and safe reliable data. By relevant requirements, the Company has continuously carried out security assurance work, regularly conducted contingency plans & security drills, built & used an off-site disaster recovery system, and further played the role of a hybrid cloud computing data center to realize off-site data backup and application-level disaster recovery deployment.

5. Conclusion

With the rapid development of digital technology, the integrated public service model (of lifelong learning) for all faces unprecedented opportunities & challenges (Hofman & Meijerink, 2015). By analyzing the innovative practice (of the digital empowerment model), this paper demonstrates its remarkable effectiveness in improving the: (a) openness, (b) flexibility, and (c) personalization of educational resources. However, we must also be soberly aware that in realizing this model, there are still problems, (such as uneven application of technology, personalized services that are difficult to meet, and data security). For this reason, we are recommended to work at multiple levels, (including policy guidance, technological innovation, resource integration, and public education), to jointly promote the in-depth development (of digitally empowered lifelong learning public services for all).

References

Cheng, L., & Li, L. (2023). Higher Education Modernization of Chinese Style:Discourse Expression Essential Characteristics, and Advancing Path. *Journal of Guizhou Normal University*, (1), 42-52. (In Chinese) https://doi.10.12154/j.qbzlgz.id=7108873890

He, S. Y., & He, G. Q. (2019). Lifelong Education in a Hundred Years: From Lifelong Education to Lifelong Learning. *Modern Distance Education Research*, (01), 66-77+86. (In Chinese) https://doi.10.3969/j.issn.1009-5195.2019.01.008

Hofman, E., & Meijerink, J. (2015). Platform Thinking for Services: the Case of Human Resources. *Service Industries Journal, 35*(3-4), 115-132. https://doi.org/10.1080/02642069.2014.989999

Jiang, L., Yang, M., & Yu, S. (2020). Chinese Ethnic Minority Students' Investment in English Learning Empowered by Digital Multimodal Composing. *TESOL Quarterly, 54*(4), 954-979. https://doi.org/10.1002/tesq.566

Kottmeyer, B. (2021). Digitization and Sustainable Development: the Opportunities and Risks of Using Digital Technologies for the Implementation of a Circular Economy. *Journal of Entrepreneurship and Innovation in Emerging Economies, 7*(1), 17-23. https://doi.org/10.1177/2393957520967799

Li, J., & Wu, J. (2024). Digitization Empowering the High-quality Teaching in Vocational College: Representation Patterns and Achievement Paths. *Vocational Education Research,* (06):84-90. (In Chinese) https://doi.CNKI:SUN:JNWJ.0.2024-84-90

Li, Y., Lv, C. S., & Wu, W. F. (2023). The Logic of Credit Bank Policy Change in China: Based on the Analysis Framework of Historical Institutionalism. *Journal of Distance Education, 41*(04), 92-102. (In Chinese) https://doi.10.15881/j.cnki.cn33-1304/g4.2023.04.009

Qiao, W. (2013). Outline of the National Medium and Long Term Education Reform and Development Plan (2010-2020) - Analysis of the Generation of Higher Education Policies Based on Stage Inspiration Method. *Jiannan Literature*, (09), 301. (In Chinese) https://doi.CNKI:SUN:JNWJ.0.2013-09-201

Suryanarayana, K., & Prasad, G. (2024). Artificial Intelligence Enhanced Digital Learning for the Sustainability of Education Management System. *Journal of High Technology Management Research,* (2), 100495. https://doi.org/10.1016/j.hitech.2024.100495

Copyright Disclaimer