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New Ecological Development of Regional Smart Education Based on Big Data

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Abstract: With the advancement of information technology and the acceleration of educational informatization and intellectualization, the construction and operation of a regional smart education ecosystem has become a new hot spot in the current educational informatization field. Traditional school management is reflected in the rational distribution of various material and human resources in the school, which is basically consistent with the school-based management system. The informatization of smart education should not only allocate materials and teachers reasonably, but also make reasonable use of information resources and network technology talents. This paper analyzed the changes and existing problems of regional smart education through big data, which has been planed and designed. The goal and value of development have been discussed, and then a comprehensive service platform system for smart education has been constructed. Through experiments, the development of regional smart education in recent years and the use of smart education platforms have been analyzed. The results showed that under the background of big data, the number of regional smart education users has increased by 11.6%.

1. Introduction

With the rapid development of information technology, the acquisition of knowledge and changes in teaching methods are also accelerating. Traditional education basically follows the principle of unified teaching. However, with the development of modern education, teaching at each individual's pace and the use of big data are adopted to promote personalized teaching, which has become the current and future teaching trend.

Regional smart education is based on "Internet +" and premised on a new generation of information technology. The constructed regional modern education information service system has been continuously applied in education. According to the area smart education utilizes a series of

digital technologies to support e-learning, Hoel T constructed two models, which laid the foundation for a new standard development platform in this field [1]. Yang H discussed how to make better use of big data in regional smart education platforms to improve education quality and serve platform users. Teaching work was divided into basic modules. An intelligent classroom application platform was built to identify the sharing of high-quality educational resources, expand the implementation and promotion, so as to realize intelligent learning [2]. Yoo G J built a regional smart education service model, which could promote the organic integration of educational dissemination, educational research, learning activities, teaching affairs management, and information infrastructure. At the same time, the platform provided more intelligent, more efficient and more accurate services for teaching [3]. Janati S E adopted the strategic method and technology of adaptive learning system to build a regional smart education system framework, adapt learning content to learners and users with physical disabilities, which provided a good learning platform for the disabled [4]. Liao D L studied the impact of smart technologies on cognitive and educational activities. He assessed the role of regional intelligence education in education and cognition from semiotics and epistemology [5]. Based on the research on the main components of the intelligent education system, Yaremko S built an account interface for students to log into the system using the global wide area network development tool. The system allowed quick access to educational materials, smart simulators, interactive personal assistants, virtual boards and other educational tools [6]. Narayanan L mentioned that with the outbreak of the novel coronavirus pandemic, many schools had adopted a complete online education format. He also proposed a regional wisdom education pedagogy. This pedagogy was not only inclusive, but also adaptable to future developments without compromising educational standards [7]. Although regional smart education has been widely used, there are still some problems in the application.

Big data technology is an important force to promote teaching reform. More and more scholars are studying it. Zhang W mentioned the rapid development of big data, which was fully prepared to participate in school education and realize smart education. Based on the architecture of big data artificial intelligence, the closed-loop structure based on intelligent interaction and intelligent deep learning was used to reshape teaching [8]. Lei X believed that big data provided new ideas for the construction of high-tech smart parks. He discussed the current problems in the construction of high-tech parks: the construction of high-tech smart education was affected by multiple factors such as software and hardware, professional and technical personnel, and lack of understanding of smart education [9]. Parksu Y S combined the big data analysis platform "Intelligent Learning Partner" with the theory of subject ability analysis to develop intelligent education based on the Internet and big data. It aimed to provide personalized services for students, teachers and administrators [10]. Reinders H established a framework for evaluating the application of big data in education, including related theories of knowledge sharing and innovation communication [11]. In order to improve teaching accuracy, enrich learning resources, and enhance students' consciousness, Al-Rahmi W M discussed how to apply big data technology in education, which accomplished the goal of changing the educational model of colleges and universities [12]. Wang M built a system of complementary integration of big data education and real-world education to promote the complementary integration of data thinking and traditional experience, and the complementary integration of situational awareness and ubiquitous education. In this way, school moral education could be effectively developed [13]. Li L analyzed the application research of big data in education, how big data and open data technology actually participated in education. In addition, the large amount of unused data could benefit educators and improve the way of education, which provided some new tools and methods, opening up new educational avenues [14]. Although there are abundant research theories on big data, some of them lack practical proof.

In order to solve the problems in smart education, the regional education smart education

platform is an opportunity. Resource sharing was promoted with the help of information education platform, which broke the drawbacks of the development of education informatization. Modern information technology was used to promote teaching reform and development. Informatization was used to promote the modernization of education, which transformed traditional teaching methods with informatization.

2. Problems in the Development of Regional Smart Education

Smart cities are advancing, the development of smart education industry has become the focus. Provinces, cities and districts have planned the development of regional education informatization. In the process of implementation, they have been highly valued by the education sector, government, enterprises and society. However, in general, smart education is still in the exploratory stage. There are still many problems in promoting the development and construction of smart education in various places, as shown in Figure 1.

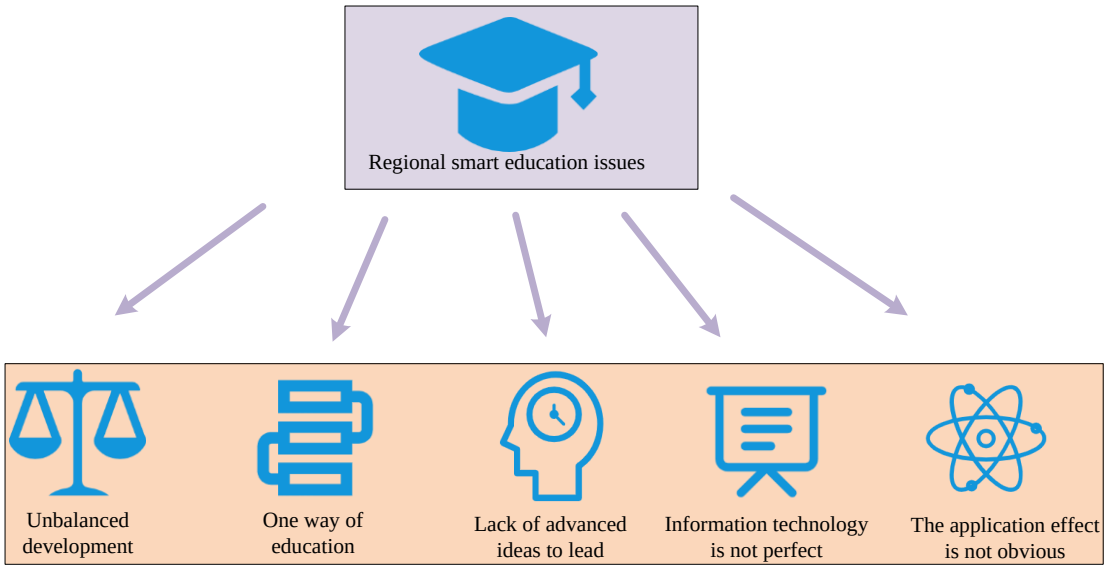

Figure 1. Problems in the development of regional smart education

1) Unbalanced development

At present, there is the problem of unbalanced educational development level among regions with the largest scale and the most complex structure. In the early stage of education informatization, it is difficult to obtain the information of teaching process due to the restriction of technical conditions. There is a deviation in the relationship between supply and demand, so that every child cannot get the ideal personalized education [15].

2) A single way of education

Today's educational reforms are not very effective. Although there are occasional cases of information technology revolutionizing classroom teaching, it has not yet formed the mainstream. A single, teacher-centred classroom teaching still dominates. Individualized education, development, evaluation, and learning are the joint efforts of the education sector and the government.

3) Lack of advanced ideas to lead

In actual work, there are still many staff whose ideological concepts are relatively backward, who lack a sense of urgency for education informatization work. Some people are still in a wait-and-see state without a clear idea and direction. Due to the rigid management system, imperfect management system, routine management of managers, low continuous investment, imperfect maintenance management system, imperfect maintenance service system and other

problems, the sustainable and healthy development of enterprise informatization work has been restricted [16]. At present, the top-level design of regional smart education still lacks advanced ideological guidance.

4) Inadequate information technology

In the construction of smart education, due to the lack of technology's understanding of education business and the lack of information and utilization of educational resources, this has led to reluctance by teachers and students to use siloed campus platforms. The phenomenon that teaching information is not available for teaching diffusion has been formed. The data between various application systems and between schools cannot be connected to each other, which is difficult to form a better regional education information ecosystem.

5) Insignificant application effect

In the process of regional education informatization, the regional education cloud computing platform has been established, but the application system construction has been neglected. Insufficient resource services have formed the problem of "emphasizing platforms, ignoring resources, focusing on construction, and ignoring applications" [17]. Not only does the application system not really enter the formal teaching, but also fails to collect and summarize precious teaching materials in time. The function of the regional platform has not been fully exerted, and the practical effect is not significant.

3. Application of Big Data in the New Ecological Development of Regional Smart Education

(1) Target positioning of regional smart education ecological development

The purpose of regional smart education is to create regional resource interaction and form development paths of different types and models, so as to lead the region to move forward in the direction of future reforms. Its target location is shown in Figure 2.

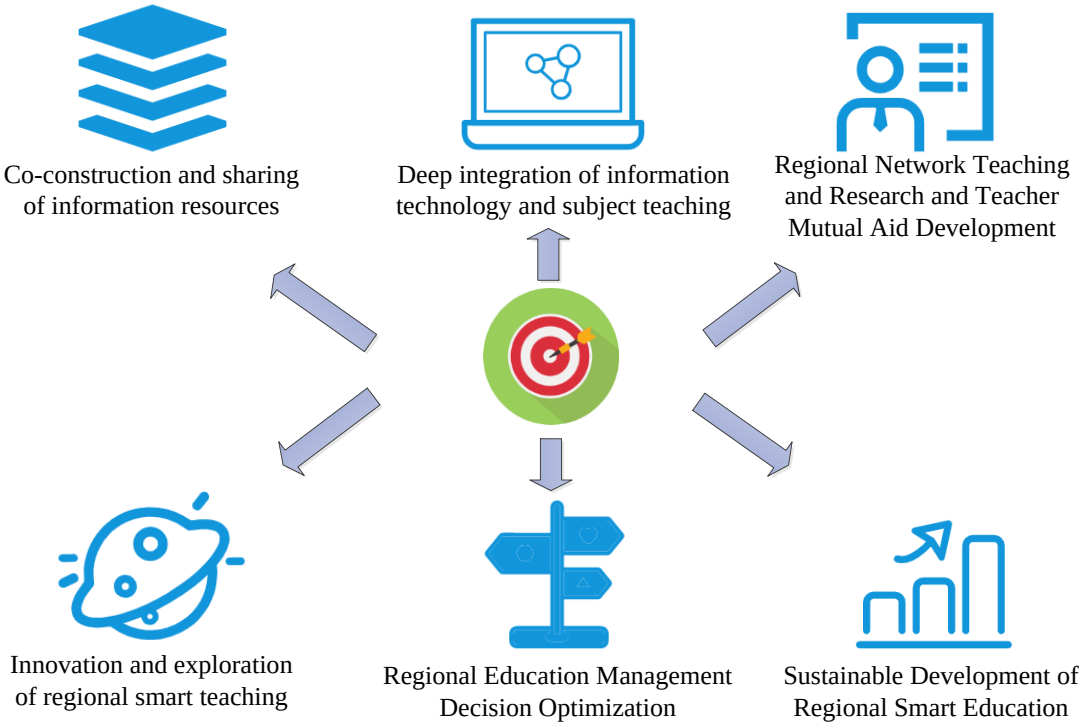

Figure 2. Target positioning of regional smart education ecological development

1) Co-construction and sharing of information resources

In accordance with the development law of regional education informatization, the problems of scarcity of resources, repeated construction, inconsistent data and platform standards are solved, so that resources can be reused. Efficient management of resources is achieved, which promotes the sharing of high-quality resources and balanced development. The concept of self-purchase and construction in the past has been changed, and the way of educational resource construction has been broadened. With educational software developers, schools and related social organizations as the main body, educational resources can be used by more people.

2) Deep integration of information technology and subject teaching

The application of information technology in various majors is strengthened, which promotes the application of information-based teaching from a regional perspective. In the network environment, school-based curriculum is developed, and new curriculum reform is promoted. Science, teaching research and innovation experiments are actively organized to enhance the overall quality of the school.

3) Regional network teaching and research and mutual aid development of teachers

Through the development and use of network teaching resources, an open, dynamic and interactive network teaching and research support system has been established. Regional online study and learning communities are built. Teachers can obtain the assistance of peers, teaching researchers, and teaching experts in the network environment, which promotes the public use of educational information.

4) Innovative exploration of regional smart teaching

It has been researched and developed smart classrooms, online courses, and research-based learning support platforms. Advanced technological means such as electronic schoolbags, smart terminals, and wearable devices are used, which exert their advantages in the fields of cognition, context, autonomous learning, and collaborative learning. Regional smart classroom teaching is carried out, and the rules and characteristics of the application of new technologies in the classroom are discussed. A set of systematic intelligent teaching modes and methods have been constructed. With intelligent teaching and learning, all students can achieve the goal of intelligent education development according to their individual needs [18].

5) Regional education management decision optimization

In smart education, a regional education management information system has been established. Educational administrative work is systematically collected, processed and delivered. Big data is used for analysis, statistics and decision-making of educational management information, which provides students with targeted decisions and suggestions that can solve practical problems, so as to achieve data-based management and decision-making and improve the intelligence of educational management. degree.

6) Sustainable development of regional smart education

To make full use of the resources of regional education management departments and information technology teachers, leaders of education bureaus at all levels and teams of information technology teachers in each school are formed. With the joint efforts of educational informatization enterprises, a new third-party service model has been explored. A long-term mechanism for multi-party input to ensure development has been formed, and methods and approaches to evaluate regional education informatization work have been explored.

(2) Value positioning of regional education big data center platform

With the support of information technology, the healthy development of regional intelligent education is essential. At present, many places are undergoing a new round of planning and construction. Regional smart education business is launched. An integrated architecture, flexible and extensible information system is adopted, including several application systems to support specific teaching activities [19]. In order to effectively integrate and share educational data and

provide reliable data support for educational decision-making, it is necessary to build the management and use of educational data. The value positioning of the regional education big data center platform is mainly reflected in Figure 3.

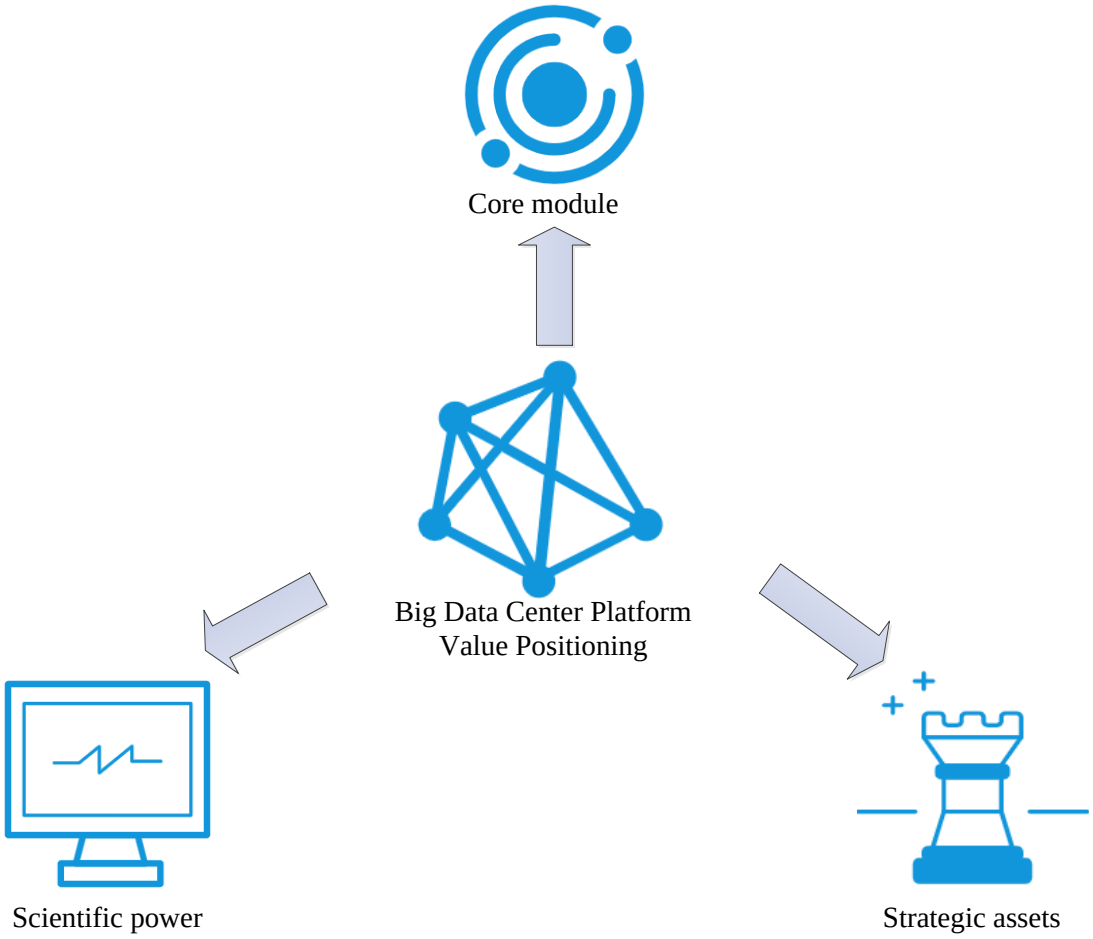

Figure 3. Value positioning of regional education big data center platform

The core module of the intelligent education integrated service platform is the education big data center. As a huge data storage and circulation center, the education big data center shares education data in the region. Its first priority is to integrate the information of various regions to ensure the timeliness, integrity and consistency of educational materials in various regions. As a data sharing channel of various application systems, it effectively solves the problem of information isolation in the process of regional education informatization.

Educational data centers are important strategic assets to promote the development of regional education. With the advent of the era of big data, data has increasingly become an intangible wealth. Various regions have accelerated the implementation of educational big data strategies to strengthen the awareness of strategic assets of educational resources. The Education Big Data Center continues to collect massive amounts of teaching data, which provides a strong impetus and financial support for the development and reform of regional education. It promotes the development of education data-related industries and promotes regional economic development.

Educational data technology is a scientific force to solve problems of educational development and change. Educational big data is like a "gold mine", which can be deeply excavated and utilized to increase the value of educational data assets. At present, the development of regional education is

faced with the problems of balanced development, improving quality, reducing burden, and choosing schools. The educational big data center can find an effective way for smart education through scientific analysis and decision-making of data. The educational big data center is not only a gathering center of "wisdom", but also a place where life is created. The core function of the educational big data center is to realize a variety of intelligent teaching applications based on educational data.

(3) System architecture of smart education integrated service platform

Service-oriented application architecture is the main trend of current and future development. To this end, a comprehensive smart education integrated service platform system is constructed, as shown in Figure 4.

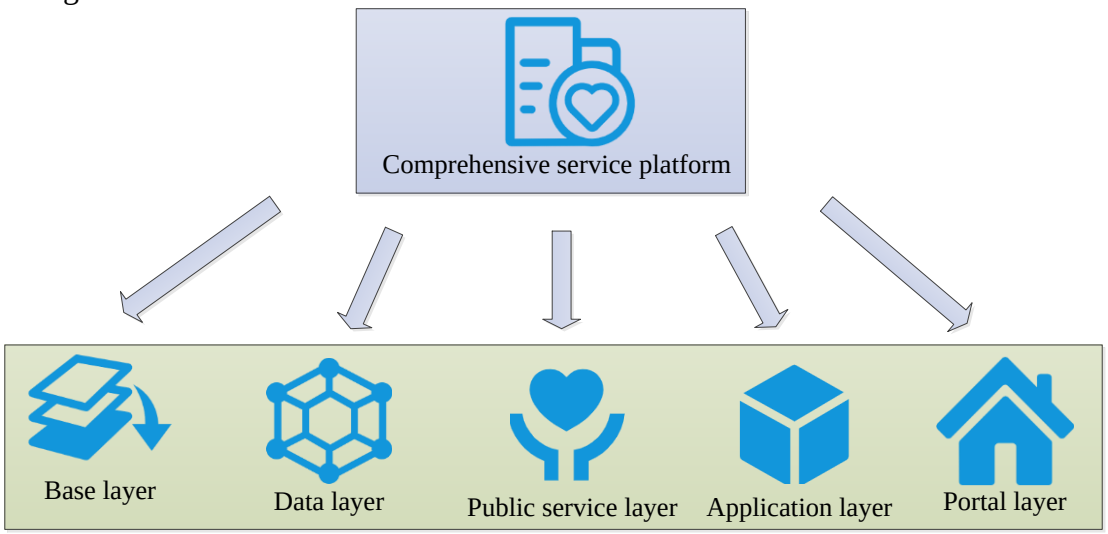

Figure 4. Smart education integrated service platform system architecture

1) Base layer

Cloud computing can connect server clusters scattered in different regions to realize large-scale computing, data processing, and data services. Using the advantages of cloud computing technology in dynamic expansion, data security and resource sharing, an intelligent teaching integrated service platform architecture for cloud data is proposed [20]. Combined with the actual needs of the education sector, an integrated regional intelligent teaching platform based on hybrid cloud technology is constructed. The infrastructure layer of the regional smart education comprehensive service platform integrates public cloud and private cloud. It is a public channel for data computing, transmission and storage. Among them, the public cloud system is mainly deployed for common systems such as educational resource management systems and educational affairs management systems in the region. In order to meet the development needs of different campuses, the private cloud can deploy different application systems in different campuses. In addition, in the selection of cloud computing products, priority should be given to suppliers with mature systems that can customize development for the education system to prevent abuse.

2) Data layer

Above the cloud computing platform is the data layer, which is used to store various teaching data generated by the integrated business platform and provide basic data services such as data collection, storage, processing, and exchange for the basic data layer. It provides a platform for system integration and data sharing among systems, ensuring the timeliness, integrity and consistency of data. In detail, the big data center integrates data from the data source downward and maintains its synchronization update, which becomes a shared data channel among various

application systems. It is a data resource integrated by multiple different application systems.

3) Public service layer

Above the data layer, it is a public service layer, which is mainly used for centralized processing of general business in the entire system. The business of the public service level is the basic business of high-frequency invocation, and has high requirements on concurrency, reliability, and security.

4) Application layer

Above the public service level, it is the integrated service platform of each application system and the unit that implements specific business, which is the main carrier to realize the digitization of education business process. The intelligent education integration service platform integrates the existing application system and the application system to be developed. On this basis, five intelligent teaching application systems are constructed, which make full use of the functions of information technology in the fields of subject teaching, scientific research, teacher training and management. The relationship between the various subsystems is loose, and business integration can be easily carried out.

5) Portal layer

The unified information portal is the "entrance" for users to access the intelligent education comprehensive service platform. Two systems must be focused on construction, namely the external service system and the local office system. They are all deployed in different security domains of the cloud infrastructure platform to provide services for different users. Portal has powerful personalization features. Users can customize the service according to their own business needs and personal preferences, including the content of the service and the style of the theme interface. Users with different identities can have a single login on the personal portal.

6) User layer

The user layer is composed of local users, including two types of users in the region and external users. Users mainly include teachers, students, parents, teaching and research staff, managers, and the general public. Users can use a variety of terminal devices, who can log in to the unified information portal at any time through different channels and different ways. They enjoy all kinds of intelligent teaching services within their respective scope of authority.

4. Algorithms of Big Data in Regional Smart Education

Common algorithms for big data include clustering, classification, neural network, regression analysis, etc. This article analyzes from clustering and classification algorithms.

(1) Clustering algorithm

The most common ranging methods for clustering are Euclidean distance, Manhattan distance, and angle cosine. It can be defined as:

Euclidean distance: Let A and B be an n-dimensional vector, that is, the Euclidean distance between $A=\{a_1,a_2,\mathrm{K},a_m\}, B=\{b_1,b_2,\mathrm{K},b_m\}$ is the length of the line segment connecting points A and B, which is calculated as:

$$d(A,B)=\sqrt{\sum_{i=1}^{n}(a_i-b_i)^2} \quad (1)$$

If each component is given a weight, the weighted Euclidean formula is:

$$d(A,B)=\sqrt{\sum_{i=1}^{n}\delta_i(a_i-b_i)^2} \quad (2)$$

Manhattan distance: The coordinates of points A and B on the plane are (a_1, a_2) and (b_1, b_2), respectively. Manhattan distance is $|a_1 - y_1| + |a_2 - y_2|$. The Manhattan distance between two n-dimensional vectors is the sum of the differences of their corresponding components:

$$d(A,B) = \sum_{i=1}^{n} |a_i - b_i| \quad (3)$$

Included angle cosine: By calculating the angle cosine between the eigenvectors, the degree of similarity between the two can be measured. The angle cosine measure works for frequencies, probabilities and binary:

$$\cos(a,b) = \frac{\sum_{i=1}^{n} (a_i * b_i)}{\sqrt{\sum_{i=1}^{n} a_i^2} * \sqrt{\sum_{i=1}^{n} y_i^2}} \quad (4)$$

The basic algorithm process of the clustering algorithm is as follows:

Initialization: The weight vector M of the neurons in the output layer is randomly initialized. Assuming that the total number of neurons in the output layer in the network is j, and the dimension of the input space is n, then:

$$M_j = [m_{j1}, m_{j2} \mathrm{K}\ m_{jn}]^T \quad (5)$$

Competition process: The input pattern vector is randomly selected from the input space, denoted as $P = [r_1, r_2, \mathrm{K}\ , r_n]^T$. The distance of P from the weight vector of all neurons is calculated as:

$$i(P) = \arg\min \left\| P_{(t)} - P_j \right\| \quad (6)$$

Cooperative process: The response neighborhood is determined, and the neighborhood function usually uses a Gaussian function:

$$h_{j,i(P)}(t) = \exp\left(-\frac{d_{j,i}^2}{2\delta^2_{(t)}} \right) \quad (7)$$

Among them, $d_{j,i}^2$ represents the lateral distance between winning neuron i and excitatory neuron j, and:

$$d_{j,i}^2 = \left\| v_i - v_j \right\|^2 \quad (8)$$

$\delta(t)$ is the effective width of the neighborhood, which shrinks over time:

$$\delta(t) = \delta_0 \exp(-t/\varphi_1) \quad (9)$$

Adjustment of weight vector size: The weight vector of the winning neuron and its neighbor nodes in the cluster space is adjusted. It is moved in the direction of the input mode, and the weight vector adjustment rule is:

$$Q_j(t+1) = Q_j(t) + \mu(t) h_{j,i(x)}(t) (Q(t) - Q_j(t)) \quad (10)$$

Among them, μ is the learning parameter, which decreases monotonically with time t. This ensures that the neural network weight vector adaptive adjustment process formula is:

$$\mu(t)=\mu_0\exp(-t/\varepsilon_2) \quad (11)$$

(2) Classification algorithm

Most of the practical problems that need to be solved are linearly inseparable, which is also the advantage of the support vector machine algorithm compared with other algorithms. In dealing with nonlinear problems, a slack variable is introduced to constrain the constraints such that:

$$y_i[(w\cdot q)+b]-1+\eta_i\geq 0 \quad (12)$$

The slack variable $\eta=(\eta_1,\eta_2,\mathrm{K}\ \eta_l)^T$ represents the degree to which the training set is incorrectly divided. The larger the slack variable, the greater the degree of misclassification, and the objective function becomes:

$$\min_{\mathrm{w,b}}\frac{1}{2}\|w\|^2+D\sum_{i=1}^{l}\eta_i\geq 0 \quad (13)$$

Another way to deal with nonlinear problems in support vector machine algorithm is to borrow the idea of kernel function. In a high-dimensional space, it is only necessary to find a certain kernel function that satisfies the equation, and then the optimal hyperplane of the feature space can be obtained by solving it.

In the case of nonlinearity, the final optimization problem is:

$$\max_i m_i(zce)K=\sum_{i=1}^{l}\alpha_i-\frac{1}{2}\sum_{i=1}^{l}\alpha_i\alpha_j b_i b_j[\omega(x_i)\cdot\omega(x_j)] \quad (14)$$

Among them, $\omega(x)$ represents the training samples are mapped to the samples in the high-dimensional space. Let $F(x_i,x_j)=\omega(x_i)\cdot\omega(x_j)$, then Formula (14) can be transformed into:

$$\max_i m_i(zce)K=\sum_{i=1}^{l}\alpha_i-\frac{1}{2}\sum_{i=1}^{l}\alpha_i\alpha_j b_i b_j F(x_i,x_j) \quad (15)$$

Among them, $F(x_i,x_j)$ is called the kernel function. The most widely used kernel functions are:

1) Linear kernel function:

$$F(x_i,x_j)=x_i^T x_j \quad (16)$$

2) Gaussian kernel function:

$$F(x_i,x_j)=\exp-\left(\varsigma\|x_i-x_j\|^2\right),\varsigma>0 \quad (17)$$

3) Polynomial kernel function:

$$F(x_i,x_j)=\left(\varsigma x_i^T x_j+q\right)^d,\varsigma>0 \quad (18)$$

4) Double-layer neural network kernel function

$$F(x_i,x_j)=\tan\left(\varsigma x_i^T x_j+q\right) \quad (19)$$

In the feature selection stage, after the model training is completed, the relevant importance values of the model features can be output, which is measured by the average value of the importance of knowledge point b in a single directed structure:

$$G_b = \frac{1}{N}\sum_{n=1}^{N} \hat{G}_b^2(T_n) \quad (20)$$

$$\hat{G}_b^2(T_n) = \sum_{t=1}^{L-1} i^2 \quad (21)$$

In the formulas, $\hat{G}_b^2$ represents the importance of knowledge point b in the single number. i^2 represents the reduction in squared loss after node t splits.

5. New Ecological Development Experiment of Regional Smart Education

Based on the background of big data, this paper studies the new ecological development of regional smart education. Area A is selected as the survey object. Five aspects of the application satisfaction of regional smart education, the market size and investment of regional smart education industry, the scale of regional smart education users, students' mastery of knowledge, and the frequency of regional smart education use are the survey contents.

(1) Satisfaction of regional smart education application

Whether the regional smart education model can be better promoted and applied depends on whether the application of the model is accepted by the audience. Therefore, the satisfaction of the teaching mode of smart education in the big data environment of area A is investigated, and it is divided into three situations: satisfied, general and dissatisfied. The specific results are shown in Table 1.

Table 1. Regional smart education application satisfaction

	2017	2018	2019	2020
satisfy	38.52%	40.49%	43.83%	47.57%
generally	42.48%	44.26%	46.77%	49.69%
dissatisfied	39.47%	38.62%	35.31%	31.73%

It can be seen from Table 1 that from 2017 to 2020, the satisfaction with the application of regional smart education continues to increase, and the satisfaction continues to decline. In 2017, the satisfaction with the application of regional smart education is about 38.52%. In 2020, it is about 47.57%, with an increase of about 9.05%. According to the data, the use of regional smart education is recognized by more and more people.

(2) Market size and investment situation of regional smart education industry

Under the information big data, regional smart education has been paid more and more attention by the government. The market size and investment of the regional smart education industry in area A from 2017 to 2020 are taken as the research content. The results are shown in Figure 5.

In terms of the market size and investment of the regional smart education industry, from 2017 to 2020, the market size and investment of the regional smart education industry in area A are on the rise. Investments have increased with the size of the market. Among them, the market size of the regional smart education industry is about 42.87% in 2017 and about 51.08% in 2020. The market size of the regional smart education industry expands by approximately 8.2%. In the investment situation, it is about 44.73% in 2017 and about 53.52% in 2020, an increase of about 8.79%.

(3) Scale of regional smart education users

With the in-depth advancement of the education informatization strategy, the high-quality development of basic education has been promoted, which effectively supports the "double reduction" work. Smart education platforms are being used by more and more people. According to the scale of smart education users in area A as the research content, a survey is conducted. The results are shown in Figure 6.

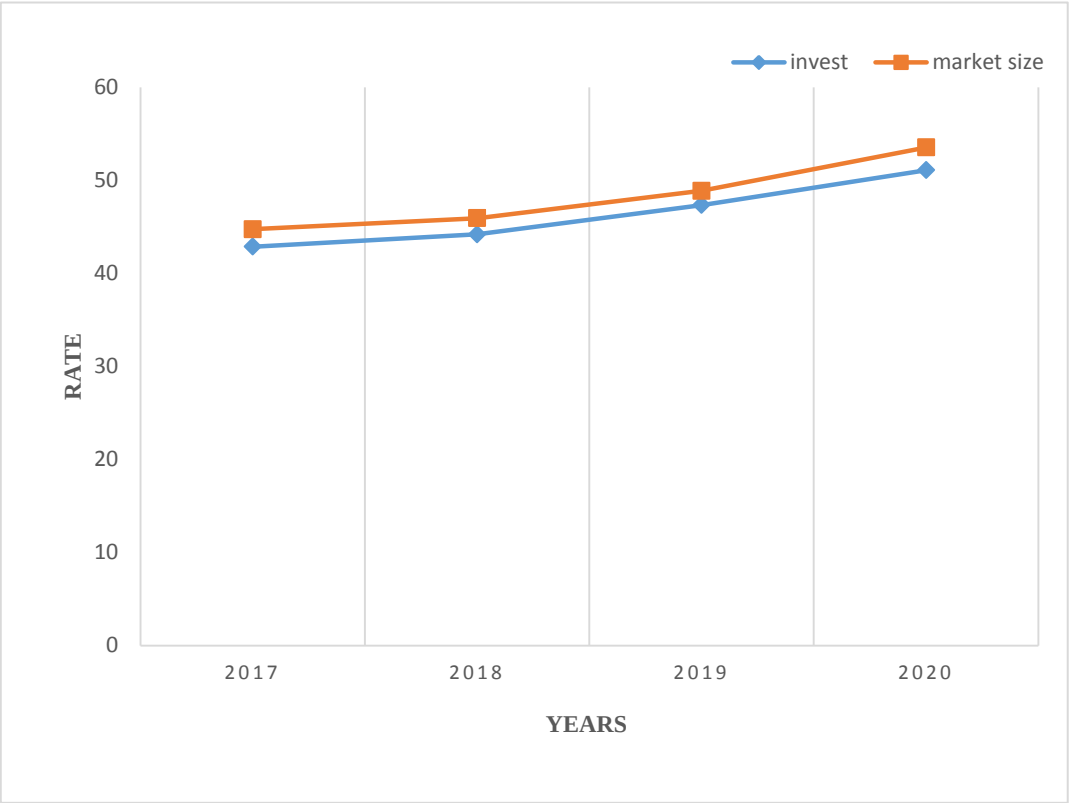

Figure 5. Market size and investment of regional smart education industry

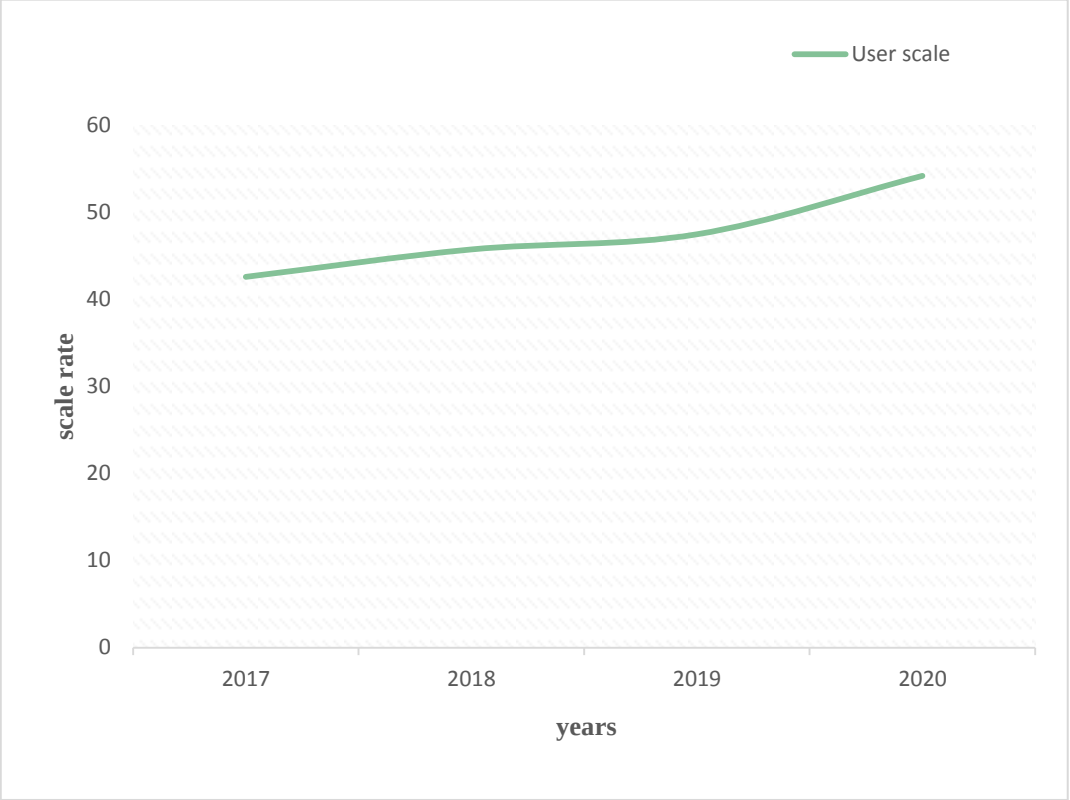

Figure 6. Scale of regional smart education users

In the scale of regional smart education users, the scale of regional smart education users is on the rise from 2017 to 2020. In 2017, the user scale is about 42.58%. In 2020, it is about 54.18%. The number of users increases by about 11.6%. It can be seen that with the development of networking and the improvement of education models, the use of regional smart education is also rising.

(4) Students' mastery of knowledge

In order to verify the effectiveness of regional wisdom education after use, the main body of the survey is the students' mastery of knowledge. The results of the study are shown in Figure 7.

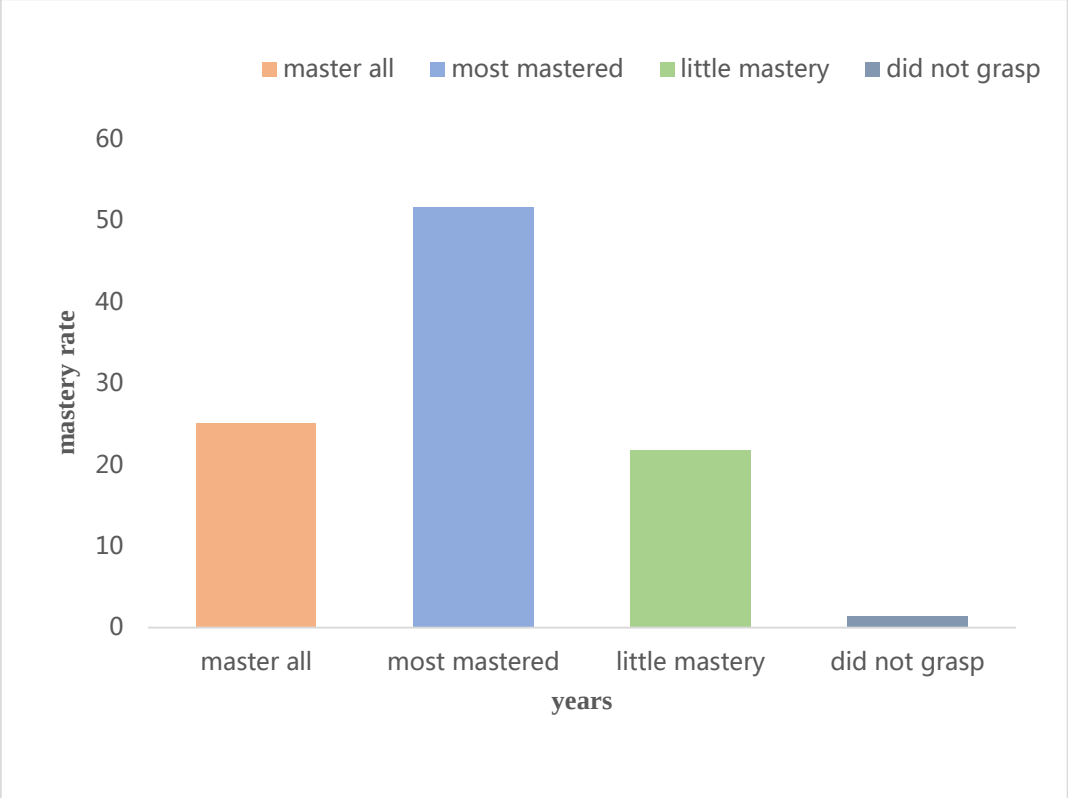

Figure 7. Students' mastery of knowledge

Among the students' mastery of knowledge, about 25.13% have complete mastery of knowledge. Most mastered is about 51.68%. A small part mastered is about 21.79%. 1.4% do not know either. It can be seen that the effectiveness of regional wisdom education is relatively high after use, which is conducive to students' mastery of knowledge and promotes the sustainable development of ecological education.

(5) Frequency of use of regional wisdom teaching

According to the frequency of use of smart education in area A, the research is conducted from daily use, more than 4 times a week, 1-3 times a week on average, 1-2 times a month on average, and never use. The analysis results are shown in Figure 8.

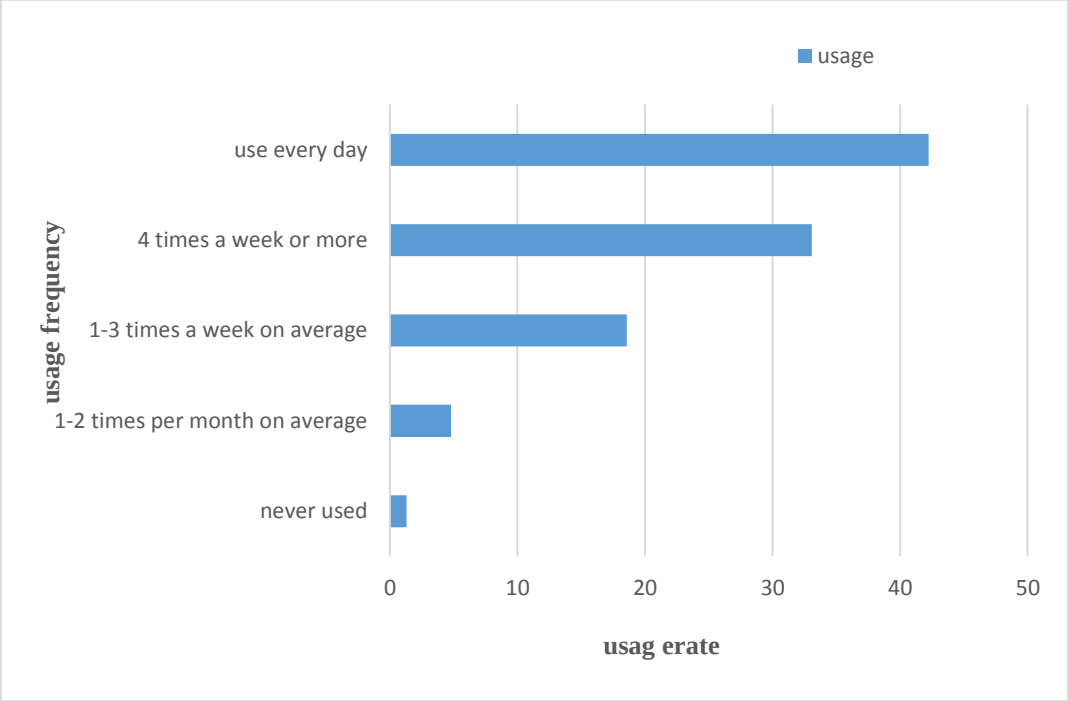

Figure 8. Frequency of use of regional wisdom teaching

In the usage frequency of regional smart education, the number of people who use it every day is about 42.25%. The number of people who use it more than 4 times a week is about 33.08%. The average number of people who use it 1-3 times a week is about 18.57%. The average number of people who use it 1-2 times a month is about 4.79%. The number of people who never use it is about 1.31%. It can be seen that the frequency of use of smart education is still relatively high.

6. Conclusion

Through the analysis of the application satisfaction of regional smart education under the background of big data, the market size and investment of regional smart education industry, the scale of regional smart education users, students' mastery of knowledge, and the frequency of regional smart education use, regional smart education would develop on a larger scale, at a higher level and at a deeper level. According to the relevant deployment of the Ministry of Education on the implementation of "smart education", on the basis of the construction of digital campuses, the digital integration and innovation of colleges and universities has been continuously promoted. A new ecology of regional educational resources has been constructed, which provides customized and accurate analysis services for teachers and students' teaching and learning.

Funding

If any, should be placed before the references section without numbering.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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