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Computer-Aided Design AND APPLICATIONS

AI-Augmented Classroom Scene Design for Exploring Intangible Cultural Heritage in the Digital Era of China

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Abstract. Digital China has maintained a strong momentum of vigorous development, and its development in various regions of China has also achieved good results. It is becoming a new engine for regional economic growth. This paper attempts to define the concept of decision and, in compulsory education, studies the relationship between classroom scene design and intangible cultural heritage research. We are in the process of establishing the primary curriculum for metaphysical cultural heritage research. The optimized KANO model proposed in this study offers a case-based classroom scenario development mode for intangible cultural heritage research from the macro, meso, and micro perspectives. The research results are in line with reality. They can provide scientific guidance and classroom scenarios for research and learning in China and other similar regions, proving that the optimized KANO model is good.

Keywords: Digital China; cultural heritage; research classroom; KANO model optimization; Artificial Intelligence
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1 INTRODUCTION

The development of digital China is not only related to the overall situation of national development but also a significant driving force to promote China's regional economic development [2]. Due to the rapid development of Digital China, the wide range of radiation, and the unprecedented degree of influence, only by correctly grasping the trend and characteristics of Digital China's development and clarifying the changing laws of Digital China's development can we promote Digital China to serve the regional economy better [21]. However, there are still many gaps in the research on digital China in the spatial dimension: first, why does digital China affect the development of regional economies? How will digital China affect regional economic development? Second, how do we evaluate the development level of China's digital economy? Together with tangible cultural and natural heritage, it carries the civilization of human society and is a concrete manifestation of the world's cultural diversity.

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The life practice for thousands of years and the intangible cultural heritage created by people is not only a symbol of the wisdom and civilization of various ethnic groups but also of the Chinese nation and maintaining national unity, which plays an important role [19],[18]. The domestic intangible cultural heritage protection practice generally shows a trend from "simple protection" to "reasonable utilization" [15]. With the continuous acceleration of economic globalization, modernization, and urbanization, its surviving environment has suffered unprecedented impact and damage [3]. Some intangible cultural heritages that rely on oral and heart teaching and behavioral inheritance are disappearing; the ranks of intangible cultural heritage inheritors are aging, and young people's lack of awareness of inheritance is becoming increasingly more prominent [1],[26]. Research, development, and utilization are the only ways to inherit. However, due to the drive of interest and the lack of guidance from scientific theories, many intangible cultural heritages are under unreasonable development at a low level or even predatory and destructive [22]. The research textbooks and knowledge points include natural folk customs, cultural heritage, domestic and foreign current situations, and daily life. At various levels, this has also fundamentally promoted the rise of intangible heritage research [8]. Requirements for curriculum development of intangible heritage research. The State Council's "Outline of National Travel and Leisure" proposes a research method of traveling and learning using non-heritage research and education to stimulate economic growth. This research and experiential learning method that combines learning in the classroom also coincides with the new college entrance examination reform and the core of students. The dynamic stage of literacy development has received attention from local education departments and schools [13]. In 2016, intangible cultural heritage research was gradually incorporated into the teaching systems of primary and secondary schools [16]. Ghostly cultural heritage research activities take the school as the organizer through the transfer of teaching space, breaking the closed growth mode of the school, and realizing the expansion of education and teaching content [7]. It is a compulsory, comprehensive, practical activity course. Students can liberate their suppressed subject consciousness, actively learn, explore, and appreciate the great mountains and rivers of the motherland, and enhance their values and national identity. Realize the individual and social development of students.

Facing the advent of comprehensive quality evaluation in the college entrance examination, middle schools should integrate various educational resources, such as teachers and environmental resources, into the province, city, and county scope of intangible cultural heritage research to improve the comprehensive quality [11]. Metaphysical cultural heritage research in middle schools at all levels to carry out intangible cultural heritage research activities courses integrated with classroom teaching can save economic costs to the greatest extent, not heritage research relying on comprehensive disciplines, to maximize the realization of students' knowledge within a limited learning time, ability, attitude expansion of intangible cultural heritage research, improve teaching effect, and effectively improve the core literacy of students.

To sum up, teachers' teaching skills and cultural teaching ability optimize the teaching design of intangible cultural heritage research courses and integrate their successful experience into Chinese cultural classrooms so that students can deeply understand Chinese culture and metaphysical cultural heritage knowledge.

2 RELATED WORKS

The study [17] mentioned the development of foreign literature, folklore, and heritage research. Therefore, there are few foreign studies on this topic, and most related articles are also based on folklore or heritage research. The objects, content, and themes are also relatively concentrated, mainly focusing on concept identification, authenticity protection, and the impact of intangible cultural heritage research. [25] selected the method of the panel data model as non-linear. The promotion of growth is more vital than that of backward regions; the promotion of the tertiary

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industry is more critical than that of the secondary sector, and in areas with a high degree of digital China development, this promotion will also be more substantial. Second, the impact of digital China on regional economic development has specific regional heterogeneity. [12],[9] measured the development level of Digital China and the level of coordinated regional development and proved empirically that Digital China can promote coordinated regional development. There are spatial spillover effects and regional differences.

In recent years, more and more scholars have realized the effect of student teaching and discussed its necessity. [10] pointed out that it is an effective way to express the affinity and influence of Chinese culture, spreading the rich and colorful Chinese culture and demonstrating folk knowledge, skills, art, and wisdom. Integrating intangible cultural heritage protection into the international Chinese language education system will enrich the connotational construction of this major. [23] believes that teaching Chinese intangible cultural heritage as an essential content of cultural teaching to international students will help international students to fully and accurately understand the richness of Chinese national culture, completeness, systematicness, and uniqueness, help international students to eliminate some obstacles encountered in cross-cultural communication, and further feel and comprehend the Chinese cultural character and national spirit. The impact of the epidemic on research studies is undoubtedly massive. Various airlines have launched preferential products such as "Fly as You Want" and "Free Flight" to stimulate consumption.

Due to the foreign epidemic and the suspension of outbound and inbound tourism, young people who want to study abroad will shift their research needs to China, which will be a rare opportunity for the domestic research market. According to the data related to the Dragon Boat Festival holiday in 2020, local tourism is the most popular [14]. As a "new Internet celebrity" in research studies, research studies will promote economic development and, at the same time, bring new vigor and vitality to cultural heritage. [4] Implementing the "two-child policy" and the demand for diversified communication carriers will promote research and learning. The trend of integration development. It has several research and study tour bases with sound research and study tour conditions [20], which has particular significance in realizing its value and comprehensive benefits. Through the evaluation of the value of my country and the development of research, we can seek sustainable methods and fundamental solutions for the rescue [24].

To sum up, combined with the background of digital China, under the theoretical guidance of the experiential, cultural teaching method, teachers change their cultural teaching ideas, actively build cultural teaching situations, optimize intangible cultural heritage research classrooms, and deepen their understanding of cultural heritage. A sense of identity and achievement, and promote learners' correct understanding of intangible cultural heritage.

3 KANO MODEL OPTIMIZATION

As shown in Figure 1, the product quality characteristics have a higher degree, and to the left indicates that the product quality characteristics have a lower degree; the vertical coordinate upwards, the higher the user satisfaction, and the lower the user satisfaction is more melancholy.

The KANO model uses a linked list to connect events in series, uses timestamps to store changes in management status information, and describes the evolution process of changes in non-legacy research objects through the sequence of events on the time axis, as shown in Figure 2. Users can push and view the research elements (as shown in Figure 3) and promote the information service level when they browse intangible cultural heritage information.

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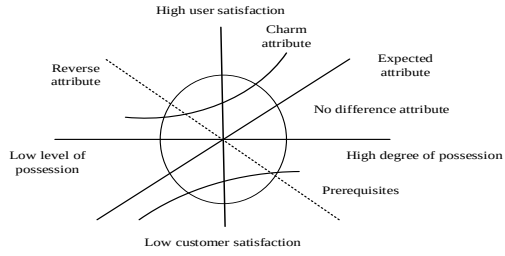

Figure 1: KANO model optimization.

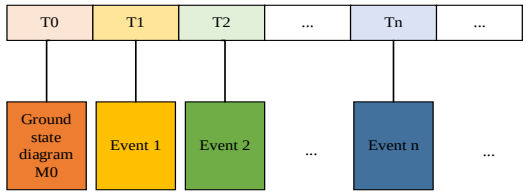

Figure 2: Optimization of grid data model based on intangible cultural heritage research classroom.

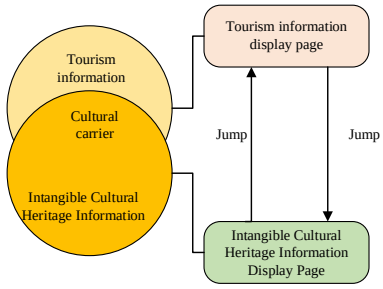

Figure 3: Intangible cultural heritage integration information and research information.

Proximity centrality is the sum of the shortcut distances between an industry and other networks in the network. If an industry can be associated with different industries through a short path, it indicates a high proximity centrality. The calculation expression is:

$$C_{API}^{-1} = \sum_{j=1}^{n} d_{ij} \tag{1}$$

Corresponding to the three central degrees, the significant potential is divided into degree major potential, intermediate main potential, and near central potential. The calculation expression is:

$$C = \frac{\sum_{i=1}^{n}(C_{max} - C_i)}{max[\sum_{i=1}^{n}(C_{max} - C_i)]} \tag{2}$$

C_{ij} represents the ratio of the influence of C_i and C_j to O, forming a pairwise comparison matrix.

$$C = \begin{bmatrix} C_{11} & C_{12} & \ldots & C_{1n} \\ C_{21} & C_{22} & \ldots & C_{2n} \\ \mathrm{M} & \mathrm{M} & \ldots & \mathrm{M} \\ C_{n1} & C_{n2} & \mathrm{L} & C_{nn} \end{bmatrix} \tag{3}$$

$$C = (C_{ij})_{n \times n}, C_{ij} > 0, C_{ji} = \frac{1}{C_{ii}}, C_{ii} = 1 \tag{4}$$

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By normalizing the coefficient of variation of each indicator, the weight of each indicator is obtained:

$$q_i = \frac{CV_i}{\sum_{i=1}^{n} CV_i}, i = 1,2,3,\dots,n \tag{5}$$

The ascending segment and descending segment of the linear start operator are parallel; that is to say, the weights of the ascending segment and descending segment of the operator are equal, and the thresholds of the ascending segment and descending segment are opposite. The expression is as follows:

$$y = \begin{cases} W(x-r) & x - \frac{y}{W} = r \\ c & -r < x - \frac{y}{W} < r \\ W(x+r) & x - \frac{y}{W} = -r \end{cases} \tag{6}$$

When the running time is t_0, the initial function of the LPO operator is:

$$y(t_0) = F(x(t_0), y_0, r) = max\{\mathbf{x}(t_0) - r, min\{x(t_0) + r, y_0\}\} \tag{7}$$

The P-I hysteresis model can be formed by the linear superposition of many LPO operators with different thresholds, and its expression is as follows:

$$\begin{aligned} & z(t) = \sum_{j=1}^{n} W_j F_j\left(x(t), y_j(t_{i-1}), r_j\right) \\ & = \sum_{j=1}^{n} W_j max\left\{x(t) - r_j, min\{x(t) + r_j, y_j(t_{i-1})\}\right\} \\ & j = 1,2,\mathrm{L}n-1,n \end{aligned} \tag{8}$$

4 METHODS

Intangible cultural heritage research courses must be implemented within the framework of the national curriculum when designing the content. They must maintain the boundaries and norms of the original national curriculum. "The national curriculum is the curriculum formulated by the state. It embodies the will of a country in the field of education. It is specially designed to cultivate future citizens and is a curriculum designed according to the quality and level required by future citizens." The national curriculum reflects the mandatory will of the state; the curriculum design has a sufficient basis for argumentation. Therefore, when local education units create their characteristic sex education courses, they should still connect with the content of national classes as much as possible. There are many humanities sites for intangible cultural heritage research. The selection of ethereal cultural heritage research courses must reflect the Chinese curriculum spirit of the national compulsory education junior high school, and through metaphysical cultural heritage research and study, dig deep to expand the spiritual content of the national curriculum.

The intangible cultural heritage research curriculum must fully reflect the spiritual concept of "beyond the Chinese curriculum without departing from the Chinese curriculum" in its specific implementation. The diffusion of horizontal communication of culture, that is, the process of spatial change of intangible cultural heritage, has two main types: expansion diffusion and migration diffusion. Among them, expansion and diffusion refer to developing a particular idea or invention at its core, which is still spreading outward while maintaining prosperity. It can be further subdivided into contagious, hierarchical, and stimulating; the inheritance culture diffusion method can be subdivided into occupation type, spread type, ink stain type, and variant type, as shown in Figure 4.

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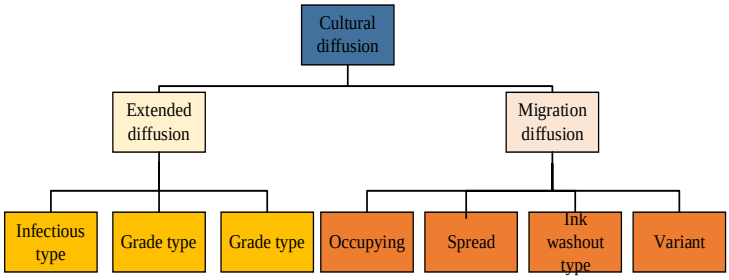

Figure 4: Main types of spatial diffusion of classroom scene design of intangible cultural heritage research.

Some tools and activities in intangible cultural heritage may also appear in other intangible cultural heritage projects. As a result, through the association of non-legacy research about people and things, it is also possible to discover the association between non-legacy research, as shown in Figure 5:

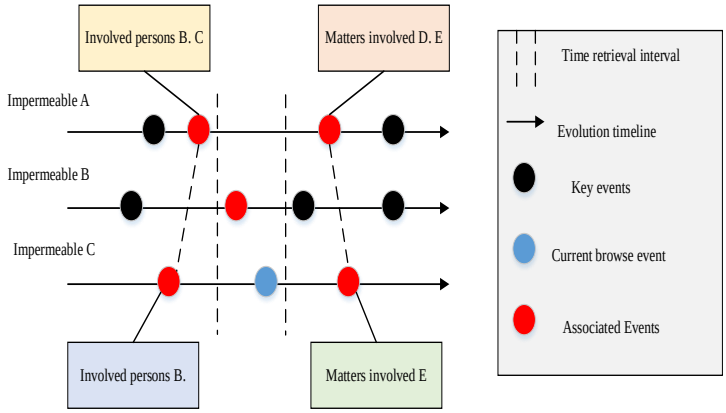

Figure 5: Optimization of conceptual research association based on people, things, and time.

Through the investigation of intangible cultural heritage, literature-related research, and tourism, types are summarized in Table 1.

Development mode name	*Characteristics of development mode*	*Suitable types of intangible cultural heritage*
Theme Park Development Mode	*Specific development mode, significant investment, and comprehensive land occupation, including various tourism formats*	*Intangible cultural heritage with high popularity and good preservation*
Model of cultural-ecological protection zone	*Macro development mode: protect the cultural ecology in areas where the cultural ecology remains intact*	*Properly integrated into the tourism industry.*
Museum development mode	*The specific development model focusing on protection suits many types but must be deeply integrated with tourism.*	*All types (especially endangered)*
Development mode of	*The specific development mode is to protect,*	*Traditional arts, traditional*

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cultural and creative parks	*inherit, and design intangible cultural heritage with cultural and creative industrial parks.*	*skills, and folk customs*

Table 1: Summary of classroom development models for intangible cultural heritage research.

Under the guidance of the experiential cultural teaching method, teachers create a cultural teaching situation. In the "Moveable Type Printing" experience class, the teacher played Li Ziqi's video. The video had a simple, ancient-style soundtrack and no Chinese dubbing or text explanation. The students could immerse themselves in the mesmerizing picture and experience the movable type printing. The classes and interrelationships corresponding to each element in the optimized KANO model are described by a simplified UML diagram, as shown in Figure 6:

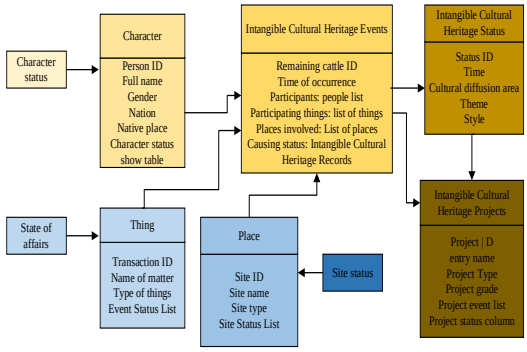

Figure 6: UML diagram of Kano model optimization for intangible cultural heritage evolution data.

This article selects several sets of representative teaching materials of Chinese as a foreign language, including "Chinese Culture" (third edition) (by Han Jiantang), "Chinese Culture Outline" (by Xu Guanghua), and "New Cultural China; Chinese Culture Reading" Course I" (written by Wang Hailong) as an example. These sets of cultural teaching materials all introduce Chinese culture from customs, language, literature, religious philosophy, political economy, history, Chinese people, etc. It can be seen from the textbook that there are many topics related to the introduction and explanation. It is not difficult to see from the textbooks that the proportion, as shown in Table 2.

Constituent elements	*Data type*	*Explain*
ID	*Integer*	*Unique identification of intangible cultural heritage items*
Event List	*String*	*Record the ID of all critical events of intangible cultural heritage projects, and divide them by."*
Common attribute set	*Basic data type*	*All common attributes of intangible cultural heritage, including name, introduction, type, level, etc*
Unique Attribute Index	*String*	*Query the corresponding table through the index to obtain all the unique attributes of the intangible cultural heritage item.*

Table 2: Description of the internal structure of the intangible cultural heritage research class project.

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The institution has successively developed high-quality and well-received intangible cultural heritage research courses with many categories, various forms, and rich connotations. But also organize independent thematic research activities, visits, experiences, cooperation, competitions, discussions, and other content. These rich, intangible cultural heritage classrooms can bring students practical expertise and cultivate their problem awareness, innovative spirit, and way of thinking.

To sum up, schools should increase the importance of teachers' teaching ability of Chinese intangible cultural heritage, improve the existing teaching conditions, and actively carry out classroom scene practice activities. The first is to attach importance to the improvement of hardware facilities to ensure that the media is well-equipped and the campus network is unblocked; the second is to provide teachers with teaching aids such as teaching material packages and high-quality courseware to help teachers avoid the worries of preparing teaching aids; Cultural heritage teaching environment, transforming the classroom environment into a classroom of Chinese elements so that students are immersed in the rich atmosphere [5],[25].

5 CASE STUDY

The success of intangible cultural heritage teaching depends mainly on selecting and using teaching aids. But also enable students to participate actively. Due to the high cost of teaching, the difficulty of finding teaching aids in other places, and the lack of teaching aids, the preparation of teaching aids has always been one of the significant problems. The teachers should consider the selection, use, and quantity of teaching aids before starting cultural teaching and tend to choose existing teaching aids or teaching aids that are easy to find, such as pen, ink, paper cut, etc., as well as teaching aids that can be recycled, such as movable type, brushes, wooden boards, etc. In addition, the use of teaching aids is essential. For demonstration and experiential teaching content, only one teaching aid is needed, displayed by the teacher, and students take the initiative to experience it, such as movable type printing. For the hand-made teaching content, it is advisable to adopt the method of group cooperation so that multiple students can use the same teaching aids together, avoid placing orders, and try to form a situation where everyone participates. The intangible cultural heritage research classroom has advantages for traditional theoretical, cultural teaching. Still, "experience for experience" should be avoided, and an excellent cultural experience atmosphere should be created. Teachers should arrange lesson preparation to prevent excessive time, increased lesson preparation, and time-consuming teaching. In this regard, teachers should reasonably agree on the teaching times and teaching time of cultural experience courses, should not be in cultural experience for a long time, and should use teaching time efficiently so as not to occupy other course time, reduce other teaching content, or affect the teaching of subsequent content, and reasonably plan the teaching progress. The analysis of students, activities, and courses is shown in Table 3.

	Very familiar	*Basic understanding*	*Heard of it but didn't understand*	*Never heard of it*
Student	*35*	*69*	*128*	*48*
Teacher	*14*	*13*	*11*	*2*
Parent	*9*	*33*	*48*	*12*

Table 3: Analysis of the degree of understanding of the curriculum of intangible cultural heritage research activities.

The analysis of teachers' and students' accurate cognition of intangible cultural heritage research activities is shown in Table 4.

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Investigation object	*Understanding level (%)*	*Spring outing, autumn outing, etc*	*Off-campus hiking*	*Group travel*	*Practical activity courses*
student	*Very familiar*	*20.58*	*5.89*	*11.77*	*61.75*
	Quite familiar	*4.42*	*10.28*	*19.13*	*66.19*
	Learn something	*6.22*	*11.64*	*19.24*	*46.03*
	Do not understand	*17.03*	*8.52*	*12.78*	*61.71*
Teacher	*Very familiar*	-	*6.78*	-	*92.32*
	Quite familiar	-	-	-	*100*
	Learn something	-	-	*8.34*	*91.68*
	Do not understand	-	-	-	*100*

Table 4: Analysis of teachers and students' accurate cognition of intangible cultural heritage research activities.

Digital China exerts spatial effects on economic growth, industrial structure, and employment structure: (1) Digital China adds new production factors to create new value for economic development, plays a symbiotic effect, and stimulates new momentum for economic growth. (2) Digital China accelerates the digital transformation of traditional industries, promotes the formation of emerging industries, and realizes the upgrading of the industrial structure. (3) Digital China produces employment destruction and compensation effects and changes the employment structure by changing the industrial and labor force structures. Through the organization of activities in four aspects, the two parts of classroom teaching and local space are connected to realize the integrated development of space and content in classroom teaching and intangible cultural heritage research activity courses, as shown in Figure 7.

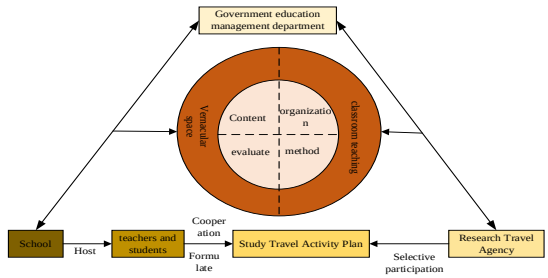

Figure 7: Construction of "three sides and two hearts" mode for research and learning of intangible cultural heritage.

As shown in Figure 8, the model uses CNN to compress further and extract features for the problem that the classroom dimension of non-legacy research is too high and then perform LSTM serialization processing.

Classification of KANO evaluation results: the classification and comparison table of KANO evaluation results to determine the demand level of each quality characteristic. For example, if the positive answer to a quality characteristic is like and the negative answer is dislike, it is an "O"-type requirement, that is, an expectation-type requirement.

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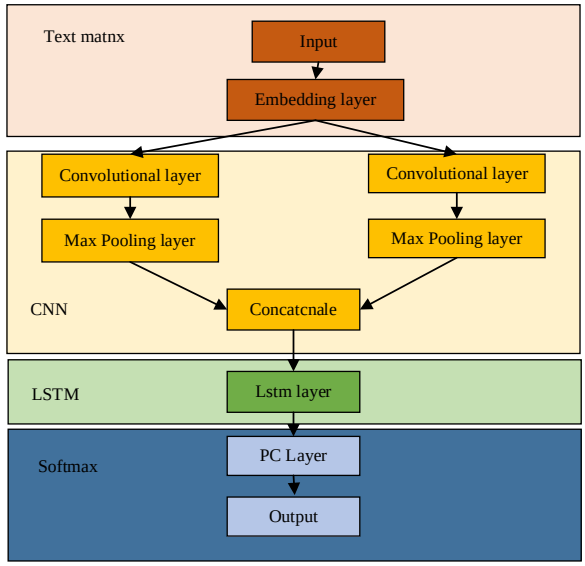

Figure 8: Optimization of classroom scene design classification model for intangible cultural heritage research.

The classification results for other requirements are shown in Table 5. The specific types of needs are: attractive needs are expressed as "A," expected needs are described as "O," basic needs are defined as "M," indifference needs are represented as "I," and reversed needs are expressed as "R." and "Q" are questionable results, and their data is invalid.

Product service demand		*Negative problem*				
Forward question	*Gauge like*	*like*	*It should be*	*Indifferent*	*Tolerable*	*Dislike*
	like	*A*	*I*	*C*	*U*	*M*
	It should be	*A*	*E*	*F*	*D*	*A*
	Indifferent	*A*	*S*	*B*	*S*	*A*
	Tolerable	*A*	*S*	*A*	*S*	*O*
	Dislike	*A*	*R*	*R*	*D*	*O*

Table 5: Classification comparison of Kano model optimization evaluation results.

According to the definition of digital China and the digital China industry by other scholars, this paper refers to the primary sectors corresponding to digital China, and the critical elements required for the Chinese industry are a single digital product or service. The sum of the industrial sectors and a series of economic activities will be accelerated to restructure the economic development and government governance model, as shown in Figure 9.

Digital Industrial Structure Map In different intangible cultural heritage projects, the locations where key events occur also have spatial connections. For example, multiple ethereal cultural heritage events may have happened in one place, or the areas where two occurred are adjacent. At this time, according to the situation of spatial data (type is point, line, or region) and actual

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needs, intangible cultural heritage events can be screened through spatial relationships such as inclusion, adjacency, buffer zone, and the spatial association of items, as shown in Figure 10.

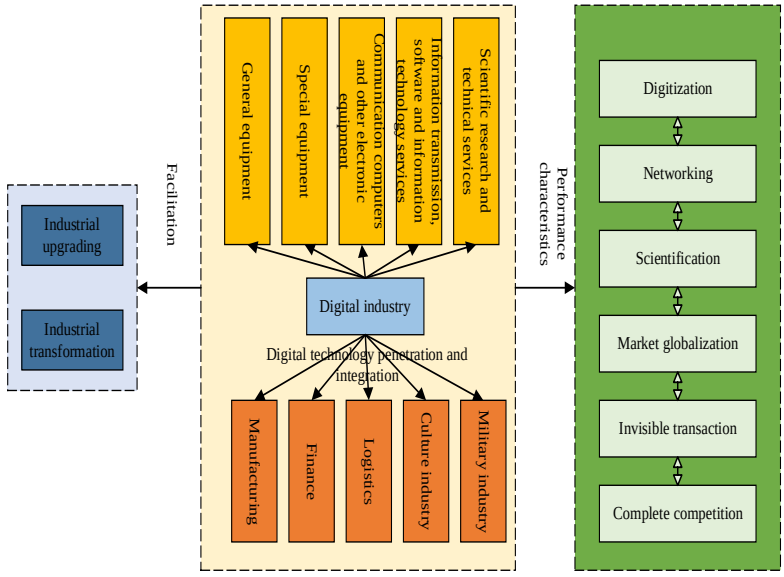

Figure 9: Digital China digital industry model optimization.

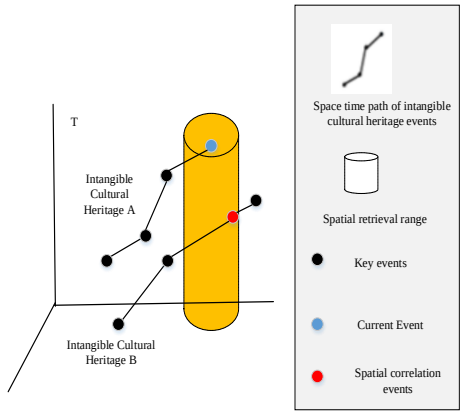

Figure 10: Spatial association diagram of projects.

However, it must be considered that the commodities and other elements are subordinate to the research and study of the non-heritage research. There is a one-to-many relationship with the non-legacy research, and since some elements are prevalent and not necessarily unique to intangible cultural heritage (for example, not all wontons have cultural background),. Whether the goods or activities have an immaterial cultural heritage background, the process is shown in Figure 11.

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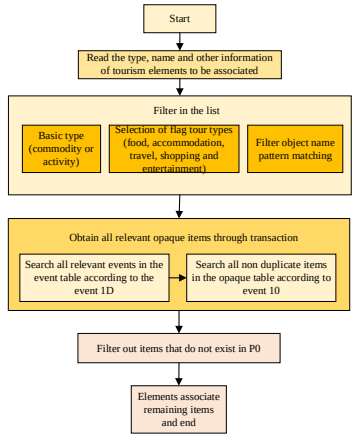

Figure 11: Optimization model of automatic association between research elements.

It is a group moral emotion and social value appeal that pursues self-transcendence, meets people's psychological needs, enriches people's spiritual lives, and fully reflects people's ultimate way of survival and life realm. Therefore, only by inheriting the aesthetic characteristics of intangible cultural heritage can we better carry forward the national cultural soft power. The 3DResNet network is used to determine the shear, non-boundary, and preliminary gradient shots; finally, the shear shots are post-processed and input into the improved SSD algorithm model to obtain keyframes with labels to realize the target detection of non-legacy research, as shown in Figure 12.

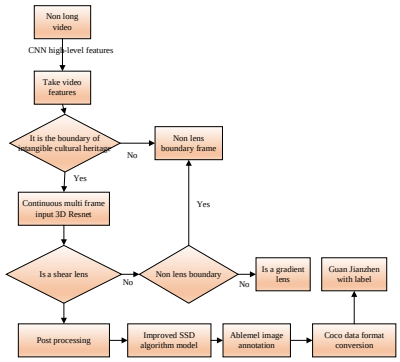

Figure 12: Optimization of target detection model of intangible cultural heritage research.

Starting from the macroenvironment of the entire region to determine it and gradually going deep into the scenic spots can also be successfully implemented. First, it is necessary to characterize the whole area from a macro perspective, that is, whether it is developed and to what extent it is suitable for development. Deviate from the general direction of inheritance and protection; then, from the perspective of scenic spot development, select intangible cultural heritage resources with good existence and development value and carry out tourism development in combination with the existing foundation of the region; finally, from a micro perspective, it is proposed that specific implementation can be carried out. Allowing students to gain different learning experiences from direct and indirect experiences and to understand the profound meaning of "reading thousands of

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books and traveling thousands of miles" so that students realize the importance of transferring and theorizing the knowledge and experience of life. Practical learning is a profound understanding based on knowledge. In addition to listening, speaking, reading, and writing in the classroom, real learning has a vision for the real world.

To sum up, from the perspective of learning purpose, intangible cultural heritage research activities tell students that learning to broaden their horizons requires the combination of classrooms and the great rivers and mountains of the world, and learning occurs in every corner of life. Learning is not only to arm the brain but also to feel the vitality in the physical practice, to form a strong perseverance that is not afraid of wind and rain and not afraid of the sun. Learning is a lifelong event that needs to be cultivated through practice. So that the research activities course can more effectively promote students' development of competencies and overall literacy,

6 CONCLUSIONS

The results of combining theory and practice, data analysis and field investigation, and good agreement with the actual situation will be helpful in other similar fields. The research activities curriculum effectively allows high school students to conduct intangible cultural heritage research activities. First, the integrated implementation enables high school students to broaden their horizons in real situations, cultivate social practice and cooperation, personal learning and thinking, promote students' active learning, and reduce the pressure of exam-oriented learning; Inheritance research activities are conducive to thoroughly combining school conditions, school and county-wide educational resources, and realizing safe intangible cultural heritage research; secondly, intangible cultural heritage research activities that attach importance to student participation and performance evaluation are conducive to promoting students' self-awareness in cooperation , to promote the development of self-expression and expression and sharing ability; finally, the multi-disciplinary integration of intangible cultural heritage research activities with geography as the core meets the content requirements of students for ghostly cultural heritage research activities courses, and also meets the college entrance examination expectations of schools and parents. Based on the experiential, artistic teaching method, this paper believes that manual operation, observation and inquiry, classroom experience, and other techniques can cultivate learners' comprehensive ability to ask questions, research questions, and solve problems to deepen their Chinese cultural understanding. Through field visits and personal experience, the author summarizes the teaching mode of intangible cultural heritage research courses, summarizes their successful experience, points out their existing problems, and provides corresponding solutions. Judging from the survey, the immaterial cultural heritage research course can deepen foreign friends' enthusiasm and culture in a novel and exciting way and deepen their understanding of Chinese cultural knowledge. The research courses are also faced with the problems of insufficient artistic cognitive ability and language proficiency among students. Integrating AI and immersive technology within the educational landscape offers unparalleled opportunities to explore and preserve China's intangible cultural heritage. This innovative classroom design bridges the gap between tradition and the digital era, fostering a deeper understanding and appreciation among students.

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REFERENCES

[1] Chatzigrigoriou, P.; Nikolakopoulou, V.; Vakkas, T.; Vosinakis, S.; Koutsabasis, P.: Is Architecture Connected with Intangible Cultural Heritage? Reflections from Architectural Digital Documentation and Interactive Application Design in Three Aegean Islands, Heritage, 4(2), 2021, 664-689. https://doi.org/10.3390/heritage4020038

[2] Dang, Q.; Luo, Z.; Ouyang, C.; Wang, L.; Xie, M.: Intangible Cultural Heritage in China: a Visual Analysis of Research Hotspots, Frontiers, and Trends Using Citespace, Sustainability, 13(17), 2021, 9865. https://doi.org/10.3390/su13179865

[3] Dou, J.; Qin, J.; Jin, Z.; Li, Z.: Knowledge Graph Based on Domain Ontology and Natural Language Processing Technology for Chinese Intangible Cultural Heritage, Journal of Visual Languages & Computing, 48, 2018, 19-28. https://doi.org/10.1016/j.jvlc.2018.06.005

[4] Hannewijk, B.; Vinella, F. L.; Khan, V. J.; Lykourentzou, I.; Papangelis, K.; Masthoff, J.: Capturing the City's Heritage on-the-Go: Design Requirements for Mobile Crowdsourced Cultural Heritage, Sustainability, 12(6), 2020, 2429. https://doi.org/10.3390/su12062429

[5] Jiang, W.; Huang, H.: GDASC: Optimizing Urban Green Space for Public Health: An Ant Colony Optimization Approach, International Journal of Cooperative Information Systems. 2023. https://doi.org/10.1142/S0218843023500090

[6] Jingchun, Zhou.; Jiaming, Sun.; Weishi, Zhang.; Zifan, Lin.: Multi-View Underwater Image Enhancement Method Via Embedded Fusion Mechanism, Engineering Applications of Artificial Intelligence, 121, 2023, 105946. https://doi.org/10.1016/j.engappai.2023.105946

[7] Kim, S.; Im, D. U.; Lee, J.; Choi, H.: Utility of Digital Technologies for the Sustainability of Intangible Cultural Heritage (ICH) in Korea, Sustainability, 11(21), 2019, 6117. https://doi.org/10.3390/su11216117

[8] Lan, T.; Zheng, Z.; Tian, D.; Zhang, R.; Law, R.; Zhang, M.: Resident-Tourist Value Co-Creation in the Intangible Cultural Heritage Tourism Context: The Role of Residents' Perception of Tourism Development and Emotional Solidarity, Sustainability, 13(3), 2021, 1369. https://doi.org/10.3390/su13031369

[9] Li, S.; Zhang, Y.; & Wang, Y.: APP Design for Xinjiang Traditional Handicrafts, In Journal of Physics: Conference Series 1627, (1), 2020, 012001. IOP Publishing. https://doi.org/10.1088/1742-6596/1627/1/012001

[10] Liu, Y.: Evaluating Visitor Experience of Digital Interpretation and Presentation Technologies at Cultural Heritage Sites: A Case Study of the Old Town, Zuoying, Built Heritage, 4(1), 2020, 1-15. https://doi.org/10.1186/s43238-020-00016-4

[11] Lo, P.; Chan, H. H.; Tang, A. W.; Chiu, D. K.; Cho, A.; See-To, E. W.; Shaw, J.: Visualizing and Revitalizing Traditional Chinese Martial Arts: Visitors' Engagement and Learning Experience at the 300 years of Hakka Kungfu, Library Hi Tech, 37(2), 2019, 269-288. https://doi.org/10.1108/LHT-05-2018-0071

[12] Sameer, M. A.; Zhang, J. Z.: A Case Study on Intangible Cultural Heritage of Indus Valley Civilization: Alteration and Re-Appearance of Ancient Artifacts and its Role in Modern Economy, Int. J. Recent Sci. Res, 9(12), 2018, 29898-28902.

[13] Song, X.; Yang, Y.; Yang, R.; Shafi, M.: Keeping Watch on Intangible Cultural Heritage: Live Transmission and Sustainable Development of Chinese Lacquer Art, Sustainability, 11(14), 2019, 3868. https://doi.org/10.3390/su11143868

[14] Su, X.; Li, X.; Wu, Y.; Yao, L.: How is Intangible Cultural Heritage Valued in the Eyes of Inheritors? Scale Development and Validation, Journal of Hospitality & Tourism Research, 44(5), 2020, 806-834. https://doi.org/10.1177/1096348020914691

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[15] Wijesundara, C.; Sugimoto, S.: Metadata Model for Organizing Digital Archives of Tangible and Intangible Cultural Heritage, and Linking Cultural Heritage Information in Digital Space, Libres: Library and Information Science Research Electronic Journal, 28(2), 2018, 58-80. https://doi.org/10.32655/LIBRES.2018.2.2
[16] Wu, J.; Ju, L. H.; Lin, P. H.; Liu, Y.: The Relationship Between form and Ritual in Cultural Sustainability, Sustainability, 14(15), 2022, 9157. https://doi.org/10.3390/su14159157
[17] Xu, B.; Pan, J.: Analysis of Structural Characteristics and Spatial Distribution of the National Intangible Cultural Heritage in China and its Policy Implications, Sciences in Cold and Arid Regions, 11(5), 2019, 389-406.
[18] Xue, K.; Li, Y.; Meng, X.: An Evaluation Model to Assess the Communication Effects of Intangible Cultural Heritage, Journal of Cultural Heritage, 40, 2019, 124-132. https://doi.org/10.1016/j.culher.2019.05.021
[19] Yan, W. J.; Chiou, S. C.: The Safeguarding of Intangible Cultural Heritage from the Perspective of Civic Participation: The Informal Education of Chinese Embroidery Handicrafts, Sustainability, 13(9), 2021, 4958. https://doi.org/10.3390/su13094958
[20] Yang, C.; Han, F.: A; Hanal Information System for Cultural Landscapes: the Case of Slender West Lake scenic area in Yangzhou, China, Built Heritage, 4(1), 2020, 1-14.https://doi.org/10.1186/s43238-020-00004-8
[21] Yanmin, X.; Yitao, T.; Chunjiong, Z.; Mingxing, X.; Wen gang, L.; Jianjiang, T.: Review of Digital Economy Research in China: A Framework Analysis Based on Bibliometrics, Computational Intelligence and Neuroscience, 2022(2427034), 2022, 11. https://doi.org/10.1155/2022/2427034
[22] Yao, D.; Zhang, K.; Wang, L.; Law, R.; Zhang, M.: From Religious Belief to Intangible Cultural Heritage Tourism: A Case Study of Mazu Belief, Sustainability, 12(10), 2020, 4229. https://doi.org/10.3390/su12104229
[23] Yingfang, Z.; Ding, Q.; Shen, D.: Character Design of Somatic Game from Perspective of Intangible Heritage Digital Protection, In Journal of Physics: Conference Series 1584, (1), 2020, 012053. IOP Publishing. https://doi.org/10.1088/1742-6596/1584/1/012053
[24] Zhang, G.; Chen, X.; Law, R.; Zhang, M.: Sustainability of Heritage Tourism: A Structural Perspective from Cultural Identity and Consumption Intention, Sustainability, 12(21), 2020, 9199. https://doi.org/10.3390/su12219199
[25] Zhao, S.; Kirk, D.; Bowen, S.; Wright, P.: Cross-Cultural Understanding of Chinese Traditional Puppetry: Integrating Digital Technology to Enhance Audience Engagement, International Journal of Intangible Heritage, 14, 2019, 139-154.
[26] Zhou, H. M.: Musical Poetics in Instrumental Music: China's Intangible Cultural Heritage in the Information Age, Heritage Science, 10(1), 2022, 1-15. https://doi.org/10.1186/s40494-022-00726-1
[27] Zhou, Y.; Sun, J.; Huang, Y.: The Digital Preservation of Intangible Cultural Heritage in China: a Survey, Preservation, Digital Technology & Culture, 48(2), 2019, 95-103. https://doi.org/10.1515/pdtc-2019-0004

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