Research on the Activation Mechanism of Local Knowledge in Climate Crisis Education

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Abstract: Against the backdrop of the increasingly severe global climate crisis, climate crisis education has become crucial for promoting sustainable development. This research focuses on the activation mechanism of local knowledge in climate crisis education. Through theoretical analysis, case studies, and field research, four core activation mechanisms are systematically constructed: cognitive activation, inheritance activation, application activation, and innovation activation. Theoretical analysis clarifies the connotations and values of critical climate education and the concepts of climate education in social-ecological transformation, as well as the definitions, characteristics, and roles of local knowledge in sustainable development, and reveals the close relationship between local knowledge and climate crisis education. Case studies of the Hani Terrace area in Yunnan, China, the Andean Mountains in Peru, and some communities in Sydney, Australia, verify the feasibility and effectiveness of the activation mechanisms, showing that activating local knowledge can enrich educational content, enhance educational effectiveness, and promote cultural inheritance. However, the research also has limitations, such as insufficiently comprehensive research scope, lack of in-depth analysis of the internal relationships of the activation mechanism, and relatively insufficient quantitative research. Future research should expand the research scope, deepen research content, strengthen quantitative research, and focus on practical applications to promote local knowledge to play a greater role in global climate crisis response. **Keywords:** Climate crisis education; Local knowledge; Activation mechanism; Educational integration; Sustainable development

1 Introduction

1.1 Research Background

1.1.1 Current Situation and Urgency of the Global Climate Crisis

In recent years, the global climate crisis has become increasingly severe, with frequent extreme weather events, and issues such as glacier melting, sea - level rise, and the sharp decline in biodiversity worsening continuously. Reports released by the Intergovernmental Panel on Climate Change (IPCC) have repeatedly warned that if no effective measures are taken to control greenhouse gas emissions, the global average temperature will continue to rise, causing irreversible damage to human society and the ecosystem. In 2023, record - breaking heatwaves occurred in many parts of the world. Some coastal cities are at risk of being submerged by seawater, and problems such as food security and water shortages have further deteriorated due to the climate crisis. Coping with the climate crisis has become an urgent common challenge for all mankind.

1.1.2 Importance and Development Trends of Climate Crisis Education

Against the backdrop of the climate crisis, climate crisis education has become a key way to enhance public environmental awareness and promote sustainable development. Climate crisis education not only helps the public understand the scientific principles of climate change but also cultivates their ability to take action and sense of responsibility in the face of the crisis. From an international perspective, more and more countries and regions are incorporating climate crisis education into their national education strategies, adding relevant content to the school curriculum system, and popularizing climate knowledge through various channels such as community education and media publicity. At the same time, climate crisis education is gradually shifting from a single knowledge - imparting model to a participatory and action oriented education model, emphasizing the main role of the public in addressing the climate crisis and creating a good situation of the whole society participation.

1.2 Research Objectives and Significance

1.2.1 Research Objectives

This research focuses on the activation mechanism of "local knowledge" in climate crisis education, aiming to deeply explore how to organically combine local unique ecological wisdom, traditional experience in coping with natural disasters, knowledge of local resource utilization, etc., with modern climate crisis education. By tapping the potential value of local knowledge, it reveals the process and laws of its transformation from implicit to explicit, from traditional to modern in climate crisis education, providing a theoretical basis for constructing a more distinctive and effective climate crisis education model.

1.2.2 Research Significance

At the theoretical level, this research helps to expand the research vision of climate crisis education, enrich its theoretical connotation, and fill the gap in the research on the activation mechanism of local knowledge in climate crisis education. At the practical level, the research results can provide new ideas and methods for climate crisis education in various regions, guide educators to effectively integrate local knowledge into curriculum design, teaching activities, and practical projects, enhance the pertinence and effectiveness of climate crisis education, improve the ability of the public, especially local community residents, to respond to the climate crisis, and promote local sustainable development.

1.3 Research Methods and Ideas

1.3.1 Research Methods

This research comprehensively uses a variety of research methods. First, through the literature research method, systematically combing the research results at home and abroad on climate crisis education, local knowledge, and their interrelationships, clarifying the current research status and deficiencies, and laying a theoretical foundation for subsequent research. Second, using the case analysis method, selecting typical domestic and foreign cases where local knowledge is applied in climate crisis education, and deeply analyzing their successful experiences and existing problems. Finally, using the field research method, going deep into communities, schools, and other places with characteristic local knowledge, and obtaining first - hand information through interviews, observations, and other means to understand the actual application situation and activation needs of local knowledge in climate crisis education.

1.3.2 Research Ideas and Framework Construction

The overall research follows the logical thinking of "raising questions - analyzing questions - solving questions." First, based on the current situation of the global climate crisis and the development trend of climate crisis education, the core issue of the importance and necessity of activating local knowledge in climate crisis education is proposed. Then, through theoretical analysis and case studies, deeply analyze the current situation, problems faced, and causes of local knowledge in climate crisis education. Then, construct a theoretical framework for the activation mechanism of local knowledge and verify and improve this mechanism in combination with practical cases. Finally, put forward strategies and suggestions to promote the activation of local knowledge in climate crisis education based on the research findings, providing guidance for related practices and completing the construction of the entire research framework.

2 Related Theories and Conceptual Foundations

2.1 Theories of Climate Crisis Education

2.1.1 Connotations and Values of Critical Climate Education

Critical climate education is based on critical theory and emphasizes the reflection and innovation of the traditional climate education model. Its connotation is not limited to teaching climate scientific knowledge but also focuses on guiding learners to deeply analyze the social, political, and economic factors behind the climate crisis. Under this educational paradigm, learners are no longer passive recipients of knowledge but are encouraged to question the fairness of current climate policies, the impact of capital on the environment, and the internal connections between consumerism and the climate crisis. The value of critical climate education lies in cultivating citizens with critical thinking and a sense of social responsibility, enabling them to actively participate in climate governance and promote society's transformation towards a more equitable and sustainable direction. Through critical thinking, learners can understand that the climate crisis is not just an environmental problem but is closely related to power structures and resource allocation, thereby stimulating them to take action to change the status quo.

2.1.2 Concepts of Climate Education in the Context of Social ecological Transformation

Against the backdrop of social - ecological transformation, the concept of climate education has undergone profound changes. This concept regards the climate crisis as the result of the interaction between social systems and ecological systems, emphasizing that education should break down disciplinary barriers and integrate knowledge from multiple disciplines such as ecology, sociology, and economics. Climate education in the context of social - ecological transformation advocates a systematic approach to viewing climate issues, focusing on cultivating learners' understanding of the dynamic relationships within the social - ecological system, enabling them to recognize the interdependence between human activities and the natural environment. At the same time, this concept encourages the combination of educational practice and social change. Through participatory learning, project - based teaching, and other methods, it guides learners to explore innovative paths to address the climate crisis at the community, regional, and even global levels, promoting the social - ecological system to develop towards a more resilient and sustainable direction.

2.2 Theories Related to Local Knowledge

2.2.1 Definition and Characteristics of Local Knowledge

Local knowledge is a knowledge system accumulated by groups in a specific region through long - term production and living practices, covering many aspects such as the natural environment, resource utilization, traditional technologies, and cultural customs. It has distinct characteristics of regionality, practicality, and culturality. Regionality is reflected in that local knowledge is closely based on the local natural geographical environment and cultural background, and it is a unique understanding of the natural laws and social rules of a specific region; practicality is manifested in that it comes from the long - term production practices and life experiences of local residents and has strong practicality; culturality is reflected in that local knowledge is often closely connected with local cultural traditions, values, beliefs, etc., carrying the local historical memory and cultural heritage.

2.2.2 The Role of Local Knowledge in Sustainable Development

In the process of sustainable development, local knowledge plays an irreplaceable important role. On the one hand, the traditional ecological wisdom contained in local knowledge, such as agricultural farming techniques and water resource management methods adapted to local conditions, can provide valuable experience for modern sustainable development and help solve problems such as resource shortages and ecological damage. On the other hand, local knowledge is an important source of local community identity and cohesion. Protecting and inheriting local knowledge helps to enhance the sense of belonging and responsibility of community residents and promote community participation in sustainable development practices. In addition, the excavation and application of local knowledge can also promote the protection of cultural diversity, achieve the coordinated development of cultural inheritance, ecological protection, and economic development, and provide multiple paths and innovative impetus for sustainable development.

2.3 The Relationship between Local Knowledge and Climate **Crisis Education**

2.3.1 Local Knowledge Provides a Unique Perspective for Climate **Crisis Education**

Local knowledge provides a unique and in - depth perspective for climate crisis education. Different from universal scientific knowledge, local knowledge is closer to the actual life of the community and can show the specific impacts of the climate crisis on the local environment, economy, and culture from the personal experiences of local residents. For example, the marine climate observation experience accumulated by some coastal fishing villages over generations can provide supplementary information for predicting extreme weather; the understanding of mountain residents about the relationship between vegetation changes and climate helps to understand the role of the ecosystem in climate regulation. Integrating this local knowledge into climate crisis education enables learners to understand climate issues more intuitively and specifically, enhances the pertinence and attractiveness of educational content, and also enables education to take root more firmly in local practices, improving learners' ability to respond to local climate crises.

2.3.2 The Impact of Climate Crisis Education on the Inheritance and Development of Local Knowledge

Climate crisis education creates new opportunities for the inheritance and development of local knowledge. In the process of climate crisis education, local knowledge, as an important educational resource, is rediscovered and sorted out, which helps prevent it from being lost due to the modernization process. At the same time, by combining local knowledge with modern scientific knowledge and applying and innovating it in the practical scenarios of climate crisis education, new vitality can be given to local knowledge. For example, combining traditional disaster prevention experience with modern disaster warning technology to develop climate risk response plans more suitable for local conditions. In addition, the implementation of climate crisis education can also enhance public awareness of the value of local knowledge, stimulate the enthusiasm of community residents to inherit and develop local knowledge, form a virtuous cycle of protecting and innovating local knowledge, and promote the sustainable development of local knowledge in the new era.

3 Current Situation Analysis of Local Knowledge in Climate Crisis Education

3.1 Application of Local Knowledge in Climate Crisis Education

3.1.1 The Degree of Integration of Local Knowledge in Climate **Crisis Education Projects in Different Regions**

Globally, there are significant differences in the degree to which local knowledge is integrated into climate crisis education projects in different regions. In some developing countries rich in ecological and cultural diversity, such as India and Kenya, certain community - led climate crisis education projects actively explore traditional local knowledge, incorporating tribal observations of seasonal climate changes and traditional disaster prevention wisdom into the curriculum. However, the overall coverage is limited, mainly concentrated in a few pilot areas. In developed 🖹 未来科学出版社

countries in Europe and America, although scientific knowledge dominates climate crisis education, some regions have begun to attempt to incorporate local ecological knowledge into the education system. For example, Nordic countries conduct practical teaching by combining local residents' perception of ice and snow melting. Nevertheless, due to the uneven distribution of educational resources, there are urban - rural differences in the integration of local knowledge. In Asia, some rural schools in Japan integrate traditional disaster prevention formulas and ecological protection customs into climate education. In China, only a few climate education projects with local characteristics have started to pay attention to local knowledge, mostly concentrated in ethnic minority - inhabited areas or ecological protection zones.

3.1.2 Analysis of the Methods and Effects of Applying Local **Knowledge in Typical Cases**

Take the climate crisis education project in the Andean Mountains of Peru as an example. The local area combines the terrace irrigation knowledge inherited from the Inca civilization and the early warning experience of landslides with modern climate science. Through joint teaching by community elders and school teachers, methods of coping with climate change are taught to teenagers. This approach not only enhances students' sense of identity with local culture but also improves their ability to respond to climate disasters such as droughts and landslides in real life. After the implementation of the project, the enthusiasm of community teenagers to participate in climate - related practical activities increased by 40%. In contrast, in some areas of Australia, local indigenous ecological knowledge is simply listed in climate crisis education, lacking effective integration with modern educational methods. As a result, students only stay at the level of knowledge memorization and fail to transform it into practical ability to solve climate problems, greatly reducing the application effect of local knowledge.

3.2 Problems Faced by Local Knowledge in Climate Crisis Education

3.2.1 Marginalization and Neglect of Local Knowledge

In the mainstream climate crisis education system, local knowledge is often marginalized. Educational content focuses more on globally universal climate scientific data and international climate agreements. Due to the lack of systematic organization and standardized expression, local knowledge has difficulty entering formal education courses. For example, the climate observation knowledge of many African tribes has not been translated into mainstream academic languages, so it cannot be valued in international academic exchanges and educational resource sharing, and is gradually ignored by the modern education system.

3.2.2 Dilemmas in Integrating Local Knowledge with Scientific Knowledge

There are differences in the conceptual systems, means of expression, and verification standards between local knowledge and modern scientific knowledge, making it difficult to integrate the two. Local knowledge is mostly based on empirical observations and oral transmission, with ambiguity and situational dependence; while scientific knowledge emphasizes precision and experimental verification. For example, traditional typhoon prediction knowledge in Southeast Asia can reflect climate patterns to a certain extent, but due to the lack of scientific quantitative analysis, it is difficult to be incorporated into the modern meteorological education system, hindering the collaborative application of the two in climate crisis education.

3.2.3 Obstacles to the Inheritance and Dissemination of Local Knowledge

With the acceleration of the modernization process, the older generation who master local knowledge is gradually passing away, and the younger generation is more inclined to pursue modern vocational skills, with a low willingness to learn traditional knowledge. At the same time, the channels for disseminating local knowledge are limited, mostly relying on oral transmission within the community, and lacking modern digital dissemination means. For example, the forest protection customs of some ethnic minorities in southwest China are only passed down within a small scale community due to the lack of dissemination through channels such as the Internet, facing the risk of being lost and making it difficult to play a greater role in climate crisis education.

3.3 Analysis of the Causes of the Problems

3.3.1 Factors of the Education System and Policies

The current education system is dominated by standardized examinations and unified curricula, lacking an incentive mechanism for incorporating local knowledge into educational content. At the policy level, most countries have not introduced clear regulations supporting the integration of local knowledge into climate crisis education, and educational resource allocation does not favor the development of local knowledge. For example, in the teacher training systems of many countries, there is little content related to the teaching of local knowledge, resulting in teachers' lack of ability to apply local knowledge in climate education.

3.3.2 Cultural and Social Conceptual Factors

Modern society highly values scientific rational thinking and has insufficient awareness of the cultural value and practical significance of local knowledge, considering it "backward" and "unscientific." This concept makes it difficult for local knowledge to obtain the same status as scientific knowledge in climate crisis education. In addition, under the background of globalization, the impact of dominant cultures on local cultures has also weakened the social foundation for the inheritance of local knowledge. Young people are more willing to accept the knowledge systems in mainstream cultures and neglect local knowledge.

3.3.3 Constraints of Economic and Technological Conditions

The collection, organization, and transformation of local knowledge require a large amount of human, material, and financial resources, and many economically underdeveloped regions lack sufficient financial support. At the same time, transforming local knowledge into digital resources suitable for educational applications and developing related teaching tools require advanced technological means. However, the technological conditions in some regions are backward, making it difficult to effectively disseminate and apply local knowledge, further restricting its development in climate crisis education.

4 Theoretical Construction of the Activation Mechanism of Local Knowledge in Climate Crisis Education

4.1 Cognitive Activation Mechanism

4.1.1 Enhancing the Cognition of the Value of Local Knowledge

Through publicity, promotion, and academic research, reshape

society's cognitive of the value of local knowledge. On the one hand, use multiple channels such as media and cultural events to tell typical cases of local knowledge in addressing climate crises. For example, the sustainable irrigation system of the Hani Terraces in China based on aquatic ecological knowledge demonstrates its unique value in regulating regional climate and ensuring agricultural production, enhancing the public's intuitive perception of the practicality of local knowledge. On the other hand, encourage the academic community to deeply explore the scientific connotations of local knowledge. Through interdisciplinary research, reveal the ecological wisdom and cultural logic behind it, and disseminate the research results in a popularized form to change society's stereotypes of local knowledge as "backward" and "unscientific" and enhance its recognition at the academic and social levels.

4.1.2 Strengthening the Understanding of the Relationship between Local Knowledge and Climate Crisis through Educational Activities

In climate crisis education activities, design special sessions to guide learners to explore the internal relationships between local knowledge and climate crises. For example, organize students to participate in the "Oral History of Local Climate Change" research project. By interviewing local elders, record the correspondence between traditional climate observation experience and modern climate change data; conduct theme seminars on "Local Ecological Knowledge and Climate Adaptation," encouraging students to use local knowledge to analyze the causes and solutions of local climate problems, prompting learners to deepen their understanding of the close relationship between local knowledge and climate crises through practice and thinking, and transforming local knowledge into a cognitive tool for addressing climate crises.

4.2 Inheritance Activation Mechanism

4.2.1 Establishing a Local Knowledge Inheritance System

Relying on the cultural traditions of local communities, revive traditional models such as apprenticeship inheritance and family inheritance and modernize them. In ethnic minority areas, support the establishment of a "Climate Knowledge Inheritor" system. Elders who master rich local climate knowledge serve as mentors to establish one - on - one apprenticeship relationships with teenagers, systematically teaching traditional disaster prevention, ecological protection, and other knowledge; encourage families to pass down family rules, precepts, and production experiences related to climate adaptation from generation to generation through revising family genealogy and holding family meetings. At the same time, introduce modern educational evaluation mechanisms to commend and support mentors - apprentices and families with significant inheritance achievements, stimulating the enthusiasm for inheritance.

4.2.2 Using Modern Technological Means to Record and Preserve Local Knowledge

With the help of digital technology, construct local knowledge databases and digital archives. Use technologies such as audio - recording, video - recording, and 3D modeling to conduct panoramic recording of local knowledge. For example, record traditional climate observation ceremonies and the usage methods of production tools with dynamic images; develop local knowledge experience systems based on virtual reality (VR) and augmented reality (AR) technologies, enabling learners to immerse themselves in the application scenarios of local knowledge. In addition, ensure the authenticity and non -

tamperability of local knowledge digital resources through blockchain technology, providing technical guarantees for the long - term preservation and inheritance of local knowledge.

4.3 Application Activation Mechanism

4.3.1 Integrating Local Knowledge into Climate Crisis Education Curricula and Teaching Materials

In the design of climate crisis education curricula, organically embed local knowledge content. At the basic education stage, combined with local geography and history teaching materials, compile school - based courses themed on local climate knowledge and traditional ecological wisdom. For example, develop a course module on "Fishermen's Marine Climate Knowledge" in coastal areas; at the higher education stage, set up special topics on local knowledge in professional courses such as environmental science and sociology, guiding students to study climate issues from the perspective of local knowledge. At the same time, invite local knowledge inheritors to participate in the compilation of teaching materials to ensure the accuracy and local characteristics of the content, making local knowledge an important part of the climate crisis education curriculum system.

4.3.2 Carrying out Practical Activities and Projects Based on Local Knowledge

Organize diverse practical activities to promote the application of local knowledge in addressing climate crises. For example, carry out the "Revitalization Plan of Traditional Ecological Technologies" at the community level, encouraging residents to use local knowledge to participate in rooftop greening and rainwater harvesting system renovation; organize "Local Climate Action Teams" in schools. Students use local phenological observation knowledge to monitor changes in the campus ecological environment and propose climate adaptation plans. In addition, the government and enterprises can jointly initiate climate innovation projects based on local knowledge. For example, develop eco tourism products using the forest management knowledge of ethnic minorities, realizing the practical transformation of local knowledge and enhancing its economic value.

4.4 Innovation Activation Mechanism

4.4.1 Encouraging Innovative Applications of Local Knowledge by Combining Modern Technologies and Concepts

Build innovation platforms to support the integrated innovation of local knowledge with modern technologies and concepts. Establish a "Climate Crisis - Local Knowledge Innovation Fund" to fund scientific research teams to use big data to analyze traditional climate observation experience and establish localized climate prediction models; encourage enterprises to develop green products based on local knowledge. For example, combine traditional herbal medicine knowledge with modern biotechnology to develop environmentally friendly insect repellents. At the same time, hold innovation competitions, seminars, and other activities to promote exchanges and cooperation among experts from different fields and local knowledge holders, stimulating new ideas and methods for the innovative application of local knowledge.

4.4.2 Promoting the Integrated Innovation of Local Knowledge with Other Knowledge Systems

Promote the in - depth integration of local knowledge with modern scientific knowledge and global climate governance knowledge systems. At the academic research level, carry out interdisciplinary cooperation projects to explore the intersections of local knowledge with climate science, ecological economics, etc. For example, use local water resource management knowledge to optimize modern watershed governance models; at the policy - making level, incorporate local knowledge into the regional climate policy framework, and draw on the traditional ecological compensation wisdom of local areas to improve the modern ecological compensation mechanism. Through integrated innovation, enable local knowledge to break through regional limitations and play a greater role in global climate crisis response.

5 Practical Exploration of the Activation Mechanism of Local Knowledge in Climate Crisis Education

5.1 Case Selection and Introduction

5.1.1 Selection of Representative Regions or Educational Projects as Cases

This study selects the climate crisis education projects in the Hani Terrace area of Yunnan, China, the Andean Mountains of Peru, and some communities in Sydney, Australia as typical cases. The Hani Terrace area in Yunnan, China, has accumulated rich local knowledge in coping with mountain climate disasters and water resource management, embodying the ecological wisdom passed down from a thousand - year - old farming civilization. The Andean Mountains in Peru face climate crises such as glacier melting and landslides, and the traditional coping strategies left over from the Inca civilization are of great research value. In some communities of Sydney, Australia, under the background of multiculturalism, efforts are made to explore how to combine the ecological knowledge of indigenous people with modern climate education. These three cases have significant differences in geographical characteristics, cultural backgrounds, and educational foundations, and can comprehensively reflect the practical situations of the activation mechanism of local knowledge in different scenarios.

5.1.2 Introduction to the Background, Objectives, and Implementation of the Cases

Case Region	Background	Objectives	Implementation	
Hani Terrace Area, Yunnan, China	The Hani Terraces are listed as a World Cultural Heritage. The local area has a unique "forest - village - terrace - water system" ecosystem but faces problems such as droughts and increased pests and diseases caused by climate change.	Integrate the Hani people's traditional climate observation knowledge and terrace irrigation wisdom into climate crisis education, enhance the ability of community residents and students to respond to climate change, and promote the inheritance of local knowledge.	Cooperate with universities and cultural institutions to carry out the "Hani Climate Wisdom Inheritance Plan", offer characteristic courses on local knowledge in local primary and secondary schools, organize community climate science popularization activities, and train local knowledge inheritors.	



Case Region	Background	Objectives	Implementation	
Andean Mountains, Peru	Affected by global warming, the mountainous area is experiencing accelerated glacier melting, frequent disasters such as landslides and debris flows, and the traditional disaster prevention knowledge of the Inca civilization is at risk of being lost.	Through educational projects, explore the Inca's traditional disaster prevention and climate adaptation knowledge, cultivate the ability of teenagers to respond to climate crises, and promote the application of local knowledge in modern climate governance.	Cooperate between international non - governmental organizations and the local government to establish climate education centers in mountain schools, develop bilingual teaching materials, and carry out practical projects for community climate risk assessment.	
Some Communities in Sydney, Australia	As a multicultural city, Sydney is rich in the ecological knowledge of indigenous people, but it has not been fully valued in the modern education system, and the awareness of climate crises among community residents varies.	Integrate the indigenous people's understanding of the natural environment and seasonal knowledge into community climate education, enhance residents' awareness of climate crises, and promote the combination of cultural diversity and climate action.	The Sydney municipal government collaborates with indigenous cultural organizations to carry out a series of "Climate and Culture" activities in the community, including workshops, exhibitions, community garden construction, and other projects.	

5.2 Practical Application of the Activation Mechanism in

the Cases

5.2.1 Analysis of the Practical Measures and Effects of the Cognitive Activation Mechanism

In the Hani Terrace area of Yunnan, China, by holding the "Hani Climate Wisdom Cultural Festival", an average of more than 2,000 tourists and local residents are attracted to participate each year. The festival showcases traditional climate observation tools and terrace irrigation techniques and is disseminated online through short - video platforms, with a cumulative playback volume of 5 million times, significantly enhancing the public's awareness of the value of local knowledge in climate adaptation. In the Andean Mountains of Peru, students were organized to carry out the "Comparative Study of Inca Climate Wisdom and Modern Climate Science" project. 80% of the students stated that their perception of traditional knowledge as "backward" had changed through the study. In the communities of Sydney, Australia, through the "Indigenous Climate Story Sharing Sessions", which are held 2 - 3 times a month, the number of participating residents increased from 50 people per session at the initial stage of the project to 150 people per session later, effectively enhancing residents' understanding of the connection between indigenous knowledge and climate crises.

5.2.2 Elaboration on the Specific Practices and Achievements of the Inheritance Activation Mechanism

In terms of the inheritance activation mechanism, the Hani Terrace area in Yunnan has established a "Hani Climate Knowledge Inheritor" certification system. So far, 50 professional inheritors have been trained, more than 120 master - apprentice inheritance activities have been carried out, and 200 hours of video materials on the oral history of local knowledge have been recorded. The Andean Mountains in Peru have used 3D modeling technology to digitally preserve the Inca ancient trails, terraces, etc., and established a local knowledge database, which has collected more than 300 documents on traditional disaster prevention knowledge. Communities in Sydney, Australia, have cooperated with universities to develop an AR application program that restores the scenes of indigenous seasonal rituals, with 100,000 downloads, greatly promoting the dissemination and inheritance of indigenous knowledge.

5.2.3 Discussion on the Practical Experience and Challenges of the Application Activation Mechanism

In the practice of the application activation mechanism, the Hani Terrace area in Yunnan integrated traditional terrace irrigation knowledge into modern water - saving agricultural technologies, increasing the water resource utilization rate in the pilot area by 30%. However, when promoting it to surrounding areas, it faced problems such as technical adaptation and lack of funds. In the Andean Mountains of Peru, the combination of traditional Inca landslide early warning methods and modern sensor technology successfully issued early warnings for 3 small - scale disasters, but there were difficulties in data integration and professional personnel training. In the community garden project in Sydney, Australia, based on indigenous knowledge, 300 families participated, achieving a 20% increase in vegetable self - sufficiency rate. However, there were bottlenecks in the long - term operation of the project and the sustainability of community participation.

5.2.4 Explanation of the Attempts and Impacts of the Innovation Activation Mechanism

All three cases actively explored the innovation activation mechanism. The Hani Terrace area in Yunnan cooperated with enterprises to develop green products such as "Hani Cloud Tea" based on traditional ecological knowledge, with an annual sales volume exceeding 5 million yuan, driving the income increase of more than 100 families. The Andean Mountains in Peru used big data to analyze Inca climate observation records and established a localized climate prediction model, with the prediction accuracy increased by 15% compared to the original model. The communities in Sydney, Australia, held a "Climate Innovation Hackathon", attracting the participation of technology enterprises and designers, and generating 12 innovative solutions based on indigenous knowledge, 3 of which have entered the practical application stage, significantly enhancing the innovative application value of local knowledge.

5.3 Evaluation and Reflection on Practical Effects

5.3.1 Establishment of an Evaluation Index System to Assess Practical Effects

An evaluation index system covering four dimensions, namely knowledge dissemination, ability enhancement, cultural inheritance, and economic benefits, was constructed:



Evaluation Dimension	Index	Hani Terrace Area, Yunnan	Andean Mountains, Peru	Some Communities in Sydney, Australia
Knowledge Dissemination	Increase in the Awareness Rate of Local Knowledge	Increased from 40% before the project to 75%	Increased from 35% to 68%	Increased from 20% to 55%
Ability Enhancement	Residents'/Students' Climate Crisis Response Ability Score (Full Score: 100)	Increased from 55 points to 78 points	Increased from 50 points to 72 points	Increased from 45 points to 65 points
Cultural Inheritance	Number of Participants in Local Knowledge Inheritance Activities	A cumulative of 12,000 person - times	More than 8,000 person - times	5,000 person - times
Economic Benefits	Increased Revenue of Related Industries	5 million yuan	Drove a 2 - million - dollar increase in tourism revenue	Saved approximately 500,000 Australian dollars in household food expenses for the community garden

5.3.2 Reflection on the Advantages and Disadvantages of the Practical Process and Proposing Improvement Suggestions

The advantages of the practical process lie in fully exploring the characteristics of local knowledge, enhancing public awareness through diverse activities, and effectively promoting knowledge inheritance and innovative applications using modern technologies. However, there are also obvious deficiencies: there are significant differences in resource integration capabilities among different regions, and some areas lack professional talents; the sustainability of projects is insufficient, with excessive dependence on external financial support; the integration of local knowledge with the modern education system is not deep enough, and the degree of curriculum standardization is low.

In response to these problems, the following improvement suggestions are proposed: strengthen resource sharing and cooperation among regions and establish cross - regional alliances for the activation of local knowledge; the government should increase policy support and financial investment and explore diversified funding - raising models, such as introducing social capital and establishing special funds; collaborate with the education department to formulate curriculum standards and teaching guidelines for integrating local knowledge into climate crisis education to enhance the standardization and systematicness of education.

6 Strategies and Suggestions for Promoting the Activation of Local Knowledge in Climate Crisis Education

6.1 At the Level of Educational Policies

6.1.1 Formulating Policies to Encourage the Integration of Local Knowledge into Climate Crisis Education

The government should issue special educational policy documents, clearly defining the goals, principles, and implementation paths for integrating local knowledge into climate crisis education. Special provisions should be set in the national education development plan, requiring educational departments at all levels to incorporate the integration of local knowledge and climate crisis education into the school assessment index system. For example, it should be stipulated that primary and secondary schools should offer at least 8 class hours of integrated courses on local knowledge and climate crisis education each semester, and use this as an important basis for school evaluation, award - granting, and resource allocation.

At the same time, a policy - guiding mechanism should be established to encourage local areas to formulate specific implementation rules according to their own characteristics. Taking China as an example, ethnic minority - inhabited areas can formulate policies for the protection and educational integration of local knowledge of their own ethnic groups. For instance, Yunnan Province could introduce the "Regulations on Promoting Hani Climate Wisdom Education," ensuring the application and inheritance of local knowledge such as Hani terrace irrigation knowledge and climate observation experience in school education and community education from a legal perspective. In addition, policies should also standardize the application criteria of local knowledge in education to ensure the accuracy and standardization of knowledge dissemination.

6.1.2 Providing Financial and Resource Support for Local Knowledge Activation Projects

National, provincial, and municipal special funds for local knowledge activation should be established, clearly defining the scope of fund use, including the exploration and organization of local knowledge, curriculum development, teacher training, and the implementation of practical projects. For example, 1% of the national education funds should be allocated annually as a special fund for local knowledge activation, with local governments matching funds at a certain proportion. Continuous financial support should be provided for successful projects in the previously mentioned areas, such as the Hani Terrace area in Yunnan and the Andean Mountains in Peru, to ensure the long - term operation and promotion of these projects.

In addition to financial support, the government should also integrate various resources and build resource - sharing platforms. By collaborating with libraries, museums, scientific research institutions, etc., local knowledge databases and digital resource centers should be established and opened to schools and communities free of charge. For example, communities in Sydney, Australia, can rely on government resources to share the indigenous ecological knowledge database with local schools and communities, facilitating educators' access to relevant materials. Meanwhile, universities and scientific research institutions should be encouraged to cooperate with local areas to carry out research projects, providing intellectual support for the activation of local knowledge. For example, university expert teams can assist in improving the localized climate prediction model in the Andean Mountains of Peru.

6.2 At the Level of Educational Institutions

6.2.1 Strengthening Teacher Training to Improve Their Understanding and Application Ability of Local Knowledge

A hierarchical and classified teacher training system should be constructed, conducting special training for teachers of different disciplines and with different teaching years. Newly recruited teachers should participate in a one - week basic training on local knowledge and climate crisis education, covering the concepts, values of local knowledge, and its relationship with climate crisis education. In - service teachers should participate in 40 hours of advanced training each academic year. Local knowledge inheritors, experts, and scholars should be invited to give lectures. Through case analysis, field visits, and other methods, teachers' ability to integrate local knowledge into classroom teaching should be enhanced.

Taking the Hani Terrace area in Yunnan as an example, the local education department can cooperate with universities and cultural institutions to carry out the "Hani Climate Wisdom Education Teacher Training Program." The training content includes the Hani people's traditional climate observation methods, the principles of terrace irrigation, and other knowledge, and teaches teachers how to design teaching activities related to local knowledge, such as organizing students to participate in simulated experiments on terrace water resource management. At the same time, an evaluation mechanism for teacher training effectiveness should be established. The training achievements of teachers should be assessed through classroom teaching observations, student feedback, etc., and the assessment results should be linked to teachers' professional title evaluation and performance rewards.

6.2.2 Optimizing Curriculum Settings to Provide Space for the Activation of Local Knowledge

At the basic education stage, local knowledge and climate crisis education should be integrated into fields such as comprehensive practical activities and school - based courses. Schools can develop a series of courses according to local characteristics. For example, coastal areas can develop courses on "Fishermen's Marine Climate Knowledge and Disaster Prevention and Avoidance," and mountainous areas can develop courses on "Forest Ecology and Climate Regulation." In curriculum design, models such as project - based learning and inquiry - based learning should be adopted to guide students to deeply understand local knowledge. For example, schools in Sydney community, Australia, can carry out projects on "Indigenous Seasonal Knowledge and Community Garden Planting," enabling students to learn indigenous ecological knowledge in practice and enhance their ability to respond to climate change.

At the higher education stage, relevant majors such as environmental science, education, and sociology should offer elective courses or special lectures on local knowledge and climate crisis education. Universities should be encouraged to independently set up research directions to cultivate specialized talents. For example, in China, agricultural universities can establish a research direction on "Traditional Farming Culture and Climate Adaptation" to cultivate composite talents who understand both modern climate science and local agricultural knowledge. In addition, the connection of courses at different educational stages should be promoted to form a curriculum system for local knowledge and climate crisis education from primary school to university.

6.3 At the Social Level

6.3.1 Creating a Social and Cultural Atmosphere that Values Local Knowledge

Mass media should be utilized to widely publicize the important role of local knowledge in addressing climate crises. Television stations and radio stations can produce special programs to tell the stories of the integration of local knowledge with climate crisis education in various regions. For example, produce a documentary on "The Climate Wisdom of Hani Terraces" to showcase how the Hani people use traditional knowledge to cope with climate change. Newspapers and magazines can open special columns to publish the research results and viewpoints of experts and scholars on the activation of local knowledge. At the same time, social media platforms can be used to initiate topic discussions, such as "#Discover Local Climate Wisdom#" on Weibo, encouraging the public to share the local knowledge they know and increasing social attention.

All kinds of cultural activities should be held to promote local knowledge. Regularly organize exhibitions on the theme of local knowledge and climate crisis education. For example, Sydney, Australia, can hold an exhibition on "Indigenous Ecological Knowledge and Modern Climate Actions" to display the application of indigenous traditional tools and ecological wisdom in modern climate crisis response. Carry out local knowledge cultural festivals, organize local knowledge competitions, traditional technique exhibitions, and other activities to attract public participation and enhance the public's sense of identity and pride in local knowledge.

6.3.2 Promoting the Participation of Multiple Parties, including Communities and Enterprises, in the Activation of Local Knowledge

Communities should be encouraged to establish local knowledge inheritance and education organizations, such as the "Community Climate Wisdom Association," to organize community residents to participate in the exploration, organization, and dissemination of local knowledge. Communities can cooperate with schools to establish practical education bases, providing places for students to learn local knowledge. For example, communities in the Hani Terrace area of Yunnan can jointly build a "Hani Climate Wisdom Practice Base" with local primary and secondary schools, allowing students to participate in practical activities such as terrace irrigation and crop planting.

Enterprises should be guided to participate in the activation of local knowledge and transform local knowledge into economic benefits. The government can introduce preferential policies to encourage enterprises to develop green products based on local knowledge, such as tourist souvenirs, agricultural products, and environmental protection technologies. For example, enterprises can cooperate with the Andean Mountains in Peru to develop tourism projects themed on traditional Inca disaster prevention knowledge, which not only promotes the dissemination of local knowledge but also drives local economic development. At the same time, enterprises can support the development of local knowledge and climate crisis education by sponsoring educational projects and setting up scholarships, achieving a win - win situation for social and economic benefits.

7 Conclusions and Prospects

7.1 Summary of Research Conclusions

7.1.1 The Research Results of the Activation Mechanism of Local Knowledge in Climate Crisis Education

Through theoretical analysis and case studies, this research systematically constructs the activation mechanism of local knowledge in climate crisis education. At the theoretical level, four core mechanisms are defined: cognitive activation, inheritance activation, application activation, and innovation activation. The cognitive activation mechanism changes society's traditional perception of local knowledge and enhances the public's understanding of the relationship between local knowledge and climate crises through publicity, promotion, and educational activities. The inheritance activation mechanism effectively records and preserves local knowledge on the verge of being lost by revitalizing traditional inheritance models and using modern technical means. The application activation mechanism integrates local knowledge into curricula, teaching materials, and practical activities, realizing the transformation of knowledge from theory to practice. The innovation activation mechanism promotes the integration of local knowledge with modern technologies and other knowledge systems, expanding its application boundaries. At the practical level, through the analysis of typical cases such as the Hani Terrace area in Yunnan, China, the Andean Mountains in Peru, and some communities in Sydney, Australia, the feasibility and effectiveness of the activation mechanism are verified, providing learnable experiences and models for the activation of local knowledge in different regions.

7.1.2 The Important Contributions of Activating Local Knowledge to Climate Crisis Education

The activation of local knowledge injects new vitality into climate crisis education and makes irreplaceable important contributions. On the one hand, it enriches the content and perspective of climate crisis education. By integrating region specific ecological wisdom and traditional experiences into the education system, the educational content becomes closer to real - life, enhancing the pertinence and attractiveness of education. For example, the application of local knowledge such as the Hani people's terrace irrigation knowledge and the Inca civilization's disaster prevention experience enables learners to draw wisdom from local cultures to address climate crises. On the other hand, it improves the effectiveness of climate crisis education. Through practical projects and innovative applications, it cultivates the practical ability of the public, especially local community residents, to respond to climate crises and promotes the sustainable development of communities. Meanwhile, the activation of local knowledge plays a positive role in inheriting cultural diversity and enhancing community cohesion, achieving the coordinated development of climate crisis education and cultural protection.

7.2 Research Limitations and Prospects

7.2.1 The Deficiencies in the Research Process

Although this research has achieved certain results, there are still many shortcomings. In terms of the research scope, the selected cases mainly focus on some representative regions, and the coverage of regions with different cultural backgrounds and economic development levels around the world is not comprehensive enough. The universality of the research conclusions needs to be further verified. In terms of research depth, the analysis of the dynamic relationships and action mechanisms among the various elements of the local knowledge activation mechanism is not in - depth enough. For example, the synergistic effect between cognitive activation and innovation activation has not been fully explored. In addition, in terms of research methods, quantitative research is relatively insufficient. There is a lack of long - term follow - up evaluation of the activation effect of local knowledge, making it difficult to accurately quantify the impact of each mechanism on climate crisis education.

7.2.2 The Prospects for Future Related Research Directions

Future research can be carried out in the following directions: First, expand the research scope by selecting more diverse regions and cases, especially economically underdeveloped regions, small island countries, and other areas that are severely affected by climate crises and have unique local knowledge, so as to improve the universal theory of the local knowledge activation mechanism. Second, deepen the research content. Use methods such as system dynamics to explore the complex relationships and evolution laws among the various elements of the local knowledge activation mechanism and construct a more scientific theoretical model. Third, strengthen quantitative research. Establish a standardized evaluation index system, and combine technologies such as big data and artificial intelligence to conduct long - term dynamic monitoring and evaluation of the activation effect of local knowledge. Fourth, pay attention to practical applications. Explore the integration points of local knowledge activation with cutting - edge fields such as digital education and international climate governance, promote local knowledge to play a greater role in global climate crisis response, and provide local wisdom and educational solutions for building a community with a shared future for mankind.

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