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Research on the Comprehensive Regionalization of Education and Urbanization based on Multi-scale Spatial Clustering

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Abstract: ***Taking Yunnan's compulsory education as the research object, with the new urbanization as an important foundation for regional development, this study constructs a comprehensive evaluation index system of "regional background-education status" and uses linear weighted model and multi-scale spatial unit division method to carry out a districting study of Yunnan's compulsory education. The results show that Yunnan's education-urbanization can be divided into 6 first-level districts and 19 second-level districts. The key factor causing the regional-educational disparity between the first-level districts is the diversity of student sources and the new urbanization.***

Keywords: Urbanization, Compulsory education, Regionalization, Multi-scale, Yunnan Province**.**

1. Introduction

In recent years, the quality of urbanization in China has improved, but the overall level is not high, and the spatial difference in the quality of urbanization in different regions is obvious. The main reason for the regional disparity in urbanization is the uneven development of urbanization between regions [1]. The core of urbanization is the urbanization of people. Education is the key to promoting the upgrading of human resources, promoting population urbanization, and narrowing regional disparities. Urbanization is closely related to education, and education exerts promoting effects on urbanization in four forms of education investment, human capital, technological progress, and urban culture [2]. Education activities and education systems exist and develop in a certain geographical space. The unevenness of urbanization and education development in different regions is particularly prominent, and the realization of basic education equity has become an important connotation of the healthy development of urbanization [3].

Geographical regionalization has an important function in comprehensively arguing and decision-making on the direction and path of regional development [4]. Educational regionalization is the regional division of education based on the spatial division of labor in education, thereby grasping the position of the educational structure and educational strength of each educational district in the same level of educational spatial division of labor and clarifying its specific division direction and cooperative conditions [5]. Constructing urbanization and education development as a "fate community" by regional division is a useful attempt to explore the path of synergistic development between the regional education system and urbanization system and find the maximum common denominator of the two development. Compulsory education, as the foundation of education, is the knowledge base and fundamental focus of regional urbanization development, and it has significant meaning for the geographical regionalization of compulsory education in the context of new urbanization.

Current empirical studies on educational districting are concentrated in the domestic field of educational science, and the research methods mainly include multi-dimensional grey evaluation method or clustering analysis method. Ye Ping classified rural education in Hubei Province into three large categories based on social and economic conditions, human resources, and educational development level, with nine small categories in each category [6]. Subsequently, Ye Ping conducted a cluster analysis of the social and economic conditions and educational modernization level of China's provinces, classifying social and economic conditions and education into advanced, moderately developed, and underdeveloped categories, and finally classifying the two subsystems interactively to reveal the different characteristics of education modernization in each division [7]. After the concept of "educational economic region" was put forward by Shen Baifu [8], Yu Shiqiu and Dong Zefang conducted educational economic regional division studies on 30 provinces (cities and districts) in China based on two dimensions of social development level and educational development level, ultimately dividing them into four categories of directly-administered municipalities, developed, moderately developed, and underdeveloped regions [9,10]. Zhang Zhengjiang proposed that basic education in China can be divided into urban education, rural education, and ethnic education primary districts based on differences in regional educational development level and ethnic composition, and can be further divided into secondary districts by combining other elements such as regional natural geographic environment [11]. From an international perspective, Collins D analyzed the relationship between educational zoning and the community at the micro level, focusing on the perspective of students attending school through zoning in compulsory education stage. He believes that school zoning may deepen the residential segregation pattern based on social and economic status and race, and will drive the development of school-choice-oriented housing projects [12]. Byun K conducted a study on the regionalization of higher education in Northeast Asia, focusing on China, Japan, and South Korea. He found that trade and cross-border higher education in the three countries are highly correlated. Due to the diversity of the regional pattern in East Asia and the uneven development of economy and higher education, it is difficult to achieve

regional integration of higher education at the regional scale in East Asia [13]. In addition, a few scholars have studied educational zoning from the perspective of regional geography. Jiao Fengjun pointed out that educational regions are generally composed of cultural and educational centers, educational nurturing hinterlands, and educational cooperation networks [14]. Luo Mingdong first proposed the theory of "educational geography" and formed the concept of educational zoning [5]. Pan Yujun drew on the idea of human-land relationship to distill the concepts of "educational complex," "educational carrying complex," and "educational regional complex," and pointed out that educational geographic zoning is an important research content of educational geography and regional educational geography [15]. Qian Chunfu summarized the basic logic of educational districting, which states that educational districting must have a clear educational application goal, follow the logical sequence of "educational application goal → geographical analysis → district division and study" and meet a series of basic criteria [16]. In summary, the existing research on educational districting mainly focuses on typological districting, with little emphasis on regional districting. The research objects mainly focus on the education and economy categories, with too little attention paid to the economic and social subsystems that interact strongly with education. The research scale is relatively macro, mainly at the regional and provincial level. The districting at the level of educational geography is mainly theoretical analysis, with relatively less empirical research. In view of this, this paper takes Yunnan as an example to carry out geographical districting of county-level compulsory education under the background of new urbanization, in order to explore the feasible path for the coordinated development of compulsory education in different regions.

2. Overview of the Study Area

Yunnan Province is located in the southwestern part of China, between 97°31′-106°11′E and 21°08′-29°15′N, with a total land area of 394.1 thousand square kilometers. It is characterized by mountainous and plateau topography, with only 6.09% of the land area being basins. As of 2023, the total population of Yunnan Province was 46.73 million, with 33.36% of the population being ethnic minorities. There are 25 indigenous ethnic groups in the province, 15 of which are unique to Yunnan. There are 29 autonomous counties and 25 border counties, reflecting the significant ethnic diversity and source population diversity. The contribution of compulsory education to the average level of education in the province was 38.09%, 4.6 percentage points higher than the national average. The average years of education were 8.90 years, 0.88 percentage points lower than the national average. When measured by the 9-year compulsory education period, the average level of education in Yunnan is at the critical stage of finishing junior high school, reflecting the important role of compulsory education in the educational structure of Yunnan. In the 2023-2024 academic year, there were 429.8 thousand migrant children from rural areas attending urban schools, accounting for 7.4% of the total enrollment in compulsory education in the province. The education system has shifted from rural to urban, and a two-tiered polarization trend of "urban overcrowding and rural desertification" has emerged [17]. In 2023, the urbanization rate of Yunnan was 52.92%, 13.24 percentage points lower than the national average. One of the important aspects that limits urbanization levels is the uncoordinated relationship between urban and rural areas, with a dual structure. During the urbanization process, there are various forms of incomplete urbanization, including partial urbanization. Education level, as an important content of people-centered urbanization, will create conditions for farmers to transfer to non-agricultural industries and enable migrant workers to become urban residents. This is also the core mission of education in promoting human development from the perspective of new urbanization [18]. How to combine local practices and promote the steady development of population urbanization based on basic education in the process of new urbanization requires the development of educational geographical regionalization with compulsory education as the main body.

3. Research Methods and Data Sources

3.1 Principle for Regionalization

Geographical regionalization is the division of regions based on their differences, reflecting the commonality and diversity of certain phenomena within regions and between regions. In addition to the basic principles of comprehensiveness, consistency, and relatively complete administrative division, the geographical zoning of compulsory education in the context of new urbanization should also consider the main functional role of education and the principle of unifying education with urbanization.

3.2 Regionalization Method

This study uses a multi-scale spatial unit regional division method [19], which fundamentally belongs to the "bottom-up" clustering method. This method is based on the theory of scale space, where different categories of spatial regions are viewed as small light spots in spatial images. As the scale increases, nearby small light spots merge into larger ones, eventually forming a unified whole. In spatial terms, a certain spatial unit at a certain scale is determined by comparing the difference with adjacent spatial regions and based on the size of the difference, the connection path and direction are determined. Low-value regions are merged into relatively high-value regions, thus achieving spatial aggregation in a hierarchical manner. As shown in Figure 1, assuming that region N contains 9 subregions of different development levels, R, with R1a having the lowest value as the initial spatial unit, the connection from R_{1a} to R_{1b} is established by searching for the highest-value unit in adjacent units. The connection path is then continued by outwardly connecting to higher-value units until no connectable units remain. Ultimately, R_{1b} is connected and merged into the adjacent highest-value unit R_{2c}, forming the overall connection path of $R_{1a}\rightarrow R_{1b}\rightarrow R_{2c}$. In the same way, other unconnected units are also assigned to the corresponding administrative units, and eventually all units in region N are merged into the terminating unit R_{2c}, forming the R district.

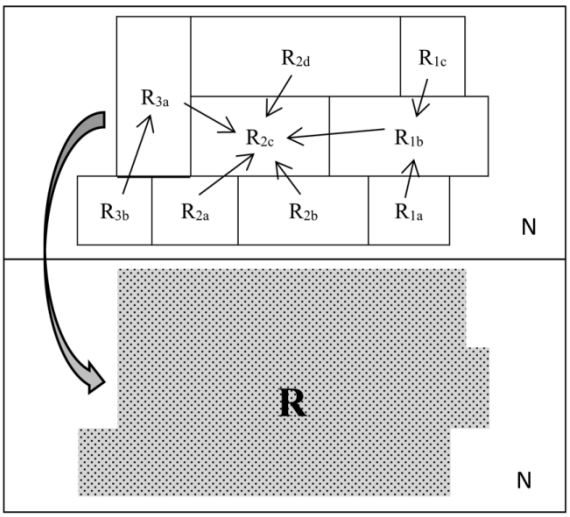

Figure 1: Schematic Diagram of Scale-Space Theory Based Regionalization for Spatial Cells

3.3 Indicator System and Data Sources

In order to comprehensively reflect the development situation of each region in the interactive process between the new urbanization and the compound system of compulsory education, we refer to the existing studies on the measurement of the level of new urbanization [20] and the measurement of educational equity [21], and follow the principles of systematic, scientific, accessible, and operable indicators system construction. We thus formulate the Yunnan compulsory education districting index system (Table 1). The index system consists of two subsystem layers and seven criterion layers, with a total of 31 indicator layers. As for the indicator layers, the 6 indicators of new urbanization are used to represent the urbanization situation of population, economy, and infrastructure; the urbanization rate of education is measured by the percentage of urban students in total students; the formula for the average years of schooling of the population is ∑(the number of years of education at each level multiplied by the population receiving education at each level) / ∑the population receiving education at each level [23]; the formula for the comprehensive density index of school points is $D = \sqrt{N/M + N/P}$, where D is the comprehensive density of school points, N is the number of county-level compulsory education school points, M is the product of the county-level land area and the terrain relief index, and P is the total population of the county. The comprehensive density index of school points is used to measure the state of compulsory education resource allocation, that is, the larger the county-level area and population, and the more complex the geographical conditions, the more school points are needed for layout [24]; the indicators of gross enrollment rate and net enrollment rate are used to represent educational opportunities. School facilities is represented by retention rate, dropout rate, and graduation rate; school facilities are represented by the number of books per student, school area, classroom area per student, and the proportion of dilapidated buildings; educational faculty is represented by the student-to-teacher ratio and the educational attainment rate of teachers; it is particularly noteworthy that, considering the provincial condition of Yunnan being a multi-ethnic province, fairness principles for various types of education are taken into account, and the proportion of ethnic minority students and the proportion of special education students are used to represent the diversity of student sources.

The primary data are mainly from the Yunnan Statistical Yearbook (2023), the annual statistical bulletins of county-level (municipal and district) units, and the Yunnan Provincial Department of Education's Planning and Development Division's "Statistical Forms for the Development of All Levels and Types of Education in Yunnan Province." In order to eliminate the differences in scale, magnitude, and orientation of the indicators, this article uses the standardization method of extremes to process the data. The weights of the indicators are determined by the entropy method, thus ensuring the objectivity of the weight values.

3.4 Evaluation Model

The multi-scale spatial unit division method used in this article takes the regional-educational development comprehensive index as the independent variable, and therefore, the system development level model is introduced for measurement and evaluation. It is evident from the index system that the regional background and educational status are two closely related but distinct subsystems that can be measured using a linear weighting method to determine the contribution level of each parameter to the overall system. The formula is as follows:

$$U_i = \sum_{j=1}^{m} w_{ij} u_{ij}, \sum_{j=1}^{m} w_{ij} = 1 \quad (1)$$

$$U_z = \sum w_i \times U_i (i = 1,2) \quad (2)$$

In equation (1), U_i represents the development index of subsystem i within the region, which includes the regional background index and the educational status index. u_{ij} represents the functional contribution value of the j indicator within subsystem i. w_{ij} is the weight of the corresponding indicator's functional contribution value. The larger U_i is, the higher the level of development and the better the development trend of subsystem i within the region; the lower U_i is, the lower the level of development and the more obstacles there are to development. In equation (2), represents the comprehensive index of regional-educational development, and w_i is the weight value of subsystem i, which is obtained by adding the weight values of all indicators in subsystem i.

Table 1: Comprehensive regionalization index system of education and urbanization in Yunnan Province

Subsystem Level	Criterion Layer	Index Level	Comentropy	Redundancy rate	Weight	Index attribute
Area background	New urbanization	GDP per capita (yuan/person)	0.94438	0.05562	0.06426	+
		Non-agricultural industry structure (%)	0.97690	0.02310	0.02669	+
		Population urbanization rate (%)	0.93160	0.06840	0.07902	+
		Highway mileage per unit area (km/km²)	0.96981	0.03019	0.03488	+
		Number of hospital beds per 10,000 people (per 10,000 people)	0.95577	0.04423	0.05110	+
		Urban per capita disposable income (yuan/person)	0.96911	0.03089	0.03570	+
	Humanistic status	Urbanization rate of education (%)	0.93789	0.06211	0.07176	+
		Average years of schooling of the population (years)	0.95548	0.04452	0.05144	+
		Comprehensive density index of school distribution sites	0.97558	0.02442	0.02821	+
Educational status	Educational opportunities	Primary gross enrolment rate (%)	0.95562	0.04438	0.05128	+
		Primary gross enrolment rate (%)	0.99251	0.00749	0.00866	+
		Gross enrollment rate of junior high school (%)	0.98666	0.01334	0.01541	+
		Net junior high enrolment rate (%)	0.98377	0.01623	0.01875	+
	Educational quality	Primary school retention rate (%)	0.99211	0.00789	0.00911	+
		Primary school retention rate (%)	0.99385	0.00615	0.00710	-
		Promotion rate of primary school graduates (%)	0.99403	0.00597	0.00690	+
		Junior high school retention rate (%)	0.98757	0.01243	0.01436	+
		Junior high dropout rate (%)	0.98884	0.01116	0.01289	-
		Enrollment rate of junior high school graduates (%)	0.97852	0.02148	0.02482	+
	School facilities	Number of books per student (books/person)	0.97965	0.02035	0.02351	+
		School area (m^2)	0.96449	0.03551	0.04103	+
		Per student school area (m^2/ person)	0.96286	0.03714	0.04291	+
		Proportion of distressed homes	0.99005	0.00995	0.01149	-
	Education faculty	Ratio of students to teachers in primary schools	0.98741	0.01259	0.01455	-
		The educational attainment rate of primary school teachers (%)	0.99486	0.00514	0.00594	+
		Ratio of students to teachers in junior high schools	0.99024	0.00976	0.01127	-
		The educational attainment rate of junior high school teachers (%)	0.99284	0.00716	0.00827	+
	Student diversity	Proportion of minority students in primary schools (%)	0.94739	0.05261	0.06078	+
		Proportion of special education students in primary schools (%)	0.95723	0.04277	0.04941	+
		Proportion of minority students in junior high schools (%)	0.94677	0.05323	0.06151	+
		Proportion of special education students in junior high schools (%)	0.95068	0.04932	0.05699	+

3.5 Regionalization Classification and Naming Rules

The main subject of educational regionalization is education. In this paper, the regional background is entered through the perspective of urbanization, and the region is divided based on compulsory education. In essence, it is a process of aggregating different divisions based on the comprehensive level of regional education development background and educational status in various regions, which adheres to the principles of comprehensiveness of the index system and scientificity of the division elements. Furthermore, in order to make the district types clear and the number of districts reasonable, the district classification level was ultimately determined to be two levels: primary districts and secondary districts. The naming of the educational district division units is an important step in expressing the results of the educational district division. The units are named according to the district classification level scheme from high to low. The naming rules for the first-level districts are "geographical location + administrative division headword". The second-level districts are named using the "first two characters of the district name + administrative division headword".

4. Results and Analysis

Based on the regional-educational development comprehensive index, the districting principles and methods were used to carry out the districting operation, and the districting level and naming rules were followed as stipulated. Finally, Yunnan was divided into 6 educational urbanization first-level districts and 19 educational urbanization second-level districts (Figure 2). According to relevant studies, the characteristics of the districts can be reflected by comparing the average values of the 7 criteria layers in each compulsory education district [25], and combined with the range and coefficient of variation for analysis. The calculation formula is as described in the literature [23].

From the first-level districts, it can be seen that the spatial layout is centered on the Central Yunnan Education Urbanization First-level District, with other primary districts surrounding it in a ring shape. The six education urbanization first-level districts ranked from high to low are: I Central Yunnan Education Urbanization First-level District (0.06341), II South Yunnan Education Urbanization First-level District (0.06032), III Northwest Yunnan Education Urbanization

First-level District (0.05881), IV Southeast Yunnan Education Urbanization First-level District (0.05750), V West Yunnan Education Urbanization First-level District (0.05250), and VI Northeast Yunnan Education Urbanization First-level District (0.03968). They display a clockwise spiral dynamic trajectory in spatial order, starting from the center and moving outward in the order of "center → south → northwest → southeast → west → northeast". The map of the education urbanization regionalization scheme in Yunnan is similar to the "Yunnan Province Urbanization Strategic Layout Map" in the Yunnan Province Planning for the Main Functional Areas, and it combines the characteristics of each region, showing that I Central Yunnan Education Urbanization First-level District corresponds to the Central Yunnan Urban Agglomeration, with the feature of leading new urbanization and lagging in education faculty, with an extreme difference of 0.09; II South Yunnan Education Urbanization First-level District corresponds to the Southwest Yunnan Urban Agglomeration , with the feature of leading student diversity and lagging in Education faculty, with an extreme difference of 0.07; III Northwest Yunnan Education Urbanization First-level District corresponds to the Northwest Yunnan Urban Agglomeration, with the feature of leading student diversity and lagging in humanistic status, with an extreme difference of 0.06; IV Southeast Yunnan Education Urbanization First-level District corresponds to the Southeast Yunnan Urban Agglomeration, with the feature of leading new urbanization and lagging in Education faculty, with an extreme difference of 0.06; V West Yunnan Education Urbanization First-level District corresponds to the West Yunnan Urban Agglomeration, characterized by the leading student diversity and the lagging humanistic status, with an extreme difference of 0.05; VI Northeast Yunnan Education Urbanization First-level District corresponds to the Northeast Yunnan Urban Agglomeration, characterized by the leading new urbanization and the lagging education faculty, with an extreme difference of 0.04. The regional-educational system difference coefficients in order of highest to lowest are: student diversity (0.36), new urbanization (0.28), humanistic status (0.21), education faculty (0.12), school facilities (0.10), educational opportunities (0.09), and educational quality (0.08).

From the second-level districts, each education urbanization district generally contains 3 or so educational urbanization second-level districts. Combining the development characteristics of each division, the specific analysis is as follows:

(1) The comprehensive index of the IA Wuxun education urbanization second-level district is 0.08299, the feature of this district is that the new urbanization is leading, while education faculty are lagging behind, the extreme difference is 0.13. The comprehensive index of the IB Honghong education urbanization second-level district is 0.06337, the feature of this district is that the new urbanization is leading, while the education faculty are lagging behind, the extreme difference is 0.06. The comprehensive index of the IC Chuyao education urbanization second-level district is 0.05574, the feature of this district is that the new urbanization is leading, while the humanistic status is lagging behind, the extreme difference is 0.05. The comprehensive index of the ID Xuanhui education urbanization second-level district is 0.05154, with the characteristic of leading in new urbanization and lagging in student diversity, and the extreme difference is 0.05.The difference coefficient between the regions and the education system in each district is in the order of: student diversity (0.55), new urbanization (0.37), school facilities (0.35), humanistic status (0.32), educational opportunities (0.16), education faculty (0.07), educational quality (0.05). (2) The comprehensive index of the IIA Jingmeng education urbanization second-level district is 0.06449, the feature of this district is that student diversity is leading, while the education faculty are lagging behind, the extreme difference is 0.06. IIB Simao education urbanization second-level district's comprehensive index is 0.05615, and the district's characteristics are leading student diversity and lagging humanistic status, with an extreme difference of 0.07. The difference coefficients between the districts in terms of regional-educational systems, from high to low, are: educational opportunities (0.29), humanistic status (0.22), educational quality (0.20), new urbanization (0.15), school facilities (0.14), education faculty (0.03), and student diversity (0.01). (3) IIIA Xianggong education urbanization second-level district's comprehensive index is 0.06531, and the district's characteristics are leading student diversity and lagging humanistic status, with an extreme difference of 0.09; IIIB Guyong education urbanization second-level district's comprehensive index is 0.06020, and the district's characteristics are leading student diversity and lagging humanistic status, with an extreme difference of 0.07; IIIC Dami education urbanization second-level district's comprehensive index is 0.05504, and the district's characteristics are leading new urbanization and lagging education faculty, with an extreme difference of 0.05; IIID Yongda education urbanization second-level district's comprehensive index is 0.05469, and the district's characteristics are leading new urbanization and lagging humanistic status, with an extreme difference of 0.05. The difference coefficients between the districts in terms of regional-educational systems, from high to low, are: student diversity (0.29), humanistic status (0.25), school facilities (0.15), education faculty (0.13), educational opportunities (0.12), educational quality (0.11), and new urbanization (0.05). (4) The comprehensive index of IVA Kaiqiu education urbanization second-level district is 0.06130, with the characteristic of leading in new urbanization and lagging in education faculty, and the extreme difference is 0.05; the comprehensive index of IVB Qizhan education urbanization second-level district is 0.05632, with the characteristic of leading in new urbanization and lagging in education faculty, and the extreme difference is 0.05; the comprehensive index of IVC Wenxi education urbanization second-level district is 0.05489, with the characteristic of leading in student diversity and lagging in education faculty, and the extreme difference is 0.04. The regional-educational system difference coefficients in order of highest to lowest are: student diversity (0.30), school facilities (0.23), humanistic status (0.14), educational quality (0.10), new urbanization (0.09), education faculty (0.06), and educational opportunities (0.06). (5) The comprehensive index of VA Ruilong education urbanization second-level district is 0.05427, with the characteristic of leading in student diversity and lagging in education faculty, and the extreme difference is 0.04; the comprehensive index of VB Luchang education urbanization second-level district is 0.05167, with the characteristic of leading in student diversity

and lagging in humanistic status, and the extreme difference is 0.04; the comprehensive index of VC Linyong education urbanization second-level district is 0.05158, with the characteristic of leading in student diversity and lagging in humanistic status, and the extreme difference is 0.03. The coefficient of regional-educational system differences among districts ranges from high to low as follows: educational opportunities (0.14), educational quality (0.13), school facilities (0.10), humanistic status (0.07), new urbanization (0.05), education faculty (0.05), and student diversity (0.03). (6) The comprehensive index of the VIA Shuiyan education urbanization second-level district is 0.04889, with the characteristic of leading student diversity and lagging education faculty, with an extreme difference of 0.05; the comprehensive index of the VIB Zhaoqiao education urbanization second-level district is 0.03799, with the characteristic of leading new urbanization and lagging education faculty, with an extreme difference of 0.02; the comprehensive index of the VIC Weizhen education urbanization second-level district is 0.03215, with the characteristic of leading humanistic status and lagging education faculty, with an extreme difference of 0.02. The coefficient of regional-educational system differences ranges from high to low as follows: new urbanization (0.45), education faculty (0.33), humanistic status (0.31), student diversity (0.28), school facilities (0.26), educational quality (0.15), and educational opportunities (0.05).

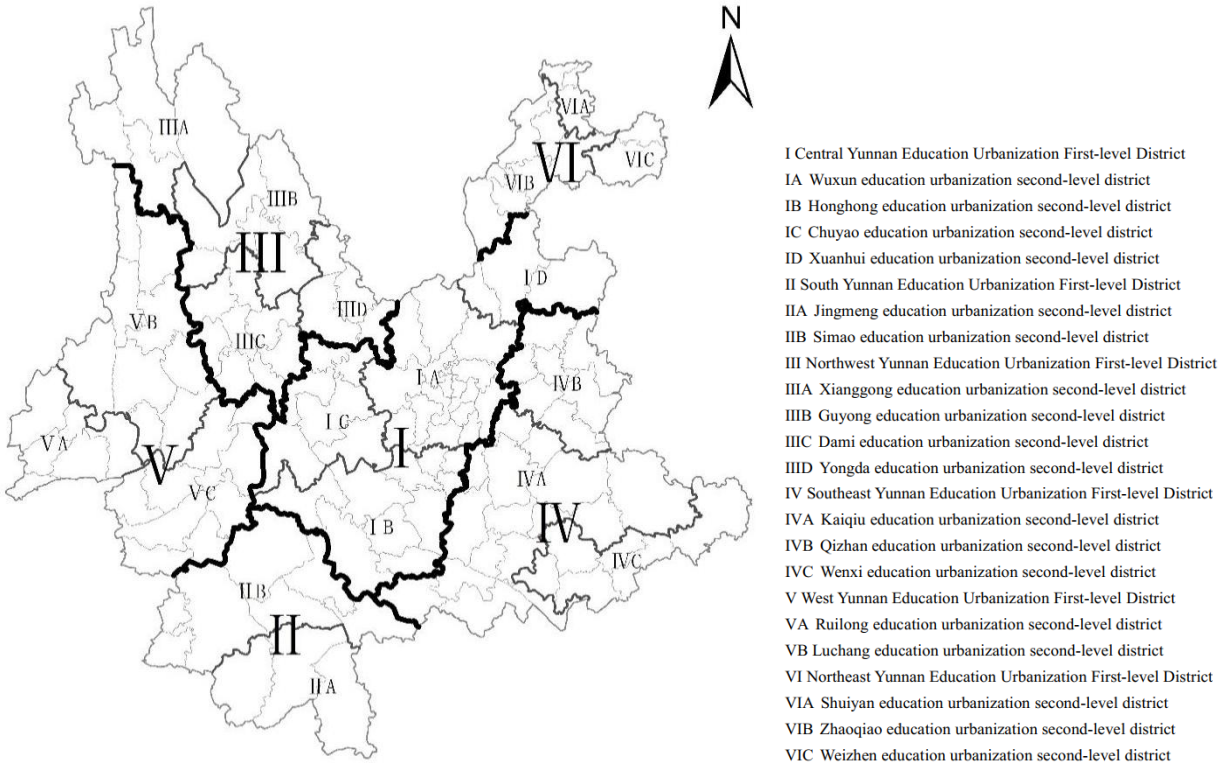

Figure 2: Yunnan compulsory education urbanization integrated district plan

In summary, firstly, the characteristics of education urbanization first-level districts and second-level districts are distinct, and there are obvious differences between each first-level district and second-level district. The higher the comprehensive index of a district, the greater the difference between its regional background and educational status, and vice versa. Secondly, at the first-level district scale of urbanization education, the new urbanization ranks first in three districts and ranks second in the remaining districts, while education faculty ranks last; the humanistic status is extremely low in districts with extremely student diversity; the key factors that cause regional-educational differences between districts are student diversity and new urbanization. Finally, at the second-level district scale of urbanization education, the differences between different zones within the same district are relatively small; the key factors that cause regional-educational differences between districts in each of the five regions are as follows: in the districts of Central Yunnan Region, the key factors are student diversity and new urbanization; in t·he districts of South Yunnan Region, the key factors are educational opportunities and humanistic status; in the districts of Northwest Yunnan Region, the key factors are student diversity and humanistic status; in the districts of Southeast Yunnan Region, the key factors are student diversity and school facilities; in the districts of West Yunnan Region, the key factors are educational opportunities and educational quality; in the districts of Northeast Yunnan Region, the key factors are new urbanization and education faculty.

5. Conclusion and Discussion

This paper takes Yunnan's compulsory education as the research object, with the new urbanization as an important basis for regional development, focusing on the core mission of education promoting population urbanization, it constructs a comprehensive evaluation index system of "regional background - education status" and based on the regional - education development comprehensive index, it applies the linear weighted model and multi-scale spatial unit regional division method, ultimately forming the Yunnan compulsory education districting scheme, dividing Yunnan into 6 compulsory education urbanization first-level districts and 19 compulsory education urbanization second-level districts,

among which the level one districts are in the order of Yunnan Central Compulsory Education District, Yunnan South Compulsory Education District, Yunnan Northwest Compulsory Education District, Yunnan Southeast Compulsory Education District, Yunnan West Compulsory Education District, Yunnan Northeast Compulsory Education District.

The regional background - education status comprehensive index is higher in the educational division with a relatively large difference between the regional system and the education system; the key factor causing the regional - educational differences among the first-level districts is the diversity of student sources and the new urbanization. The key factors that contribute to the regional-educational disparities within the same administrative level in Yunnan are: the diversity of student sources and new urbanization in the central Yunnan districts, educational opportunities and cultural status in the southern Yunnan districts, diversity of student sources and cultural status in the northwestern Yunnan districts, diversity of student sources and schooling conditions in the southeastern Yunnan districts, educational opportunities and educational quality in the western Yunnan districts, and new urbanization and educational personnel in the northeastern Yunnan districts.

The educational-urbanization districting scheme and related suggestions can provide theoretical reference for the targeted policy implementation of compulsory education in Yunnan. In practical application, it can be refined to the scale of townships, which requires further districting research. Looking ahead, the key factors that may dominate the educational-urbanization districting are likely to include: the specific impact of urbanization on rural-urban compulsory education; the contribution degree of compulsory education to vocational education, general high schools or other intermediate education; and the regional differences in the functions of compulsory education in poverty alleviation and ethnic culture inheritance.

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