Spatiotemporal Characteristics of Online Attention to Community Education: An Analysis of Baidu Index Data

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Abstract: This study employs the Baidu Index to analyze search behaviors related to community education from 2011 to 2024 using big data analysis. Based on the analysis of search trends, demand mapping, and demographic characteristics, it is found that community education has shown a continuous upward trend over time, with regional development imbalances in spatial distribution. The demand for community education is diversified, with the primary audience being women aged 20-49. In the future, community education needs to continue efforts in policy support, resource integration, and digital development to meet the growing learning needs of residents and promote the construction of a learning society.

Keywords: Community Education; Baidu Index; Lifelong Learning; Senior Universities; Data mining

1. Introduction

The widespread adoption of the internet and the massive amount of information generated daily have significantly impacted various sectors of society. According to the 55th Statistical Report on Internet Development in China released by the China Internet Network Information Center (CNNIC), as of December 31, 2024, the number of internet users in China reached 1.108 billion, with an internet penetration rate of 78.6%. Among them, the number of search engine users reached 878 million, accounting for 79.2% of the total internet users (CNNIC, 2025). Against this backdrop, internet search engines have become an essential tool for people to access information and search for resources. Baidu, as the largest Chinese search engine globally, has become the preferred and mainstream search tool for most Chinese internet users due to its powerful functionality and convenient services. Based on the analysis of massive search data, Baidu launched the Baidu Index, a big data analysis platform that visually reflects the public's attention to specific events or topics over a given period. The launch of Baidu Index has provided an extremely valuable reference for studying the online attention to different fields and events, and holds significant importance.

Community education, which connects formal and informal learning (Jajat, & Mulyono, 2018), is crucial for addressing demographic transitions and the digital divide. Essentially, community education is an educational form that closely integrates education with community life. From the perspectives of educational anthropology, educational sociology, and educational history, the earliest educational models and forms in human society were essentially a form of community education. At its broadest, Community education prides itself on process as much as content with a commonly evoked mantra being the idea of starting where the person is at. (Fitzsimons, 2017) community education sees a community as a group of people who perceive common needs and problems, have a sense of identity and a common sense of objectives (Tett, 2006). Community education is an integral part of building a modern education system that serves learning for all, and developing high-quality community education is a critical step in constructing a learning society and a learning-oriented China (The State Council of the People's Republic of China, 2018).

In China, vigorously developing community education is a foundational task in building a lifelong learning system that serves the entire population. This raises two core questions: First, what are the characteristics and facts of online attention to community education in China? Second, what factors contribute to the differences in online attention to community education? To systematically address these questions, this paper employs Baidu Index data to conduct a big data analysis and in-depth exploration.

2. Materials and Methods

Baidu Index is a data-sharing platform based on the massive behavioral data of Baidu users. It records and analyzes the frequency of keywords searched by users over a certain period, reflecting the online attention to these keywords. The data is updated daily, with PC search indices available since June 2006 and mobile indices since January 2011. Baidu Index uses standardized search volume (not absolute volume), enabling the study of keyword search trends, insights into user interests and demands, monitoring of public opinion trends, and identification of audience characteristics.

This study obtained data from the Baidu Index official website, covering the period from January 1, 2011, to December 31, 2024. Using "community education" (including bilingual matches for "community education" in Chinese and English) as the primary search term, the study selected national PC and mobile users to display statistical data from three visualized data modules: "Trend Research," "Demand Mapping," and "Audience Portrait." This allowed for the analysis of daily average search indices, demand mapping, and demographic attributes (age/gender/region) correlation strength.

3. Results and Discussion

3.1. Results

Based on the Baidu Index analysis of the spatiotemporal characteristics of online attention to "community education," the following results were observed across the three modules: Trend Research, Demand Mapping, and Audience Portrait.

3.1.1. Temporal Differences in Attention to community education

The search volume for the keyword "community education" remained relatively stable from 2011 to 2024 (Figure 1). The mobile search index showed an upward trend (Figure 2), while the PC search index gradually fell below the average after October 1, 2023 (Figure 3). In terms of time cycles, search popularity was relatively higher on weekdays and lower on weekends and holidays. Additionally, the public tended to use mobile devices for related searches.
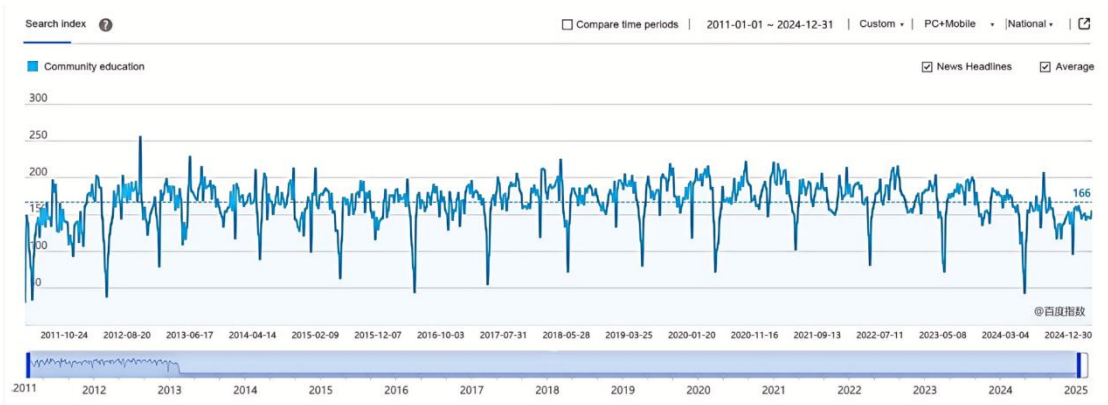
Figure 1: Trends in the Search Index for Online Attention to Community Education (PC + Mobile)
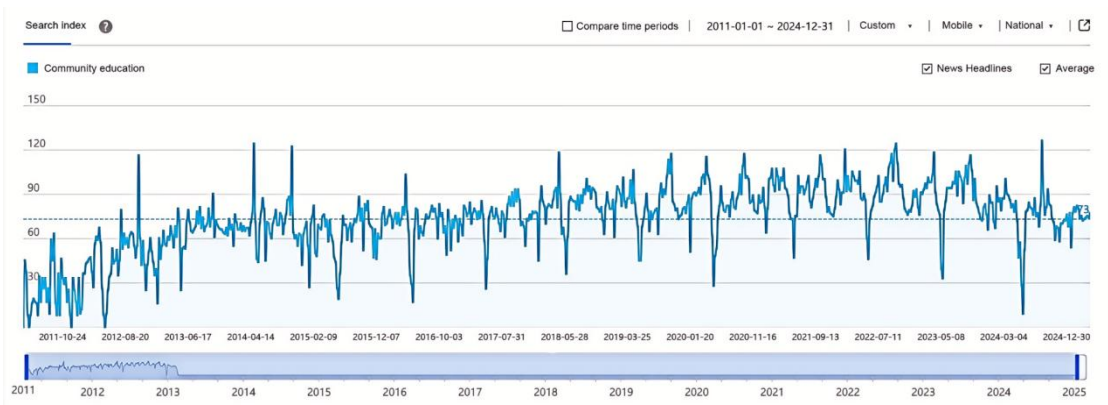

Figure 2: Trends in the Search Index for Online Attention to Community Education (Mobile)
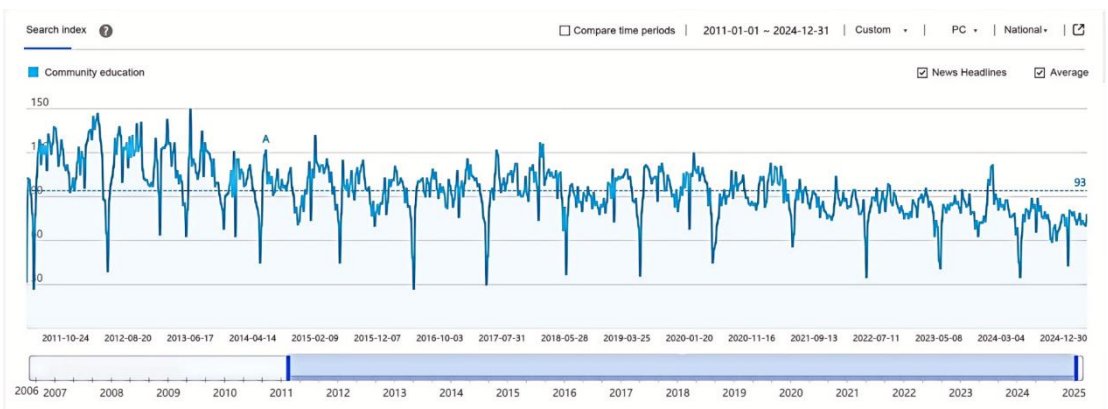

Figure 3: Trends in the Search Index for Online Attention to Community Education (PC)

3.1.2. Analysis of Demand Structure for community education

The demand map reveals that users searching for "community education" are more interested in related concepts such as "lifelong learning" and "Senior Universities". In addition to basic information like definitions and significance, they also show high attention to aspects such as course content, learning methods, and access to educational resources in community education (Table 1).

Table 1: Top 10 Analysis of Demand Types Related to Search Popularity for "Community Education"

No.	Theme	Typical Keywords
1	Lifelong Learning	Digital Library, Time Education
2	Senior Universities	Silver Economy, Health and Wellness
3	Community Education	Livelihood, Pre-employment Training
4	Open Education	Distance Education, Life Education
5	Smart Community	AI-Assisted Teaching, Personalized Recommendations
6	Community Governance	Waste Sorting, Training for Property Management Committees
7	Family Education	Parent-Child Communication, Homework Coaching
8	Resource Integration	Resource Sharing, Innovative Development
9	Continuing Education	Adult College Entrance Examination, Self-directed Learning
10	Education and Training	Education and Training Institutions, Vocational Training

3.1.3. Spatial Differences and Demographic Structure for community education

From a geographical perspective, the search popularity for "community education" is generally higher in developed eastern coastal regions (e.g., Guangdong, Jiangsu, Zhejiang) compared to central and western regions (Figures 4, 5, 6). This is related to the varying levels of development and implementation of community education across regions. Community education in eastern regions started earlier and has more abundant resources, leading to higher public attention.

In terms of age distribution, 90.54% of searches come from individuals aged 20-49, with female users accounting for 63.18% (Figure 7). The young and middle-aged population is the main driving force behind searches for "community education".
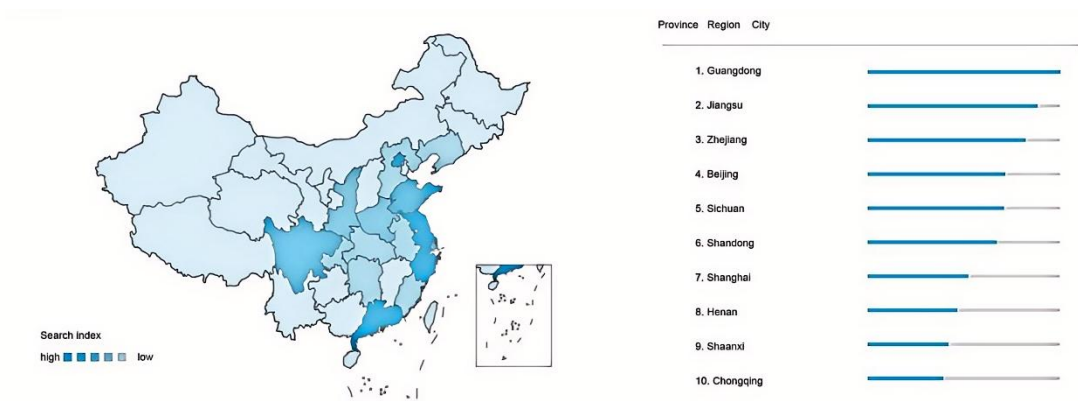
Figure 4: Provincial Distribution of the Search Index for "Community Education" (July 1, 2013 - December 31, 2024)
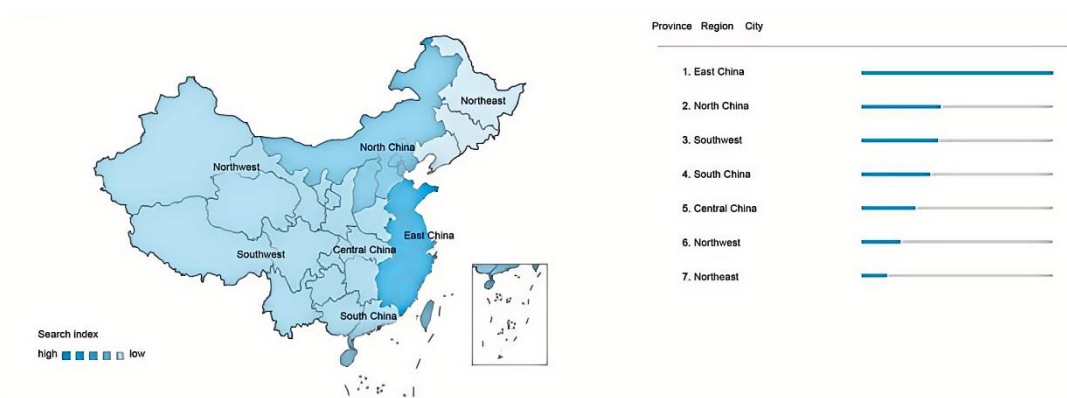

Figure 5: Regional Distribution of the Search Index for "Community Education" (July 1, 2013 - December 31, 2024)
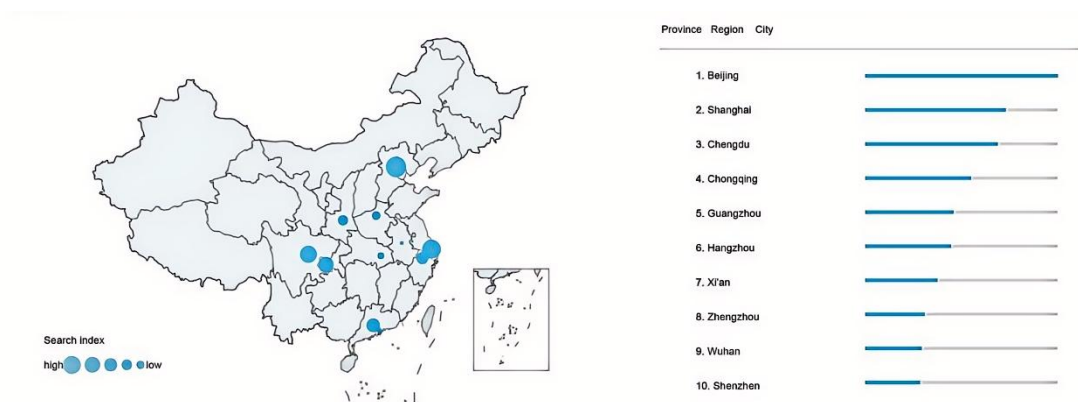

Figure 6: City Distribution of the Search Index for "Community Education" (July 1, 2013 - December 31, 2024)
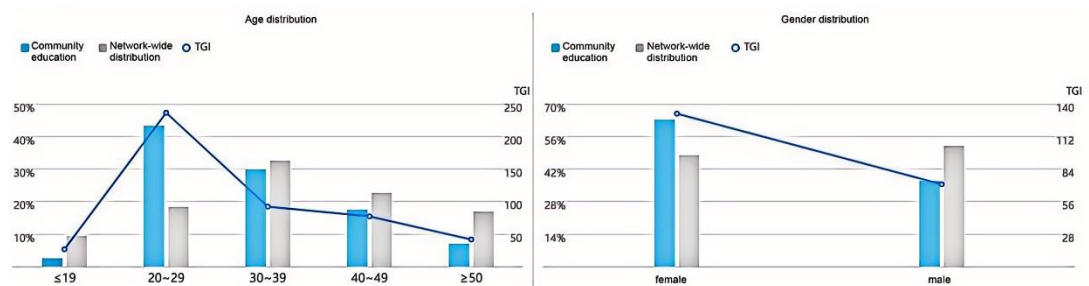
Figure 7: Demographic Distribution of "Community Education" Searches (January 1, 2015 - January 31, 2025)

3.2. Discussion

Despite the challenges posed by China's vast geography and large population in investigating the development of community education, big data analysis from Baidu Index offers new insights. The search trends indicate a steady increase in search popularity, suggesting that community education is gradually gaining more attention under the dual influence of policy promotion and societal demand. From a policy perspective, the nation's vigorous efforts to build a learning society have highlighted the growing importance of community education as a crucial platform for lifelong learning. Additionally, during specific periods, such as policy announcements or the promotion of community education activities, search popularity shows noticeable spikes. The higher search activity on weekdays compared to weekends and holidays may be attributed to people's greater focus on education-related information and resources during workdays, while leisure activities take precedence during weekends and holidays.

Changes in the demand map reflect a diversification in the content of community education needs in China, including vocational skill enhancement, cultural knowledge acquisition, health and wellness, and the cultivation of hobbies and interests. Among these, senior education has become a significant component of community education, particularly under the backdrop of active aging, where the integration of senior universities and community-based senior education has emerged as a focal point (World Health Organization, 2015). Furthermore, the widespread adoption of lifelong learning concepts has driven the development of community education, making it an essential pathway for residents to update their knowledge and enhance their capabilities (UNESCO Institute for Lifelong Learning, 2022). With the advancement of digital technologies, new educational forms such as distance learning and online education are gradually becoming prevalent in community education (OECD, 2023). Community education is increasingly integrating with school education and social education, gradually forming a diversified educational model (Hope, Casto, & LeBeau, 2024; Ji, Dou, et al., 2023).

Geographically, the development of community education exhibits regional imbalances, with widespread urban-rural disparities and issues in policy implementation efficiency (UNESCO

Institute for Lifelong Learning, 2025). In developed eastern coastal regions (e.g., the Yangtze River Delta and Pearl River Delta), interest in community education is relatively high. These areas have more mature community education systems, continuously updated policies and models, rich course content, and high resident participation rates. In central regions, the development of community education has been relatively slow but is gradually progressing. In contrast, western regions lag behind overall, possibly due to limitations in awareness and community conditions, resulting in lower participation rates. Additionally, the phenomenon of "policy valley" cannot be ruled out, where high central fiscal subsidies are not matched by adequate local funding, leading to dependency on transfer payments (OECD, 2024). Overall, China's community education has formed a gradient development pattern, with major cities like Beijing and Shanghai as the leading force, developed eastern coastal regions as the backbone, and focused development in central and western regions. A number of cities have emerged with strong development momentum and rapid progress, even achieving large-scale implementation of community education. Some regions have also seen coordinated urban-rural development, where urban areas drive rural areas in advancing community education (Liu, Y., 2010). Demographic characteristics reveal that women aged 20-49 account for a significant portion of searches, which is related to traditional Chinese culture and family role divisions. This group shows high concern for both their own career development and their children's education, and community education provides them with opportunities for self-improvement and enhancing their children's education (Leathwood, & Franci, 2006).

4. Conclusion

Baidu Index can effectively track the online behaviors and interests of Chinese internet users regarding educational topics, aiding in understanding educational development trends and public demands. Community education has shown a continuous upward trend over time, while exhibiting regional development imbalances in spatial distribution. The demand for community education is diversified, with the primary audience being women aged 20-49. In the future, community education needs to focus on the social structures and institutional contexts in which it operates, draw on policy tools for balancing educational resources across regions, and continue to strengthen efforts in policy support, resource integration, and digital development. By leveraging the radiating effect of major cities on surrounding areas and promoting urban-rural coordination, community education can meet the growing learning and health needs of residents and advance the construction of a learning society. Additionally, further validation of the reliability of internet big data in educational monitoring is necessary.

5. Research Limitations

The limitations of Baidu Index align with those of search engine-based research. Specifically, there is an issue of representational bias in big data. While Baidu Index can reflect active search behaviors, the demand for community education has significantly diverted across new platforms, leading to platform ecosystem fragmentation and blind spots in behavior capture. For example, it does not cover data from the WeChat, short video platforms like TikTok, or offline scenarios. Baidu Index may also only cover specific user groups (e.g., younger internet users), while neglecting the needs of senior populations or non-internet users, resulting in a holistic misjudgment of educational demands (Boyd, & Crawford, 2012). Furthermore, Baidu Index only

records "search actions" and cannot track subsequent behavioral conversions, creating a disconnection between search and action and missing negative experiences. Therefore, it is essential to further integrate search engine data with traditional survey data to enhance the reliability and validity of community education research (Mellon, 2013).

Funding

Reference

Boyd, D., & Crawford, K. (2012). Critical Questions for Big Data: Provocations for a Cultural, Technological, and Scholarly Phenomenon. Information, Communication & Society, 15(5), 662-679. DOI:10.1080/1369118X.2012.678878

China Internet Network Information Center. (2025). The 55th statistical report on internet development in China. Beijing: China Internet Network Information Center. Retrieved from

https://cnnic.cn/n4/2025/0117/c208-11228.html.

Fitzsimons, C. (2017). Community Education and Neoliberalism. Cham, Switzerland: Palgrave Macmillan. DOI:10.1007/978-3-319-45937-0.

Hope, G., Casto, K., & LeBeau, J. W. (2024). Leading for Educational Equity and Community Vitality: A Comprehensive School-Community Framework. School Community Journal, 34(2), 129-158. Retrieved from https://www.adi.org/journal/FW2024/CastoEtAl.pdf.

Jajat, S. A., & Mulyono, D. (2018). Community Education in Community Development. Journal Empowerment, 7(1), 25-35. DOI:10.22460/empowerment.v7i1p25-35.661.

Ji, A., Dou, Y. F., et al. (2023). Research progress on community education in China over the past two decades: A visual analysis based on CiteSpace. Statistics and Applications, 12(4), 1154-1163. DOI:10.12677/SA.2023.124118.

Leathwood, C., & Francis, B. (2006). Gender and Lifelong Learning: Critical Feminist Perspectives. London: Routledge. DOI:10.4324/9780203969533.

Liu, Y. (2010). Current status, challenges, and strategies for community education development in China. Journal of Huazhong Normal University (Humanities and Social Sciences), 49(4), 143-148. Retrieved from https://kns.cnki.net/kcms2/article/abstract?v=m17bUIR54SOd5vqMzGVM1KDdRPTBNL 1ru0a6PRAnp-_SJv0dZtaUx44rTrWnaLWS-IA8q0nBondw5zILsCyWbZWqdMH9xriEH9dEChKoY4oI1llCDrWnB3d-aSxMNmU-_nhDC1yyeKW360SollxA32YhdbQxIZgRZNXhnVx5cUg6kyOqctW7Tw==&uniplatfor m=NZKPT&language=CHS

Mellon, J. (2013). Internet Search Data and Issue Salience: The Properties of Google Trends as a Measure of Issue Salience. Journal of Elections, Public Opinion and Parties, 24(1), 45-72. DOI:10.1080/17457289.2013.846346.

OECD. (2023). Education 2030: Future of Education and Skills. Paris: OECD Publishing. Retrieved from

https://www.oecd.org/en/about/projects/future-of-education-and-skills-2030.html.

OECD. (2024). Education at a Glance 2024: OECD Indicators. Paris: OECD Publishing. Retrieved from

https://www.oecd.org/en/publications/education-at-a-glance-2024_c00cad36-en.html.

Tett, L. (2006). Community education, lifelong learning and social inclusion(2nd Edn.). Edinburgh: Dunedin Academic Press. DOI:10.26203/w36b-gp62.

The State Council of the People's Republic of China. (2018). China Education Modernization 2035. Beijing: The State Council of the People's Republic of China. Retrieved from

https://www.gov.cn/xinwen/2019-02/23/content_5367987.htm.

UNESCO Institute for Lifelong Learning. (2022). Making lifelong learning a reality: A handbook. Hamburg: UNESCO Institute for Lifelong Learning. Retrieved from

https://unesdoc.unesco.org/ark:/48223/pf0000381857.

UNESCO Institute for Lifelong Learning. (2025). Sixth Global Report on Adult Learning and Education (GRALE 6). Hamburg: UNESCO Institute for Lifelong Learning. Retrieved from

https://unesdoc.unesco.org/ark:/48223/pf0000391600.

World Health Organization. (2015). World report on ageing and health. Geneva: World Health Organization. Retrieved from

https://www.who.int/publications/i/item/9789241565042