

Analysis and Sustainable Development of New Campus-Social Sustainability in the Case of Pingyi New High School Campus in China

Lin Zhou

China Luncheng Architecture Design (Shanghai) SDN BHD, Shanghai, 200092, China

Keywords: Featured campus; constructive; architectural scheme; plan and design

Abstract: The evolution of educational paradigms in China has led to a growing emphasis on the design and functionality of academic institutions, imbuing campuses with exacting standards. This includes orchestration of campus architecture, spatial allocation, and various elements such as spatial choreography and functional stratagem. Architects have deftly harmonized pedagogical values, cultural influences, and future aspirations, exemplified by Shandong's Pingyi high school campus. This discourse highlights the ebullience of design ideas and their realization, with the overall aim of enlightening similar projects. In summary, the orchestration of campus planning involves a fusion of numerous elements, with the design ethos galvanizing the creation of academic spaces aligned with contemporary education and cultural nuances, as seen in Shandong's Pingyi campus

1. Introduction

In the realm of national academia and education, amid the expansive educational landscape, the nurturing of intellectual acumen among primary and secondary school students garners escalating attention from pertinent authorities and the majority of parents. As China's educational objectives have transitioned from a singular focus on academic attainment to the holistic enhancement of students' comprehensive capabilities, the requisites for the educational milieu have burgeoned. Alongside this transformation, it is discernible that the educational locus extends beyond pedagogy, encompassing the architectural schema, the pedagogic force of the faculty, campus infrastructure, environmental aesthetics, and architectural tenor, all of which amalgamate to orchestrate the ambiance of the scholastic precinct.

Amid the endeavor of conceiving a novel high school campus, the bedrock upon which the edifice of design rests is none other than the design philosophy. This principled underpinning engulfs a multitude of facets:

Humanistic Eminence: The design ethos gravitates towards the student, casting a habitat conducive to their intellectual maturation and academic progression. Through judicious spatial arrangements and amenities, the aspiration is to evoke an organic zeal for learning.^[1]

Multifaceted Fusion of Functions: In consonance with the evolving paradigms of education, the campus metamorphoses into an arena not only for instruction but also for socialization, innovation, athletics, and other manifold endeavors. The spatial blueprint seamlessly interlaces distinct

functional domains, thereby facilitating a milieu that catalyzes holistic growth.

Cultural Amalgamation and Enrichment: By embarking on a cultural odyssey that reflects the university's unique identity, an ambiance resonant with authenticity is forged, fostering a deep sense of affinity and allegiance among students.

Sustainability as Leitmotif: Through the conduit of green edifices and energy-efficient infrastructure, a sanctuary of environmental stewardship is cultivated, offering students a harmonious sanctuary for erudition.^[2]

Frontiers of Innovation: The blueprint incorporates the contours of modern pedagogy, with progressively flexible classrooms enhanced by multimedia equipment, driving the adoption of pioneering teaching methods.

Efficacious augmentation of scholastic amenities and the optimization of the campus milieu form an integral fragment of campus delineation and architectural conception. This exposition chiefly centers upon the recent high school campus initiative in Pingyi, Shandong Province, as a vantage point for probing campus schematics and architectural aesthetics. Through this exploration, we aspire to furnish a reservoir of insights that may illuminate the trajectory of future endeavors.

2. Synopsis of the Undertaking

The new high school campus project is located in the southeast of Pingyi County, Linyi City, Shandong Province. It is bordered by Chaoyang Road (40M wide) in the north, Yinhua Road (40M wide) in the south with a 20M urban green belt, Xiangshan Road (40M wide) in the west and Baoding Road (20M wide) in the east. It is adjacent to the Pingyi Experimental Primary School in the east, the existing park green space with wide view in the west, and the Pingyi County Public Security Bureau in the south. The urban roads around the site have been built, and the interior of the site is open space with few existing buildings, relatively flat in the east and west, and the terrain is high in the south and low in the north, with a maximum height difference of nearly 10 meters. As shown in Figure 1.



Figure 1: Schematic diagram of the project site

The total site area of the project is about 20.8 hectares, contract 311.7 acres. The project base is about 220 meters wide from east to west and 940 meters deep from north to south. The site is long and narrow, which brings certain limitations and challenges to the planning and design of the whole project. According to the campus construction plan, the campus needs to accommodate about 4,500 people, with 140 classrooms (90 classes), about 600 dormitories with 6-8 rooms (4,000 people need

to be accommodated), a public cafeteria to cater for 4,000 people at the same time, a 1,600-person auditorium, a gymnasium, and a life service building, with a total floor area of up to 120,000 square meters. The total floor area is not more than 120,000 square meters.

3. Design Concept and Objectives

Before the construction of the project, the need to do a good job of the overall planning and design of the campus, and clear its design concept and planning and design objectives are the basic requirements.

3.1 Planning concept

3.1.1 Rigid and flexible learning and living integration campus pattern

Combining the topography of the base and the west side of the mountain, it shapes the interweaving pattern of rigid ceremonial axis space and flexible living corridor space, thus creating a full-time, multi-dimensional nurturing environment that combines classroom instructional learning and after-school spontaneous learning.

3.1.2 Ecological open space system permeated by mountains and water

On the basis of the west side of the original mountain, we can properly introduce landscape water system, establish a landscape space network that can penetrate into the surrounding natural environment, create a vibrant campus open space, guide the weaving of campus ecological landscape and learning life, and create a campus suitable for education, study and life. ^[3]

3.1.3 Traffic Organization for Separating People and Vehicles

Schools should reasonably organize campus traffic, make reasonable use of poor terrain, and establish three-dimensional traffic flow lines for people and vehicles to ensure the continuity and safety of walking space on campus.

3.1.4 Cultural campus reflecting humanities

The combination of college atmosphere, academy spirit and architectural function, the three-dimensional space compound and the organic combination of teaching, learning, living and sports functions, the formation of multi-level innovative college-style campus space, reflecting the characteristic humanistic flavor and campus spirit.

3.1.5 Green campus building with ecological technology integration

We should start from the teaching needs of middle schools, focus on the local climatic conditions and ecological environmental characteristics, the use of sloped roofs, wind and rain corridors, three-dimensional greening, passive shading components and other low-cost green technologies, combined with the valley terrain to create an overhead to use space, maximise resource saving, to provide healthy, applicable and efficient green campus buildings. This is living in harmony with nature.

3.2 Planning Objectives

Through the overall planning and environmental design of the campus environment, to promote

the formation of a culture-oriented, learning-oriented and garden-oriented campus environment atmosphere.

Cultural Campus: While cultivating cultural talents for the country, the new high school, combined with the overall cultural atmosphere of the school, focuses on inculcating and shaping the outlook on life and values of the children in this age group, and cultivates talents with good quality and social responsibility for the country.

Garden Campus: The planning and design should be combined with the overall layout, make full use of the existing terrain, combine students' learning and living space with the environment, create a school environment with a sense of life, and the planning scale is appropriate, the environment is beautiful, emphasising the integrity and multi-level of the campus, so that the campus becomes an organic garden-style campus.

4. layout plan

In the context of the layout planning and design of the new high school campus project in Pingyi, Shandong, attention should be paid to combining the actual situation of the project site as well as the campus planning and design concepts and objectives. The design should be combined with the characteristics of the local reasonable design of the building structure, in-depth student groups, to understand the living habits of students, to meet the actual needs of students.^[4]

4.1 Overall Layout Design

Due to the long and narrow shape of the project site, how to effectively and rationally utilize the limited topographic area conditions for scientific campus layout is the greater challenge of this project. As shown in Figure 2.



Figure 2: Schematic diagram of the overall layout design of the project

According to the topographic conditions of the project, the overall layout of the project is arranged in a strip shape. In the north side of Chaoyang Road, the main road is designed as the main gate of the campus. Considering that the campus is about 900 meters long in the north and south, it is inconvenient for teachers and students to enter and exit the campus daily, and the secondary gate and other entrances and exits are designed in the middle of the campus on Yinhua Road in the south

and Xiangshan Road in the west, which provide convenience for entering and exiting the campus. The main gate on the north side of the entrance for the comprehensive building, behind the two sides of the four teaching buildings, teaching buildings in the middle of the design of the artificial lake, for students to relax after school to provide visual enjoyment. The artificial lake is designed in the shape of a dragon, which has the good meaning of hoping for a dragon and soaring to the sky. Further back are the auditorium, cafeteria area, sports field and dormitory area.

The overall planning and design of the project is fully integrated with the project planning and design concepts and objectives, adapted to local conditions, and fully designed in a novel and unique way. The scale between different buildings is open and the location is moderate. The vertical axis is blurred and permeated, up to 900 metres, and the layout is relatively orderly. The design of the artificial lake makes the overall pattern of the campus austere but lively. The teaching buildings are situated along the water and the surroundings are beautiful.

4.2 Functional Layout Design

In accordance with the overall functional needs of the campus, the school planning was designed with a comprehensive office area, teaching area, living area, sports and recreation area, dormitory area, several major areas are arranged sequentially from north to south, as shown in the following figure.

The library building is facing the main entrance of the campus, showing the external image of the campus. The teaching building is flanked on both sides by the laboratory building, the library complex, the student cafeteria and the auditorium, fully reflecting the teaching-centered and student-centered design concept. The campus sports ground and dormitory building are designed at the south end of the campus, which makes the teaching activities, sports exercise and living accommodation area levels obvious. As shown in Figure 3.

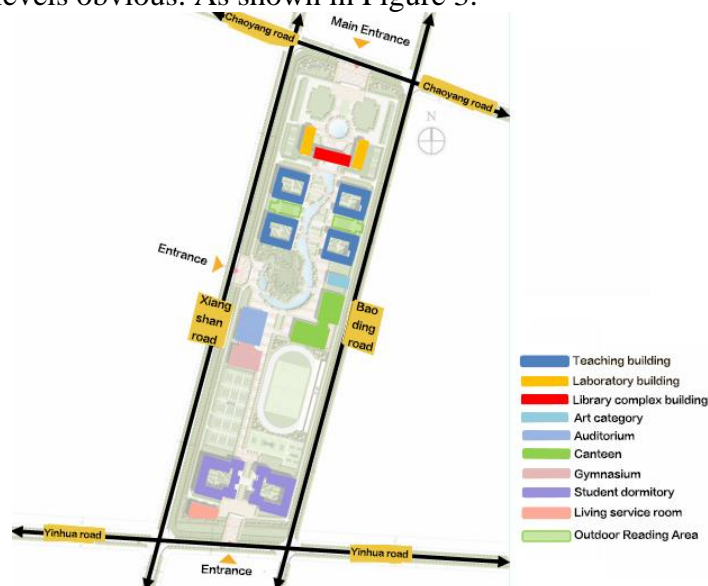


Figure 3: Schematic diagram of the functional layout design of the project

By rationally dividing the functional groups, a comprehensive campus with clear structure, clear groups and interconnections is formed. The school should strengthen the functional layout of the campus so that each area can be organically connected and relatively independent. As far as possible, the campus can meet the needs of daily office, study and recreation, and create a good campus environment.^[5]

4.3 Transportation Layout Design

Flow line usually refers to a comprehensive environment, for all kinds of people, vehicles and other distribution activities to produce a certain flow process and flow route [3]. For the school, its traffic flow design is also particularly important, reasonable traffic flow design is not only related to the campus teachers and students safety, but also affects the efficiency of school teaching. Ensuring the independence and efficiency of each flow line is an important part of the design of this project.

According to the campus layout design and traffic environment needs, it is necessary to analyze the vehicle flow line and pedestrian flow line for scientific and reasonable layout. At the beginning of the design, the layout design of the campus was first studied and analyzed. Vehicle flow design mainly considers the traffic flow of travel, office and public activities, in order to provide a better basis for planning and designing an independent vehicular system. Pedestrian flow analysis mainly considers path analysis, in order to better design pedestrian access, improve the utilization of space inside the campus, reduce the traffic pressure on the campus, and maximize efficiency. As shown in Figure 4.

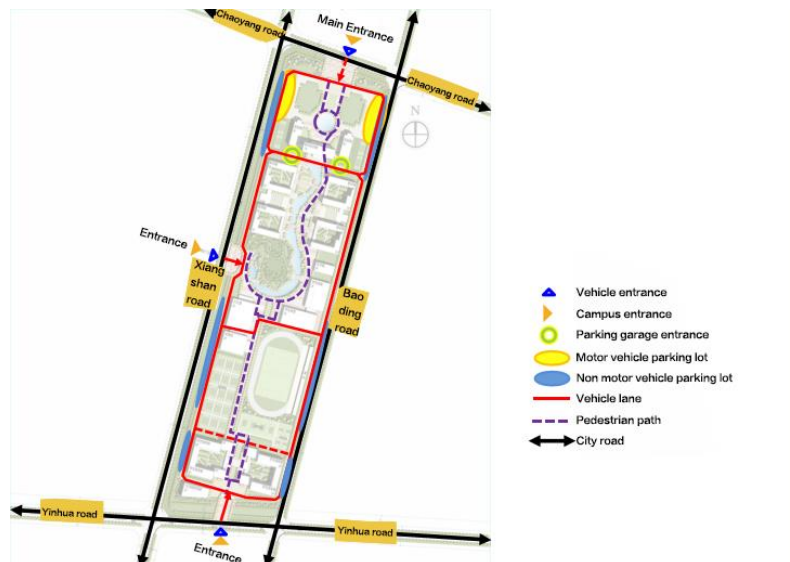


Figure 4: Schematic diagram of the project's transportation layout design

In the traffic layout design of the project, in order to differentiate between vehicular and pedestrian traffic, the vehicular routes are designed on the periphery of the campus and locally connected. The pedestrian flow routes are mainly in the interior, and the routes are designed according to the daily learning and living activities of the teachers and students of the school. The overall traffic layout design better realizes the separation of pedestrian and vehicular traffic, and effectively guarantees the continuity and safety of the walking space inside the campus.

5. Architectural Design

5.1 Architectural Style Design

When carrying out the design of the campus architectural style, the project fully draws on the essence of the English classical style of famous western schools such as Harvard, Oxford and Columbia. While analyzing the characteristics of classical western famous school architectural style, the overall style of the campus is designed through the details of color, landscape and architectural details, which effectively enhances the unique image of the school, highlights the traditional cultural temperament and essence and the characteristics of western classical mathematics, science

and aesthetics, and renders the visual enjoyment as if it were in the institution of higher learning. As shown in Figure 5.



Figure 5: Campus architectural style design effect diagram

5.2 Color design

The color design of the campus building is mainly red and white. Through the visual collision of red and white, matching the college English classical style color tendency, laying down the style attributes. The overall dark color system style building, help highlight the campus quiet and elegant campus cultural environment, for students carefully go dry for cultural learning has a certain role in promoting. At the same time, in terms of details, we can use the proportion and decorative stability of the building to highlight the sense of order on campus. On the whole, it effectively accentuates the college atmosphere and humanistic flavor of the campus.

5.3 Landscape design

In the project campus design program, also includes environmental design, which is an important design content to create ecological and technological integration of green campus buildings. Environmental design, mainly refers to the campus buildings around the environment for scientific planning and design, more suitable for the requirements of students' learning and living, but also cater to the current theme of green development. And how to carry out vegetation greening design is extremely critical.

In order to create a good campus environment, we should combine the local characteristics of the project and the health needs of students, mainly in the campus buildings around the greening, tree planting, shrubs, etc., through reasonable plant configuration, to build a three-dimensional green campus, create a good campus ecology and pleasant ecological environment. In terms of methods, the main point or juxtaposed arrangement, set up water features and other small landscapes in the center, focusing on the overall campus perception, set up corresponding open spaces, such as public green space, etc., to build a natural and easy communication atmosphere, highlighting the effectiveness of teacher-student communication in schools.

6. Conclusion

This paper discusses the design of the modern campus and its internal buildings, adopts appropriate design concepts, comprehensively considers the multiple needs of the campus teachers

and students, integrates humanistic and ecological concepts, and takes the overall planning as the starting point to analyse the overall layout of the campus, the organisation of traffic flow, the design of the campus style, etc. When planning and designing this kind of modern campus with integrated characteristics, it is necessary to closely follow its basic functions and consider the design scheme from multiple angles under the guidance of human-oriented planning concepts, in order to improve the level of modern campus design in all aspects.

References

- [1] Cibulka, J. G. (1994). *Policy analysis and the study of the politics of education*. *Journal of Education Policy*, 9(5), 105–125.
- [2] Edin, M. (2003). *State capacity and local agent control in China: CCP cadre management from a township perspective*. *The China Quarterly*, 173, 35–52.
- [3] Ferreira, J. (2009). *Unsettling orthodoxies: Education for the environment/for sustainability*. *Environmental Education Research*, 15(5), 607–620.
- [4] Lin Zhou.(2023) *Sustainable Development and Architectural Design of Featured Campus-in the Case of Wangcheng No. 2 Middle School in Jiangxi[J]*. *Journal of Civil Engineering and Urban Planning*, 5(9), 16-22.
- [5] Zu, X-Y. (2006). *Using the concept of sustainable development education as guideline to improve the quality of education – the development and practices of school-based curriculum*. *Sustainable Development Education in China*, 25(5), 40–43.