

Subject, Relationship, Temporality: The Social Dimension of Future School Spaces — A Case Study of the “New School Initiative”

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Abstract—Facing the update and development of future school space under the background of education reform, combined with the cases of 10 primary and secondary schools in the “New Campus Action Plan” in Shenzhen, China, the connotation and characteristics of the social attributes of primary and secondary school spaces are analyzed, and innovative methods in campus space creation are discussed, thinking about the social attributes of future campus space from the three dimensions of “subject, relationship, and timing”. The design strategies are proposed for the intensive practices of spatial ontology, the adaptive expression of spatial carriers, the fuzzy creation of spatial interface, exploring the shared nature of spatial boundaries, and the diachrony and synchronicity of space.

Keywords—social space, new school initiative, subject, relationship, temporality

I. BACKGROUND

In the process of pursuing high-quality development, China has sparked a fervor for digital transformation in education. The increasingly abundant educational digital application scenarios have inhibited the occurrence and continuation of social behaviors of primary and secondary school students to a certain extent, and have had an adverse impact on their social personality cultivation. Education is not only about “Imparting knowledge” but also about “Educating people”. In the future, schools will shoulder the important task of cultivating the next generation of successors with healthy bodies and minds and sound personalities. Primary and secondary school spaces are the primary venues where the social behavior of children occurs. As illustrated in Fig. 1, from the “Education 1.0” era when Confucius taught under a tree, to the “Education 2.0” era of old-style private schools and official schools in feudal society, and then to the “Education 3.0” era of classroom-based instruction in industrial society, the birth and evolution of space have been influenced by social productivity and production relations. In the context of the digital transformation of school education, the curtain has been lifted on the “Education 4.0” era [1]. The exploration of future school spaces has become a subject that educators and architects must address collectively.

Danish scholar Jan Gehl, in “Life Between Buildings”, defines social activities as various activities in public spaces that depend on the participation of others [2]. Social activities of primary and secondary school students include playing, greeting, conversing, cooperating, and observing. The spatial attributes that facilitate these behaviors are termed as “social

attributes”. As illustrated in Fig. 2, this paper considers the social attributes of future school spaces from three dimensions: “subject, relationship, and temporality”. It aims to provide theoretical foundations and design guidelines for the research and construction of future school spaces.

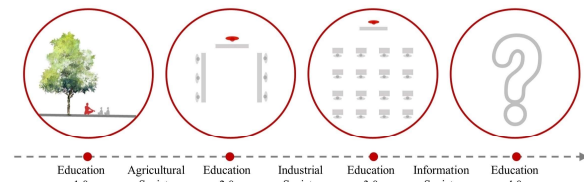


Fig. 1. The transformation of school space.

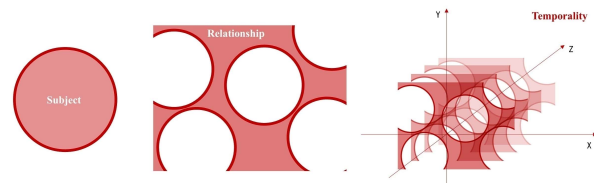







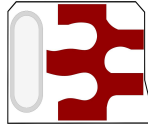


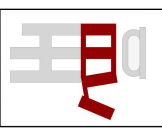
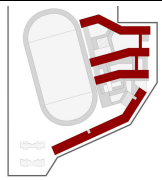
Fig. 2. Subject, relationship and temporality.

II. CASE SAMPLE

The “New School Initiative” originated in Shenzhen, China, initially to alleviate the shortage of school slots caused by rapid population growth. Through collaborative efforts between urban management departments, planning approval departments and architects, the initiative became a model for primary and secondary school construction in Shenzhen and even the whole nation, providing valuable insights for research and discussion. The “New School Initiative” consists of three parts: the “Prelude to the New School Initiative” – where Hongling Experimental Primary School, Meili Primary School and Shixia Primary School initiated the reconsideration of new campus construction; the “8+1 Architectural Exhibition” – an innovative design management system that coordinated the implementation of eight primary and secondary school projects and one kindergarten project; “Off-site Relocation” – as a transitional strategy, utilizing vacant urban land or green spaces for temporary relocation of schools like Meili Primary School, Shixia Primary School and Xinsha Primary School [3]. Excluding the renovation and expansion of the sports stadium in Hongling Middle School, a total of 10 primary and secondary school projects have been implemented within the plan as presented in Table 1. These projects feature avant-garde design concepts, bold management innovations and

have emerged in a short period. They have met the criteria for researching the social attributes of future school spaces.

Table 1. Information statistics on the implementation of the “New School Initiative” in primary and secondary schools

No.	Layout	Name	Volume rate	Number of classes
1		Hongling Experimental Primary School	3.5	36
2		Meili Primary School	3.0	36
3		Shixia Primary School	3.4	36
4		Xinsha Primary School	3.4	36
5		Xinzhou Primary School	3.7	36
6		Jinglong Primary School	3.4	36
7		Renmin Primary School	2.2	36
8		Hongling Middle School Yuanling Campus	2.3	60
9		Hongling Middle School Shixia Campus	1.9	60
10		Futian Middle School	2.4	60

III. SUBJECT AND MEDIUM: THE SUBJECTIVE DIMENSION OF SPATIAL SOCIAL ATTRIBUTES

The subjective dimension focuses on the inhibiting or promoting effect of space itself on social activities. As a place where social activities take place, the social attributes of space indirectly affect the starting point, intensity and quality of social interaction between students. On one hand, from the perspective of ontology, the focus is on the ‘being’ of

space—that is, space is physical and real, and its intrinsic attributes, such as color, scale, and form, affect social activities. On the other hand, from the viewpoint of spatial behavior, space serves as a medium for behavior, influencing the occurrence and sustainability of actions to a certain extent. Compared to the subject of space, the medium focuses on the functionality and usage of space.

A. Intensive Practices of Spatial Ontology

Among the 10 primary and secondary schools in the “New School Initiative,” the volume rate of the smallest, Hongling Middle School Shixia Campus, is 1.9. At the same time, the largest, Xinzhou Primary School, has a volume ratio of 3.65. The tension over land for school construction is a common issue faced by major cities nationwide. Efficient and effective spatial integration has become a hot topic. The intensive design of spatial ontology has emerged as a viable strategy. Shortening the distance of target spaces and improving spatial accessibility are effective ways to encourage students to participate in social activities. In the “New School Initiative”, as illustrated in Fig. 3, the design techniques include overhead, overlapping and sinking.

Activity spaces are the main venues where social activities occur within the campus. As illustrated in Fig. 4, Renmin Primary School preserved the internal “small forest” by elevating the teaching building and setting up a sports track. This natural activity space attracts students for exploration and communication. As illustrated in Fig. 5, Hongling Experimental Primary School has created a multi-level vertical campus through intensive vertical strategies. Teaching units, cultural and sports facilities, and auxiliary spaces are stacked together to reserve as much activity space for students as possible. Students of all grades spontaneously gather in the atrium, and being close to various activities makes them naturally want to join in.

B. Adaptive Expression of Spatial Carriers

Space serves as the carrier for behavior. With the maturation of teaching systems such as “class rotation” and “elective courses”, the social needs of future school teaching units are becoming increasingly diverse. The adaptive design of spatial carriers accommodates social activities that are rich in changes and diverse needs. For example, spaces can be adapted for different social activity scenarios through the opening and closing of movable partitions and furniture arrangements. This enhances the openness and shareability of public spaces like corridors, encouraging communication, cooperation and mutual assistance behaviors.

As illustrated in Fig. 6, Hongling Experimental Primary School combined and split classes by installing flexible partitions at the central connecting point. Hexagonal layouts offer greater flexibility than traditional rectangular ones, accommodating various arrangements of desks and chairs, thereby supporting group-based and collaborative learning and discussions. As illustrated in Fig. 7, The walls and floors of teaching units create rhythmically rich activity spaces with free curves on the inner courtyard side, providing spaces for students to communicate and rest during breaks. As illustrated in Fig. 8, Xinha Primary School features scattered and twisted teaching units; the directions and spacing of the walls are in a random state. The spaces in between form a free and open activity area, serving as spatial carriers for

games and conversations. Both schools have broken the monotony of traditional linear corridor spaces. By increasing the spatial scale and incorporating spatial elements, corridors have transformed from solely transport spaces into flexible and open social spaces.

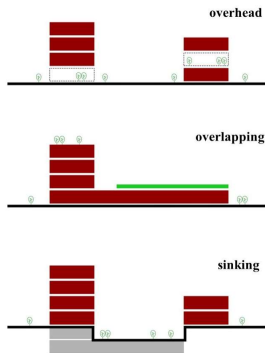


Fig. 3. Vertical campus design techniques.

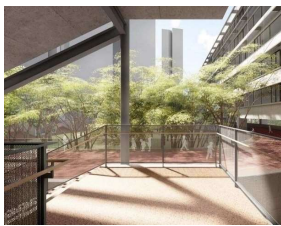


Fig. 4. Overhead buildings and runways.



Fig. 5. Vertical campus.

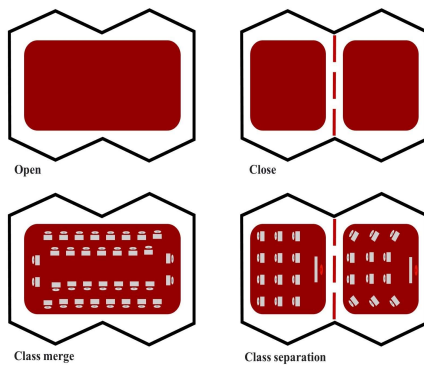


Fig. 6. Combination and division of teaching units.

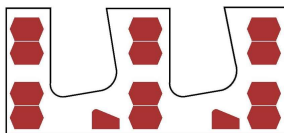


Fig. 7. Activity space and the teaching unit.

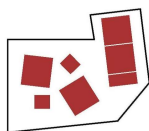


Fig. 8. The open activity space.

IV. INTERFACE AND BOUNDARY: THE RELATIONAL DIMENSION OF SPATIAL SOCIAL ATTRIBUTES

The relational dimension focuses on the combination and connection between different spatial subjects, specifically in terms of their expression at the level of spatial social attributes. On one hand, the spatial interface acts as a medium that separates one space from another while maintaining a certain degree of permeability. The design of the interface needs to focus on aspects such as its scale, material and methods of partitioning. On the other hand, the spatial boundary discusses the functional aspect of different spaces. It emphasizes the sharing and combination of various functional attributes between spaces.

A. The Fuzzy Creation of Spatial Interface

Spatial interfaces focus on the openness and closure of spaces, the penetration and obstruction of sightlines and the continuity and separation of flow lines. To adapt to more open and liberal educational philosophies, the campus spatial interfaces are transitioning from “hard interfaces”, primarily constituted of walls, to “soft interfaces” made up of glass partitions and furniture facilities. This brings a sense of permeability between different spatial functionalities and a certain fuzzification to the spatial interface. The fuzzy spatial interface brings a semi-private space to the campus, offering students a sense of domain and belonging and providing opportunities for intersections of sight and verbal communication, thereby encouraging social activity.

The architecture firm One Eleven proposed a design strategy of “no boxes, only activity spaces” for the Xinsha Primary School project. As illustrated in Fig. 9, The design uses dual-sided corridors and balconies. One advantage of this design is that classroom windowsills can break the minimum 90 cm height limitation, allowing students seated in their chairs to appreciate the scenery outside through a 50 cm high windowsill. This creates interaction with activities happening outside, naturally eliciting the desire to participate in those activities. In the design for the Hongling Middle School Yuanling campus, another strategy for blurred interfaces was implemented. As illustrated in Fig. 10, a multi-level rain shelter system is implanted between the floating playground and the teaching building. Students from different floors of the teaching building can directly reach the playground, mitigating the resistance and inconvenience that differences in elevation might bring. When spaces are easily accessible, activities are more likely to occur.

B. Exploring the Shared Nature of Spatial Boundaries

As a public resource in society, schools open their spaces and rooms to the society. Currently, there are problems in campus safety, operation management and division of responsibilities, making it difficult to advance. The “New School Initiative” clearly proposes design principles and initiatives aimed at “promoting campus autonomy, openness, and sharing” [4]. Although the architects’ attempts to implement community sharing in spatial design are yet to be validated by society and time, the opportunity exists with the challenges. Sharing campus spaces with the community offers students opportunities for social development. Students can develop the skills needed for social integration only by learning and practicing in society.

The Xinzhou Primary School has elevated its street-level spaces, making it possible to share areas such as sports fields, auditoriums, and music rooms with the community. Currently, due to safety regulations, the campus is still enclosed by a wall. However, a portion of the elevated space outside the wall is used as a waiting area for parents picking up and dropping off their children, as illustrated in Fig. 11. This small pick-up and drop-off space catalyzes student interaction with the community. The design of Xinsha Primary School attempts to achieve sharing between the campus and the community through the processing of spatial form. The building features a continuous arcade along the street, sharing what was originally school property with the community, which greatly improved urban space. The school received special approval from the planning department for this, allowing for a “zero setback along the big platform street, with a 3m setback for the exterior wall” (the original setback was 6m), as illustrated in Fig. 12. This is an innovative attempt requiring both bold creativity from the designers and an unconventional approach from the approval departments.



Fig. 9. “No boxes, only activity spaces”.

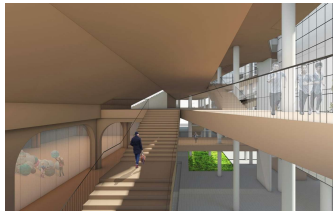


Fig. 10. The multi-level rain shelter system.



Fig. 11. Parent pick-up and drop-off space.



Fig. 12. Arcade design.

V. DIACHRONIC AND SYNCHRONIC: THE TEMPORAL DIMENSION OF SOCIAL PROPERTIES IN SPACE

In the individual development model of social ecology theory, the Chronosystem represents the development and changes that an individual undergoes over time. The

temporal dimension adds a layer of time to the existing dimensions of spatial subject and spatial relationships, elevating the concept of “space” to a four-dimensional “space-time”. Borrowing the concepts of “diachronic” and “synchronic” from Swiss scholar Ferdinand de Saussure’s systemic approach to linguistics [5], this addresses the temporal dimensions of social properties in campus spaces. Spatial diachrony refers to the changes in campus space over a period of time, that is, how the space gradually develops and evolves, focusing on the factors that affect spatial changes; spatial synchronicity refers to the characteristics and status of campus space at a specific moment, for Attention to synchronicity can help understand the rationality of spatial configuration [6].

A. Diachronic Representation in Space — “Relocation Strategy”

Primary and secondary school students are in a period of rapid growth, and psychological changes are easily affected by the environment. During the renovation and expansion of primary and secondary schools, attention should be paid to students’ psychological problems. Besides the changes in form, function, and layout, campus space also exhibits a clear diachronic nature: past spaces become memories, present spaces carry the current moment and future spaces are filled with anticipation. Given the frequent educational reforms happening today, spatial planning should be coordinated with the future development and renovation plans of the campus, considering diachronic elements as a design strategy for campus spaces.

In addition, the renovation and expansion of the campus also faces a problem that how to carry out the school’s daily activities during construction, especially when construction land is scarce. Construction noise and safety risks further exacerbate the problem. The “relocation” strategy in the “New School Initiative” proposes innovative solutions, using idle urban land or green spaces to provide high-quality transitional school buildings to meet students’ basic social activity needs and reduce the impact on students’ daily behaviors. In the “New School Initiative”, Meili Primary School, Shixia Primary School and Xinsha Primary School used the “moving school buildings” strategy during the construction phase. As illustrated in Fig. 13, Professor Zhu Jingxiang’s team used a modular spatial design approach in Mei Li Primary School. The insertion of spatial modules allows students to more directly feel the “growth” of the campus, thereby enhancing their sense of belonging to the school.

B. Synchronic Features in Space

If diachronic elements represent the development and evolution of campus spaces over their entire lifecycle, synchronic features emphasize the intrinsic relationships displayed by these spaces at a specific moment in time. The social activities of primary and secondary school students have an instantaneous quality, usually occurring during breaks or free periods. Before deciding to participate in any given activity, students tend to observe the situation first and then make a choice. Enhancing the interconnectivity and visual permeability between different spaces is the most effective way to encourage student interaction. While the previously mentioned section on the ambiguity of spatial

boundaries already addresses this, the design and creation of themed activity spaces also effectively enhance spatial synchronicity.



Fig. 13. Mei Li Primary School.



Fig. 14. Landscape-themed park.



Fig. 15. Landscape-themed park.



Fig. 16. Landscape-themed park.

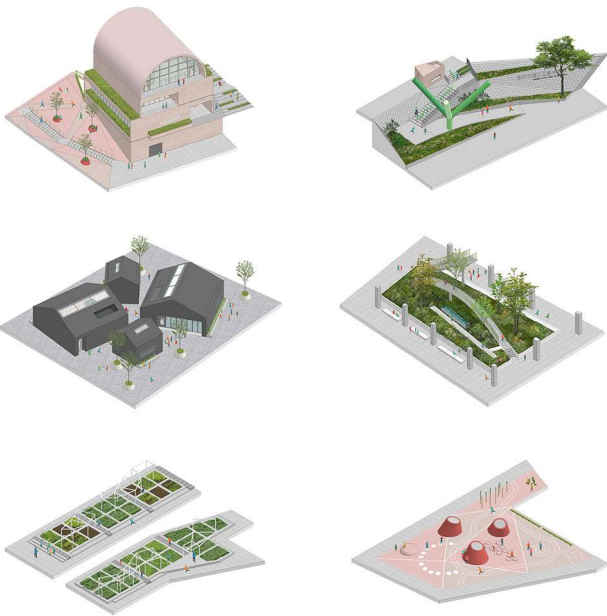


Fig. 17. Playgrounds throughout campus.

As illustrated in Figs. 14–16, Hongling Experimental Primary School built a landscape-themed park on the ground level, connected by gentle slopes and steps. Students flock to this undulating park during free periods, interacting, moving,

and playing in open-air stair theaters, small gardens, and basketball courts. The sight of children joyfully participating in activities was a goal set by “11 Architecture” in their Xin Sha Primary School project. By considering child-friendly spatial dimensions and forms, the designers offer a theme-park-like spatial experience. On the campus of Xinsha Primary School, there are more than one themed playgrounds such as floating bridges, alleys, green forests, triangular hills, entrance mountain roads, dome castles, and rooftop farms, which greatly stimulate children’s desire to explore (Fig. 17).

VI. CONCLUSION

Regarding the issue of the social attributes of future school space, the 10 primary and secondary school cases in the “New School Initiative” gave different interpretations from different starting points. Although the case samples are geographically homogeneous, the bold innovation and humanistic care reflected in the project plan are commendable in today’s design environment. Whether analyzing its intensification and adaptability from the perspective of spatial subjects, thinking about ambiguity and sharing from the perspective of spatial relationships, or exploring diachrony and synchrony in spatial sequence, we must fundamentally think about the social attributes of future school spaces. Talking about education is inseparable from concern for education and care for children. Future attempts and innovations in campus space socialization should transcend the scope of function and aesthetics, truly serve people, and return to the origins of architecture [7].

IMAGE SOURCE

Figs. 1–3 and Figs. 6–8 are all drawn by the author.
 Figs. 4, 5, 9, 11, 12 and 14–17 are from <https://www.gooood.cn>.
 Fig. 10 is from <http://tanghuaarchitects.com>.
 Fig. 13 is from <https://www.szdesigncenter.com>.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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