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# Application of Perceived Teaching with Moderate Elimination of "Graphics" in Architectural Design Courses

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**Abstract** Starting from the traditional form of "graphic" architectural education, this paper explores a teaching method of entity construction experience, instrument assistance, and digital virtual expression symbiosis symbiosis from three aspects: environmental perception, ontology perception, and extension perception. Using physical perception as a medium, and gradually rising from active perception to a comprehensive expression of visual audience perception through practical operation, it allows students to have a more comprehensive understanding of the meaning of architectural design on the basis of the "graphic" expression paradigm.

**Keywords** Graphics, Beaux-Arts system, Perceived teaching, Digital technique, Constructing, Experience

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In China, as early as the Warring States period, the architectural master plan "Zhaoyu Map" appeared. By the end of the Qing Dynasty, the style Lei family would use drawings and models for design and conceptualization. However, until around 1900, the artisan system of on-site coordination and construction remained dominant, which had a profound impact on Japan, Korea, and other countries[1]. In the West, scientific "mapping" can be traced back to the Italian Renaissance period. Architecture was conceived and guided through scientific projection and perspective[2], and it became the main form of expression in architectural design, which has been influencing modern Western architectural design. At the beginning of the 20th century, Western architects who received the "Beaux-Arts System" education from the University of Pennsylvania in the United States, as well as the first generation of Chinese architects such as Liang Sicheng, introduced the form of Western "graphics" into the career and education of Chinese architects. Since the 21st century, with the advancement of media and technology, the transformation mode and technological means of "graphics" have become increasingly rich, such as 3D stereo projection, VR roaming, panoramic video, etc. At the same time, it also faces new challenges in integrating with entity perception, human perception technology, etc., further clarifying the inevitable trend of design in new era needing to express all-round perception.

## 1 Impact of perception in the fields of practical education and theory

In the field of architectural design practice, the famous American architect Wright and his students lived together in Essen, and completed architectural design and construction process based on labor perception. Japanese architect Tadao Ando traveled the world through boxing competitions, demonstrating the significance of the perception of walking experience in architectural learning. During the construction of the Bruder Klaus church, Swiss architect Zumthor involved local residents in perception construction process and experiencing the sublimation of architectural spirit. These excellent cases seem to be verifying that "only by moderately breaking away from graphics and strengthening designers' perception of things" can we design works that truly meet the needs of society.

In the field of architectural education, institutions such as Bauhaus, Black Mountain College, Texas Rangers, AA, and Columbia Architecture are all experimental and creative architectural education systems, breaking the traditional "graphic" based academic style of architectural education and cultivating a group of top design talents, which has influenced the development of the entire architectural education. For example, Design+Make, a representative of the British Architectural Alliance College, is composed of designers, engineers, mechanics, and forest rangers. Through a unique experience model of eating, drinking, housing, and learning in contemporary woodworking bases, it cultivates students' vocational skills in on-site construction. As early as 2000, Zhang Yonghe founded the Architecture Research Center at Peking University, aiming to cultivate "hands-on thinkers" and "thinking craftsmen"[3], and enhance their understanding of the city and society by building houses themselves. The construction festival of "Learning by Doing" at Tongji University aimed to enhance the teaching experience through physical perception. Wang Shu from the China Academy of Fine Arts directly offered courses on woodworking and soil research, enhancing students' personal perception of materials and skills, which has led to new directions for perceptual education practice.

In the field of theory, Finnish architect Yuhani Palasma pointed out that "true architectural experience is more characterized by verbs rather than nouns", and emphasized the importance of non graphic sensory experiences. The series of articles by Liu Binyi from Tongji University on visual elements of landscape space point out that when obtaining landscape aesthetic elements, vision also has significantly different perceptions of landscapes at different scales, distances, colors, etc. Chen Yiwei et al.[4] explore the significance of intangible odor perception in design by combining how traditional Chinese gardens to use odor to achieve the artistic realm of design. Zhang Jianlong et al.[5] emphasize the importance of cultivating students' perceptual abilities in cultivating their design research and analysis abilities. Xu Kai et al.[6] emphasize in

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space teaching practice that space teaching practice needs to go from observation and experience to rational cognition and then to specific operations. Zhu Meng et al.[7] use human perception measurement instruments to combine ontology perception with measurement experiments, exploring the importance of perception in design feedback.

It can be seen that the design content involves a wide range of aspects, and the form of "graphics" is difficult to fully cover. It is necessary to combine complex perception systems to comprehensively express the design results, which is the trend of architectural education and practice.

## 2 Teaching practice adapted to perceived teaching

Paris Lavulet School of Architecture, the new teaching concept separated from the Beaux-Arts system, whose landscape perception teaching curriculum core includes two levels: individual behavioral perception and site rational analysis[8]. Drawing on the characteristics of this course, adjustments will be made on the basis of the original "graphics" teaching, and the teaching content of "graphics" will be appropriately reduced or upgraded. From three aspects: perception subject, external media, and tools, perception teaching strategies will be applied in each learning stage of environmental cognition, ontology perception, and extension perception to exercise and improve different learning abilities. The specific content is shown in Fig.1.

### 2.1 Environmental cognition——passive perception of the body's active experience of the environment

Architecture and environment are an organic whole. In the process of practical teaching, it should urge students to use their perceived bodies as a medium to experience firsthand in the environment, and promote the continuous reconstruction of body structure and physical and mental boundaries through dialogue and integration with the environment, thereby strengthening their understanding of the environment on the basis of experience[9]. The specific environmental cognition framework is shown in Fig.2.

**2.1.1** Lifestyle teaching content. Design comes from life and ultimately serves life. The lifestyle architecture teaching can better integrate active perception and passive perception dynamically, as the educator Tao Xingzhi once said, "life is education". The design content and theme life are the bridges that guide students towards professional depth. As beginners, students may have a fear of difficulties when facing abstract and generalized design theories and complex design intentions directly. From a life oriented perspective, through active and audience perception, students can start to immerse themselves in familiar parts, without feeling of loss. They can actively perceive non-material factors such as culture, history, nature, and their evolution in the protagonist's posture,

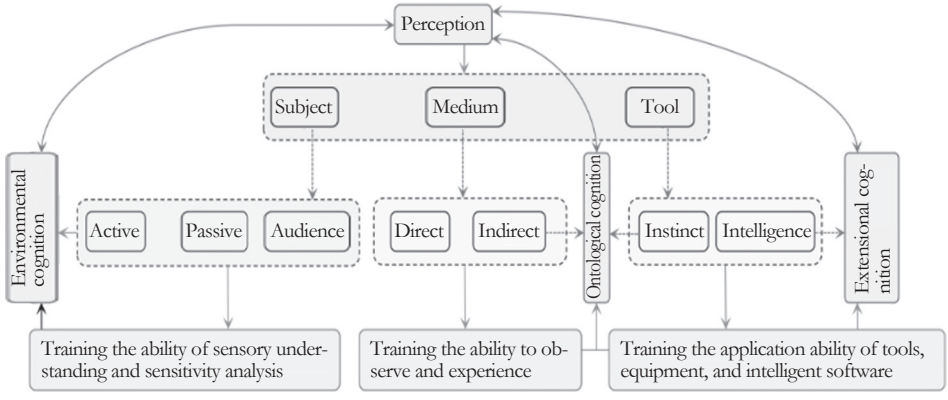


**Fig.1 Overall framework of perceptual teaching practice**

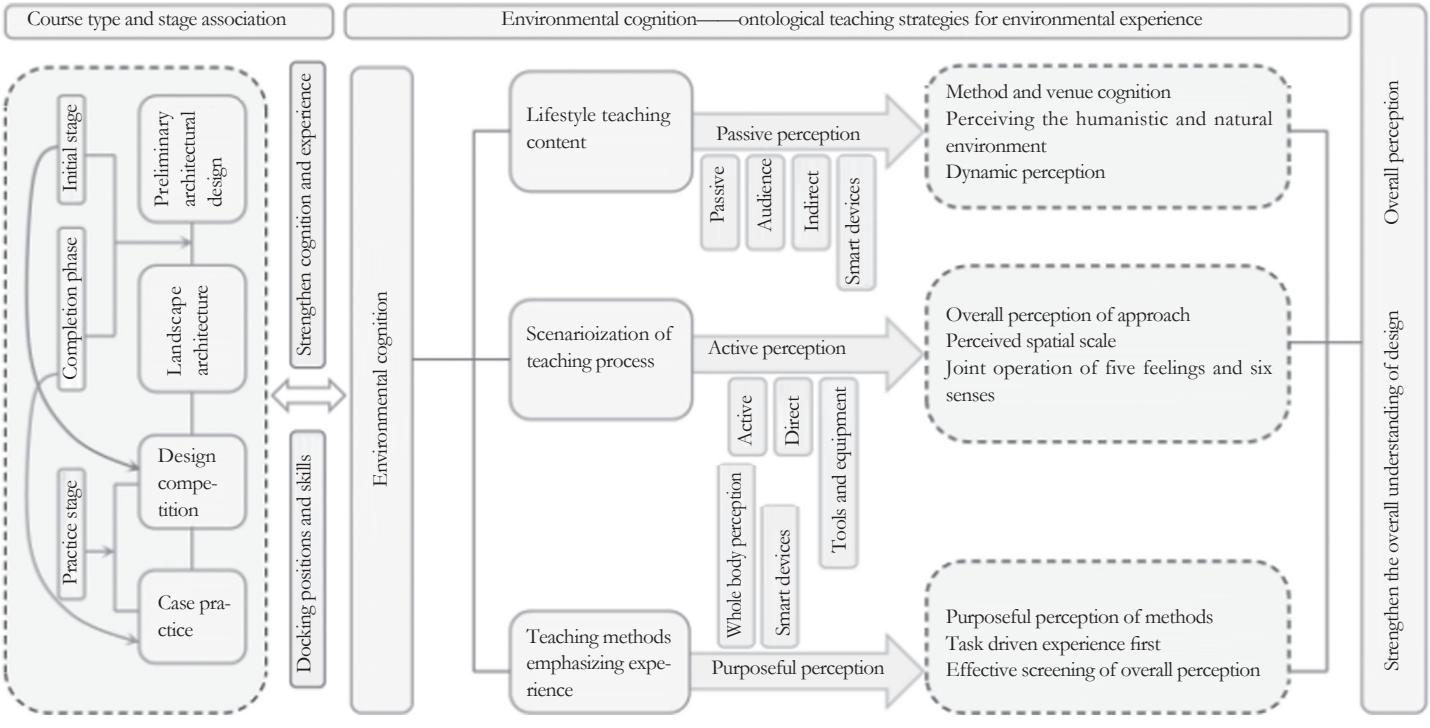


**Fig.2 Framework of environmental cognition curriculum**

and perceive information that is difficult to fully involve visually with dynamic thinking. Localization of design task site selection allows students to fully explore their own life experience and grasp the core content of design in an active and autonomous manner. Lifestyle design idea can guide students to transform their professional perspectives, actively perceive from the perspective of the experiential ontology, and think about the overall relationship between architecture and environment from the perspective of the overall environment. Only by perceiving what kind of architecture different groups of people need from the perspective of the demander can they understand the value and significance of their profession, and become a socially responsible designer.

**2.1.2** Scenarioization of teaching process. When people enter a certain scene, their instinctual perception and audience perception are the main factors. Hearing, smell, taste, touch, and vision often work together. In this all-round perception process, the body can more accurately perceive the information in the scene. During the teaching process, students are encouraged to try to resonate with the scene through sound, physical behavior, etc., forming a unique auditory space and further activating the important role of perception in scene teaching. In the initial stage of the course task, students are required to observe and research in the selected type of architectural scene, feel the overall visual spatial coordination of the site from the user's perspective, let the five feelings and six senses work together in coordination, fully exert the role of passive perception, and judge the rationality and superiority of design in visual response, environmental setting, spatial scale, and material application, in order to cultivate the perception oriented ability to capture perceptual object elements and reproduce the optimized design. In the general teaching process, homework completion and submission indicate the course end. In the perception teaching process, after the course is completed, it requires students to conduct re scenario comparison and analysis of completed content. From passive perception without purpose in the initial stage to active perception of a series of deliberation, thinking, and design, re perception can allow students to evaluate, judge, categorize, and refine their own design achievements from a professional perspective compared to similar good and bad works, improving their own design ability through audience feedback.

**2.1.3** Teaching methods emphasizing experience. Gu Daqing once commented on the relationship between space and observation as follows: once students have a clear experience of the space they create, this experience will be transformed into a clear design intention, making the initial blind operation become a conscious design activity[10]. Some seemingly unrelated experiences can connect the whole body perception, making people's whole body experience closely related to cultural contexts of different historical periods, natural environments of different periods, etc., such as combining food, photography, sports, breathing natural air, listening to rain, and other experiential behaviors of the whole body perception with intelligent perception technologies such as video shooting, oblique photography, 3D measurement, and 3D scanning. For students who have not yet developed the ability to abstract and summarize their initial design, it is even more necessary to experience, accumulate, precipitate, analyze, and summarize through instinctive perception, and output through new technologies such as animation and AI, gradually improving from purposeless audience perception to intentional active perception. In the field of education, some important design competitions place great emphasis on students' participatory cognitive experiences of the environment. For example, the competition theme of the 2019 International Hope Cup was "Happy Space", which is a re understanding and improvement of architectural design based on a healthy and happy life. The location of the 7th Purple Gold Award Architectural Design Competition in 2020 was in a familiar living environment, with the theme of using creative design with "thinking, warmth, and quality" to lead a healthy lifestyle and build a healthy home for everyone to share. Previous Anhui Provincial Rural Planning Competition and Rural Revitalization Innovation and Entrepreneurship Competition emphasize students entering the countryside and conducting the design based on perceiving local culture (Fig.3). These theme contents encourage students to enhance their perceptual ability to participate in experiences. In addition to winning awards at or above the provincial level in innovation and entrepreneurship competitions, they have laid a good foundation for future participation in practice and research.

### 2.2 Ontological experience——active perception of the body itself

Tao Xingzhi advocates the integration of "teaching, learning and action", and the outstanding people's educator Xu Teli proposes the combination of textbook knowledge and action, and the combination of hard work and effort. The teaching of architectural courses that focus on practical operations directly starts with abstract spatial training, and it is not suitable for students who lack hands-on experience and spatial awareness. On the basis of "graphics", it can enable students to have a comprehensive understanding and argumentation of the design space, structure, details, scale, etc. during the process of hands-on deliberation and adjustment by increasing physical perception training of the body.

**2.2.1** Teaching content based on dynamic experience. It emphasizes the dynamic process of teaching by example. It can train students to start from spatial three-dimensional thinking by transforming the dynamic operation of body construction into graphic design expression, thereby avoiding the design being too fine in the plane and ignoring the overall correlation of spatial structure. In Juhani Pallasmaa's *Collision and Conflict*: *Architecture Record of Pallasmaa*, he points out that true architectural experiences are more characterized by verbs rather than nouns. For example, the visual image displayed by a door is not a true architectural image; entering and exiting are the experiences of architecture[11]. It should encourage students to analyze classic cases through dynamic experiences. For example, the Jewish Museum breaks the balance through the tilt of the ground, creating a dizzying spatial perception and creating a oppressive atmosphere to strengthen the scene of Jewish massacres. The Southern Song Dynasty Imperial Street in Hangzhou allows tourists to wander and translate in historical spaces and modern life, experiencing the modern inheritance of historical and cultural heritage. As shown in phenomenology of perception, design is a return to the body, and local refinement of design is achieved through dynamic perception, thereby seeing the big from the small and crossing professional boundaries to achieve the overall design effect.

**2.2.2** Teaching form focusing on entity construction display and practical training. As the old saying goes, "it's better to watch than to listen, and to do it than to watch". In the teaching process, it needs auxiliary physical display and hands-on production process, emphasizes the return of physical behavior and the perception of spatial essence in construction and experience, and further bridges the overall perception effect of auditory, tactile, situational perception, emotional perception, place perception, and visual aesthetic perception.

Although physical construction display is not a direct operational training, the visual perception of physical products can enhance

tactile perception and visual intuitive understanding of structure. Students can gain a macro level understanding of structure, materials, space, and art through visiting, feeling, and touching. For example, the Shanghai Architecture Model Museum deconstructs the architectural space, materials, and construction logic using miniature models of excellent architecture, providing visitors with an intuitive perception and experience of the construction process. In the Kuma Kengo's Five Senses Architecture Exhibition, from the visual, auditory, tactile, olfactory and intelligent dimensions, it mobilizes people's senses through various forms such as models, installations, multimedia art, music, aroma, calligraphy, etc., integrating design with daily perception, and providing demonstration and guidance for design creation to return to perception (Fig.4). The ultimate goal of physical display is to encourage students to make things by themselves during the teaching process, from imitating the design to trying to design and create, and then to creating themselves. Students are required to use certain mechanical tools and model instruments to reconstruct small-scale models of classic design works, use different material structural properties to create physical building models, and use ontology perception of practical training to make each student become a thoughtful craftsman, transforming passive indirect perception learning into active direct perception, and truly integrating ideas into craftsmanship (Fig.5–6).

### 2.3 Digital virtual technology for intelligent perception——body extension perception

Digital virtual technology can perceive media through body extension, and combine the brain's nervous system, to expand beyond the limitations of human beings to the entire ecosystem, and examine and optimize design results from different perspectives. In the training process of environmental cognition and body ontology perception, combining 3D scanning and oblique photography technology, it can restore the scene more realistically, providing more accurate and standardized data images and dynamic impact information for the later design site (Fig.7). In the results sorting stage, with the help of instruments and intelligent software systems, images, data, materials, etc. that exceed the limitations of the human body are collected and expressed, such as sketchup, lumion, mapflows, mapbox, street view maps, population migration models, Mileseey, arcmap, etc. assisting the brain in organizing and expressing complex information. The final result is imported into a 3D model in the form of virtual simulation, develops and derives through VR software, transforming the design subject into an audience object for passive perception. These intelligent perceptions can further promote the three-dimensional and realistic nature of graphic content, making complex perception systems more intuitive, and thus expanding, improving, and optimizing in a reasonable manner. In addition, students can intelligently enhance their learning outcomes and transform them into innovation, entrepreneurship, or research results. For example, students can complete relevant papers under the guidance of teachers: Identification of Key Influencing Factors of Nighttime Safety in Street Walking Environments: Perception Experiments Based on Wearable Physiological Sensors[7], Evaluation of Landscape Space Vitality in Historical and Cultural District Based on AHP Technology[12], complete software writing on the cultural and tourism space vitality evaluation system V1.0, produce and design animations to win relevant awards in the National Computer Design Competition, and obtain several awards in the Provincial Innovation and Entrepreneurship Competition and the Three Creativity Competition.

## 3 Conclusions

At present, the design market is still dominated by independent division of labor among designers, engineers, and construction personnel, which makes it difficult for designers


**Fig.3 Research site of participating in the National Rural Revitalization Competition and the exhibition site of the 100th Anniversary of the Founding of the Communist Party of China for the Labor Day of College Students**


**Fig.5 Small-scale model production results by students**


**Fig.4 Shanghai Architecture Model Museum and Kuma Kengo's Five Senses Architecture Exhibition**

**Fig.6 Creation of physical models when participating in the competition of construction festival**

and other participating builders to have a complete understanding of the project. Their perception of the project is also weakened by fixed management procedures and mechanical construction, resulting in increasingly obvious homogenization of design results. With the increasing demand for passive perception of regional culture, a group of excellent designers and design teams have emerged in the design industry, attempting to break this dichotomy and effectively integrate active perception among design, construction, and management, as well as passive perception during use. Examples include Dashe Architecture, Wang Shuhe, Liu Jiakun, and Acomi Star Architecture Firm, and the EPC general contracting system, which extends the one-way task from design to construction to the entire lifecycle of the building, have provided direction for future design path. The ultimate goal of teaching is to cultivate the ability to truly connect with society. Perceived teaching emphasizes the overall understanding of architecture and the environment in the environmental cognition stage, strengthens the dynamic cognition of building ontology in ontology perception, and integrates digital virtual technology to enhance the comprehensive application of intelligent perception (Fig.8). The purpose of perceptual teaching is not to replace, but to conduct collaborative teaching according to students of different ability types to achieve the symbiosis between perceptual teaching and graphics. It aims to cultivate students' ability to view design problems from a comprehensive and holistic perspective, so that design is no longer just a creator, but also an organizer of design projects, participants, improvers, and supporters of social activities.

**Fig.7 Students using oblique photography, 3D scanning, and virtual simulation equipment**

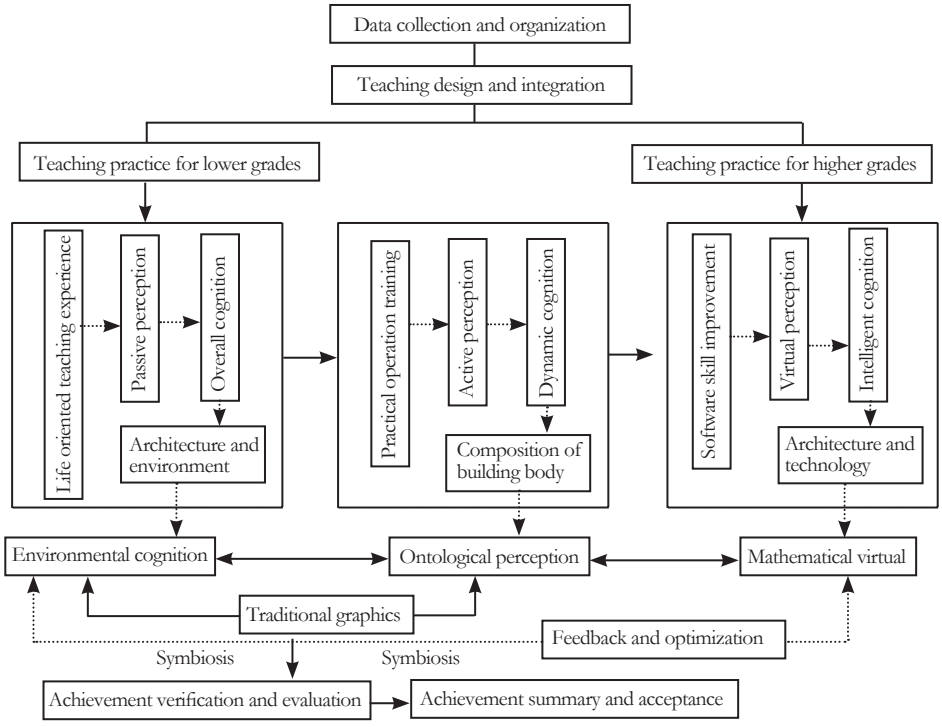


**Fig.8 Framework of perceptual teaching and graphics symbiosis**

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