

Design tools in the formation of art space using the example of at Changzhou High tech Second Primary School

Proposal Defense

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01 Research Background and Problem Statement

Era Background: Profound Transformation of Educational Philosophy

Shifting from "Knowledge Indoctrination" to "Competency Cultivation",
Focusing on Creativity and Comprehensive Abilities

The integration of aesthetic education and STEAM education has become a key issue in basic education reform. They are highly consistent in core goals, both emphasizing interdisciplinary integrated learning experiences, aiming to stimulate students' innovative thinking and cultivate core competencies for adapting to future society through the collision of art and science.

Practical Dilemma: Lagging Development of Physical Spaces

The fixed desk-chair layout and one-way teaching mode in traditional classrooms form a physical "hard boundary", which can hardly support dynamic project-based learning, group collaboration and diverse artistic expressions, becoming an important bottleneck restricting the implementation of educational philosophies.

Core Question: How to reconstruct learning spaces, break down barriers, and truly achieve the deep integration of aesthetic education and STEAM education?



Traditional Passive Spaces

Standardized desks and chairs are neatly arranged, creating physical barriers between teachers and students. This one-way spatial form limits interaction and cannot carry the collaboration and creation required by modern education.



Modern Interactive Fields

Flexible layouts breaking physical boundaries support multi-form group collaboration. An environment emphasizing both technology and humanity provides an ideal material foundation for aesthetic education immersion and interdisciplinary inquiry.

02 Definition of Core Concepts



Elastic Space

It is a highly adaptable and variable spatial design strategy that can be dynamically adjusted according to teaching scenarios and students' activity needs. It breaks fixed boundaries, enables flexible reorganization and multi-functional use of physical space, and provides infinite possibilities for educational activities.



Aesthetic Education

It is an educational form centered on cultivating students' ability to perceive, appreciate, and create beauty. Beyond skill training, it focuses on guiding students to gain perceptual experience and emotional resonance, and nurtures the soul and enhances comprehensive aesthetic literacy through free expression and artistic practice.



STEAM Education

It is an interdisciplinary integrated education model that combines Science, Technology, Engineering, Art, and Mathematics. Emphasizing real problem-oriented and project-based learning, it enables students to apply multidisciplinary knowledge to solve practical problems in hands-on practice, fostering innovative thinking and comprehensive practical ability.

03 Research Objectives and Significance

Through the design strategy of 'Flexible Space', this study explores spatial solutions for the integration of aesthetic education and STEAM education, providing theoretical support and feasible practical paths for the innovation of art education environments in primary schools.

Theoretical Dimension

Deeply analyze the intrinsic relationship between aesthetic education and STEAM education, clarify the core spatial requirements for interdisciplinary educational models, and lay the theoretical foundation for design strategies.

Methodological Dimension

Construct a design system for primary school art spaces centered on 'Flexible Design', and refine modular and multi-functional spatial organization methods to adapt to dynamic teaching.

Practical Dimension

Select Changzhou Gaoxin No.2 Primary School as a real case, transform theories and methods into physical spatial proposals, and verify the effectiveness and practicality of the strategies through implementation.

The core objective of this study is to break the single-functional boundaries of traditional educational spaces and use the 'flexible' spatial language to respond to flexible and diverse teaching scenarios. Through a closed loop of theoretical construction and practical verification, space is truly made a carrier for the integration of aesthetic and technological education, enabling the physical environment to empower educational innovation.

The value of this study is not only reflected in specific design outcomes but also in providing a new perspective for the innovative development of educational spaces, generating multi-dimensional positive impacts from teaching scenarios to industry standards and social demonstration.

Value for Teaching Practice

Provide schools with physical environments that support curriculum integration, break down disciplinary barriers, extend space as a continuation of teaching activities, and directly enhance classroom interaction and teaching quality.

Value for Design Discipline

Fill the strategic gap in the field of 'interaction between aesthetic education and technological education' in primary school educational spaces, enrich the theory of educational architectural design, and provide new academic references for similar studies.

Value for Social Promotion

In response to the current situation of educational development in urbanized areas of China, provide a replicable and promotable model for educational space innovation, and contribute to the high-quality and balanced development of basic educational environments in urban and rural areas.

From the optimization of micro teaching scenarios to the allocation of macro social educational resources, this study connects theory and practice through design innovation. It not only solves the spatial problems of specific schools but also provides an innovative path that balances aesthetic experience and functional effectiveness for the future renewal and iteration of basic educational spaces.

04 Research Object and Scope

Research Object: Art Space of Changzhou Gaoxin No.2 Primary School

This is a comprehensive art space in urgent need of renovation or new construction, aiming to break the physical boundaries of traditional classrooms. It upgrades single-function teaching places into open learning spaces supporting diverse art forms, interdisciplinary exploration and creative expression, to meet the development needs of quality education in the new era.



Basic Teaching

It meets the standardized teaching of regular art, music and technology-making courses, equipped with professional teaching facilities and independent operation areas for each discipline.



PBL Core

As the core carrier of project-based learning, it supports the integration of multidisciplinary knowledge, enabling students to complete creative projects through hands-on practice and collaboration.



Comm. & Exhibition

It provides a public area for displaying students' achievements, in-depth group discussions and inspiration exchange, enhancing teacher-student interaction and stimulating a proactive learning atmosphere.

Definition of Core Research Scope

This research focuses on the flexible design of spatial layout, soft treatment of physical boundaries, flexible furniture systems for teaching, material selection and lighting environment for immersive artistic atmosphere, exploring a feasible design paradigm of art education space suitable for primary school stage.

Campus Context and Design Vision

Changzhou Gaoxin No.2 Primary School features an open modern campus environment and approachable architectural language. This design aims to extend the campus's openness and inclusiveness, turning the indoor art space into a "wall-less creative laboratory". Through flexible spatial structures and warm natural materials, it echoes the school's educational philosophy of "Let every life grow freely", building a growth space for children that supports both focused learning and free expression.

05 Research Content and Framework

Example of Flexible Furniture System:

The figure illustrates a modular children's study desk with flexible reconfiguration capabilities. Featuring adjustable height, expandable tabletop, and stowable components, it achieves dynamic functional adaptation of furniture. This serves as a crucial material carrier for integrating the concept of flexible design into teaching environments, supporting the diversified implementation of aesthetic education and STEAM curricula.

Core Research Proposition: To explore how to break the physical and functional fixed boundaries of traditional educational spaces through flexible design elements, and construct an innovative teaching environment that can dynamically respond to changes in teaching scenarios, stimulate the deep integration of aesthetic education and STEAM education concepts, and support students' independent exploration.

Flexibility of Planar Layout

Abandoning fixed row-column seating arrangements, this approach adopts reconfigurable functional zoning and blurred boundary design. It allows the space to freely switch between 'centralized teaching' and 'group collaboration', 'static display' and 'dynamic creation', adapting to diverse teaching modes.

Flexibility of Furniture System

Introducing lightweight, movable, and stackable modular furniture units. Not only does it facilitate rapid spatial reconfiguration, but it also enables functional diversification within limited physical space through flexible storage and combination, meeting the spatial scale requirements of different courses.

Flexibility of Physical Boundaries

Utilizing flexible components such as sliding glass partitions, fabric soft curtains, and green plant screens. While maintaining spatial permeability, it divides private creation areas and public display areas at any time according to teaching needs, achieving separation of dynamic and static spaces and immediate spatial reconfiguration.

Flexibility of Sensory Experience

Through variable material textures, themed color combinations, and dynamic lighting systems. It creates an environmental atmosphere suitable for different teaching themes, mobilizes students' multi-dimensional perceptions such as vision and touch, and subtly enhances aesthetic perception and learning immersion.

06 Theoretical Foundations

Architectural Theory: Theory of Flexible Space

Core Idea

Space possesses adaptability, variability, and polysemy, rejecting fixed functional definitions. It advocates dynamic adjustment based on scenarios, requirements and users' development, rather than rigidification by a single function.

Theoretical Support

It provides a theoretical basis for dynamic evolution of educational space design. Breaking static layout limitations, it enables space to flexibly adapt to teaching forms and children's stages, achieving efficient reuse and continuous growth of spatial resources.

Pedagogical Theory: Design Principles of STEAM Educational Spaces

Core Idea

Centered on project-based learning, it supports collaborative inquiry and achievement display. Emphasizing interdisciplinary integration, it enables learning beyond textbooks, through practice and interaction, with outcomes intuitively presented and shared.

Theoretical Support

It emphasizes modularity, connectivity and openness of space. Through reconfigurable areas and weakened boundaries, it provides a flexible foundation for collaboration, interaction and interdisciplinary practice, stimulating children's exploration and innovation.

Psychological & Aesthetic Theories: Environmental Aesthetics & Child Developmental Psychology

Core Idea

The environment is an implicit educator, actively influencing behavior, emotions and cognition. Space is not just a container but a positive educational medium, subtly shaping children's perception, emotions and thinking.

Theoretical Support

It guides artistic application of color, natural materials and light & shadow. Through warm tones, tactile materials and dynamic light, it creates an approachable atmosphere, stimulating children's aesthetic perception and creative imagination.

07 Research Methodology and Technical Route

Literature Research Method Systematically review relevant academic theories and existing achievements, construct the theoretical foundation for the research, and clarify the research boundaries and analytical dimensions of the design problem.	Comparative Case Analysis Horizontally analyze outstanding domestic and international design practice cases of the same type, compare differences and commonalities, and extract transferable design strategies and implementation experiences.	Design Action Research Follow the iterative cycle of "design-practice-reflection-redesign", continuously revise hypotheses and optimize solutions in real design scenarios.	Post-Occupancy Evaluation (POE) Conduct field research, behavioral observations, and user interviews to scientifically evaluate the actual use effects of the space and obtain real feedback data.	Space Syntax Analysis Use quantitative analysis techniques to parse spatial structures, make rational judgments on the connectivity and accessibility of layouts, and assist in scientific decision-making for proposals.
Problem Identification Identify core user needs, analyze current contradictions and pain points, and establish the starting point of the research.	Theoretical Research Retrieve relevant literature, construct a theoretical framework, and provide academic support for design practice.	Case Analysis In-depth analysis of benchmark cases, extract successful experiences and failure lessons, and guide proposal conception.	Preliminary Design Based on previous research results, complete the deduction of conceptual proposals and form preliminary design sketches.	
Proposal Optimization Incorporate feedback from multiple parties, repeatedly refine details, and iteratively upgrade to form the final proposal.	Design Implementation Develop implementation plans, control key construction nodes, and transform design blueprints into reality.	Effect Evaluation Collect operational data and user feedback to comprehensively evaluate the actual use efficiency of the design.	Theoretical Summary Review the entire design process, extract practical achievements, and precipitate guiding theories.	

08 Expected Outcomes and Innovations

Taking kindergarten architectural design as a case study, this proposal integrates aesthetic education and STEAM concepts into spatial planning. Through visual design panels, it presents a complete spatial solution from conceptualization to implementation, intuitively demonstrating the practical application of flexible spaces.

Expected Deliverables

High-Quality Thesis Report

Systematically elaborates the research background, theoretical derivation and design process, forming a professional report with both academic and practical value.

Complete Design Drawings

Including conceptual design, layout planning, spatial renderings and technical details, it has reference value for practical implementation.

Integrated Theoretical Model

Constructs a "flexible space design model integrating aesthetic education and STEAM", providing a theoretical paradigm for similar educational space design.

Core Dimensions of Innovation

Perspective Innovation: Cross-Border Application

For the first time, the theory of "flexible space" is introduced into the integrated scenario of aesthetic education and STEAM education, breaking the rigid thinking of traditional functional zoning.

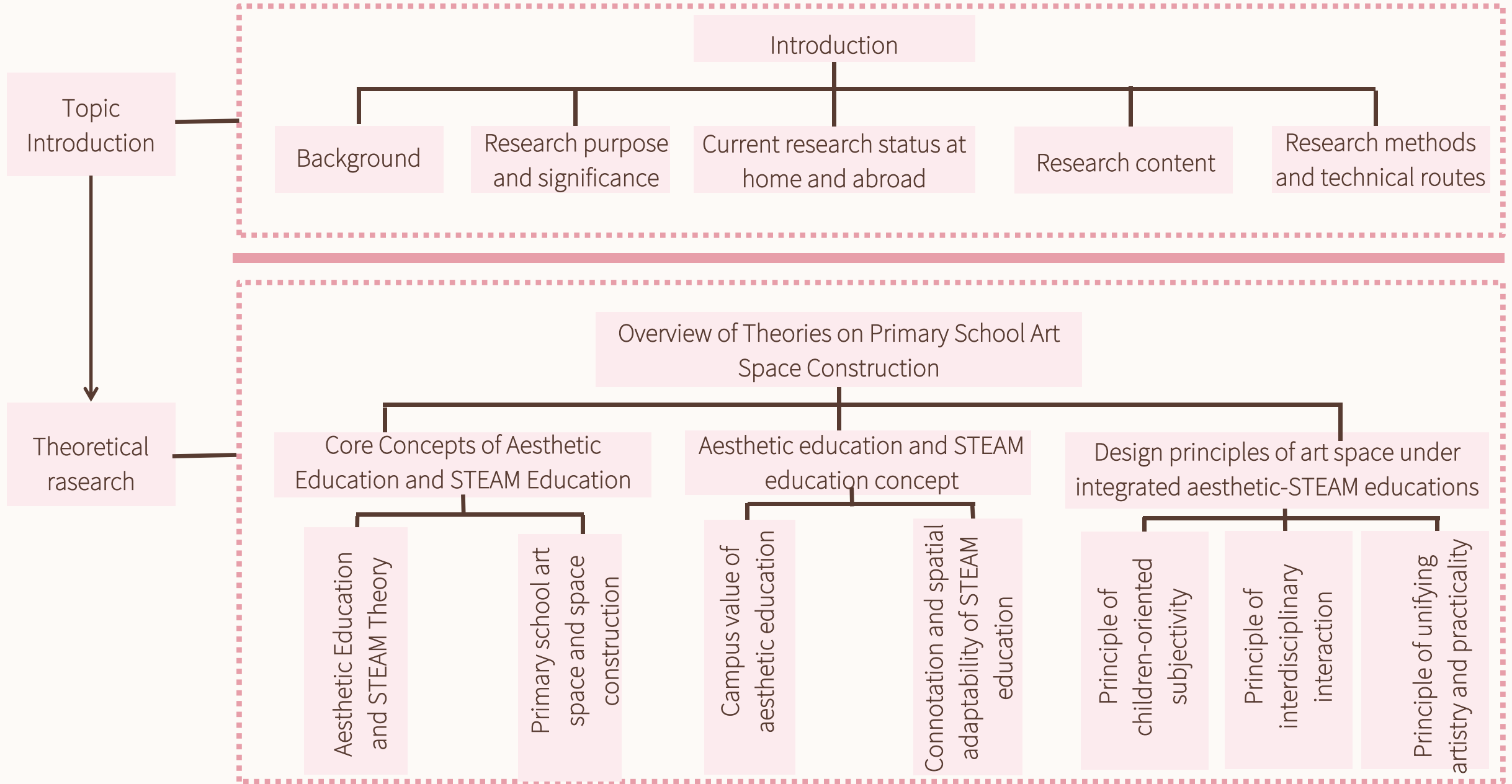
Strategy Innovation: Practical Transformation

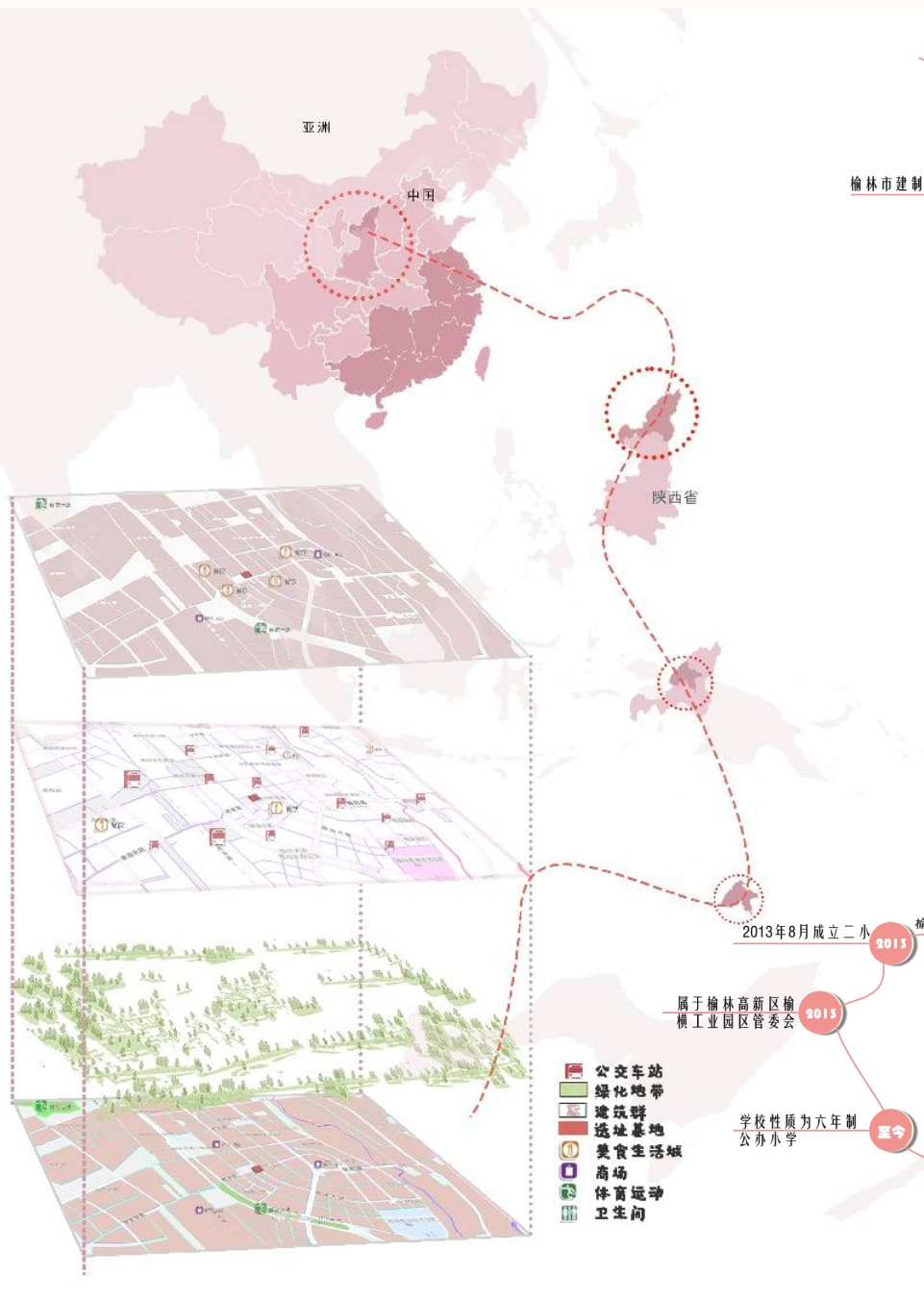
Extracts operable flexible design strategies, accurately transforming abstract educational concepts into specific spatial forms and circulation languages.

Value Innovation: Proactive Empowerment

Emphasizes the proactivity of space, making it an invisible "teaching catalyst" that stimulates teacher-student interaction and promotes knowledge exploration.

Topic Introduction





榆林市建制始于春秋战国

公元前7世纪
221年

Changzhou's administrative establishment dates back to the Spring and Autumn and Warring States periods

兴于明清

1368年

Flourished during the Ming and Qing dynasties

1408年

明永乐六年（1408年），榆林之名始见于史。

On July 1, 2000, Changzhou was established as a prefecture-level city.

2000年7月1日，设立地级榆林市。

2000年

榆林高新区第二小学

2001年

文化强国 长远战略

In August 2013, the Second Elementary School was established; Changzhou High-tech Zone No. 2 Elementary School

常住人口360.73万

2024年初

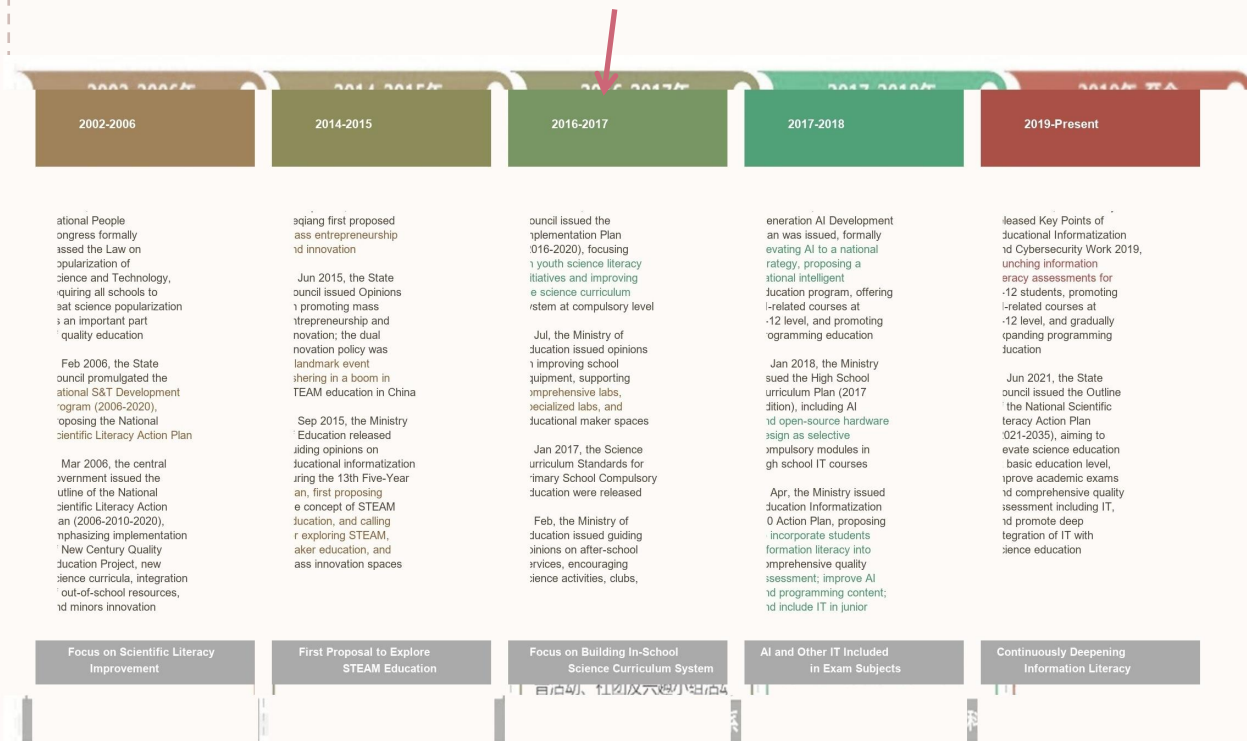
The school is currently a six-year public elementary school

The development of the STEAM timeline worldwide

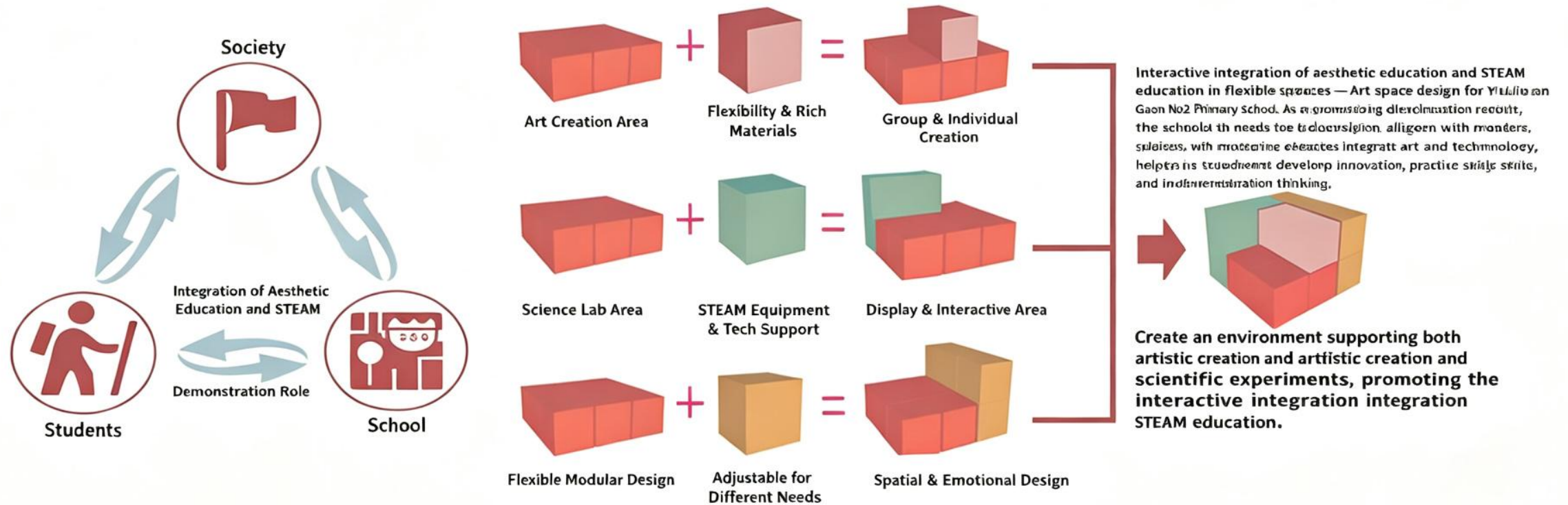
The Development Timeline of STEAM in the United States



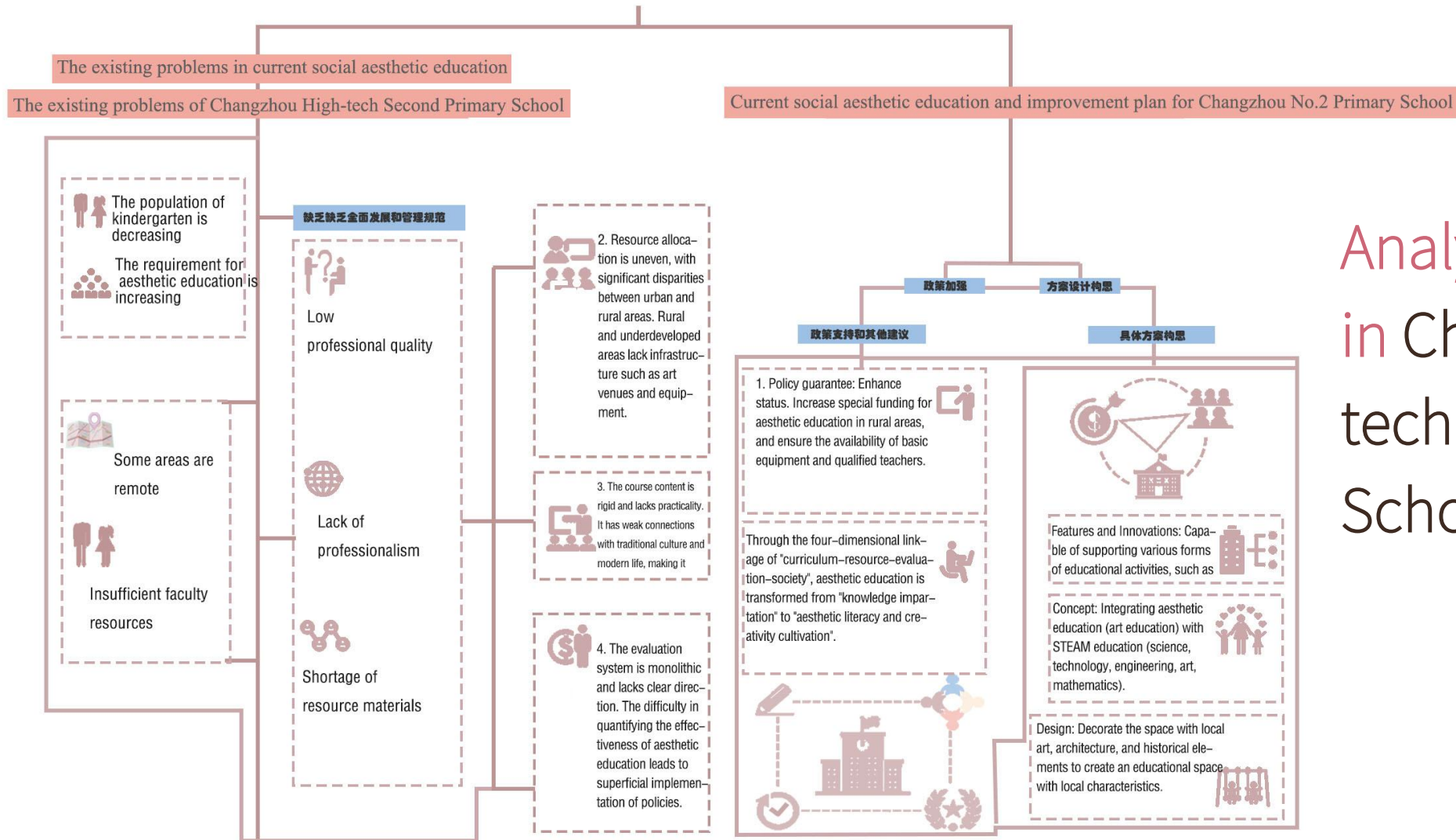
Timeline of STEAM Development in China



Design concept of Changzhou High tech Second Primary School



Problems and Improvements of Changzhou High-tech Second Primary School

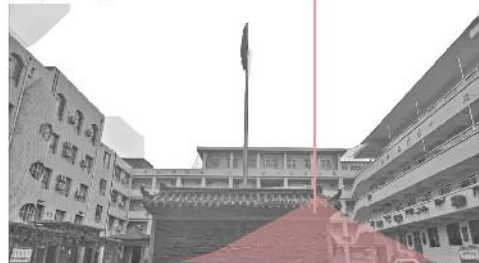


Analysis of the issues
in Changzhou High
tech Second Primary
School

基地现状分析

Status analysis

It is proposed to strengthen aesthetic education in schools and enhance the artistic literacy of young students



Establish a school aesthetic education curriculum system, innovate the content and forms of aesthetic education practice activities, and clarify key tasks in various aspects to strengthen and improve school aesthetic education work.



学校现象

On site school

美育环境

Aesthetic education environment



The school environment is insufficient to meet the needs of STEAM education

学生在空教室里进行创作和活动，没有针对性的场地



设施遭到破坏



美育课程和师资力量不足



学校内未设置专门的美育教室



The approaches to implementing aesthetic education in primary schools include offering aesthetic education courses and hosting campus cultural and art festivals. However, students are unable to bring the aesthetic tools required by teachers during these courses, making it difficult to conduct them. The forms of aesthetic education are limited, and aesthetic education courses are treated as "optional" by students, leading to low enthusiasm and motivation in the classroom. This dampens students' pursuit of beauty and encourages passivity.

Enhanced sense of independence 26%



Pre-puberty 42%



Psychological test survey for target population (50)

Transition to Adolescence 32%



Enhanced sense of independence	Transition to Adolescence	Pre-puberty
13	16	21

I want an independent public art space where I can interact with friends and explore more points of interest.

I want a multi-sensory experience and a learning atmosphere that inspires creativity and emotional expression, meeting.



10岁

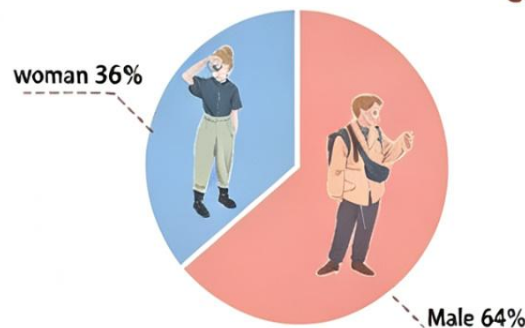
Proactivity: ● ● ● ● ○
 Purposefulness: ● ● ● ● ○
 Interest Level: ● ● ● ● ●
 Passion Level: ● ● ● ● ○



9岁

Proactivity: ● ● ○ ○ ○
 Purposefulness: ● ○ ○ ○ ○
 Interest Level: ● ● ● ● ●
 Passion Level: ● ● ○ ○ ○

Gender survey (50 People)

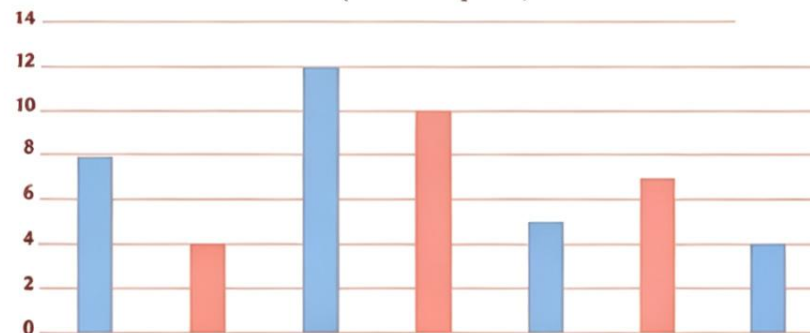


Male Woman

Male	Woman
36	14

Crowd analysis

Survey on the Demand for the Interactive Integration of Aesthetic Education and STEAM Education (50 Participants)



art education	science education	Technical Education	Purposeful Education	art education	Interest Level	Passion Level
8	4	12	10	5	7	4



人群性格特点分析 图例

我喜欢科学，在家也在做实验，但是学校满足不了我的需求。



偶尔上一次技术的课程，好不满足啊，希望能和其他同学一起。



之前妈妈带我去科技馆看过工程演示，要是能在学校学习就好了。



最爱做的事情就是在画画课上交流了，还能自己创作，想要去看艺术展。



每次上数学课都是我积极发言，我在想要是能离数学就更神啦！



科学(Science)
技术(Technology)
工程(Engineering)
艺术(Arts)
数学(Mathematics)



科学(Science)
技术(Technology)
工程(Engineering)
艺术(Arts)
数学(Mathematics)



科学(Science)
技术(Technology)
工程(Engineering)
艺术(Arts)
数学(Mathematics)



科学(Science)
技术(Technology)
工程(Engineering)
艺术(Arts)
数学(Mathematics)



科学(Science)
技术(Technology)
工程(Engineering)
艺术(Arts)
数学(Mathematics)

Analysis of personality characteristics of crowds



● **MUSIC**

● **DANCE**

● **LEGO**

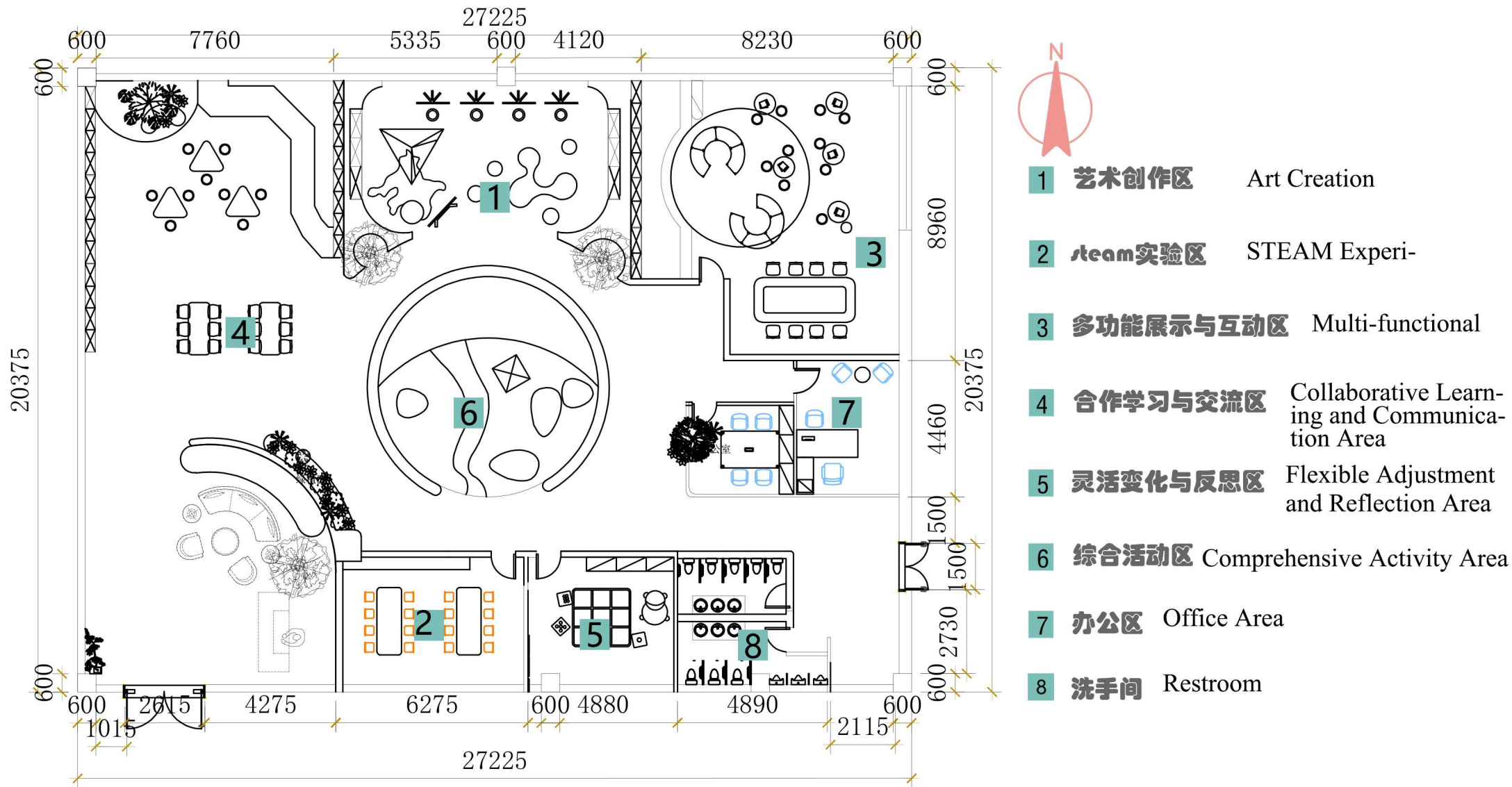
● **DRAW**



Integration of aesthetic education and STEAM education: Space design should facilitate the intersection of art and science, technology, engineering, and mathematics, utilizing space design to support interaction and collaboration across multiple disciplines, and stimulate students' innovative thinking and comprehensive abilities. The design should focus on children's emotional experiences, creating a positive, motivating, and inclusive learning atmosphere through elements such as color, materials, light, and shadow, enhancing students' creativity and desire to express themselves.

Design vision

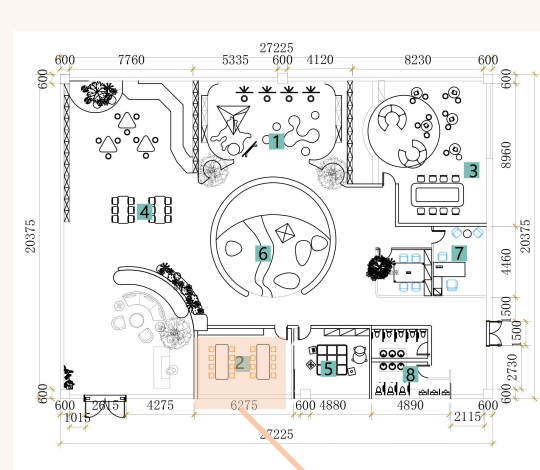




Children's space floor plan



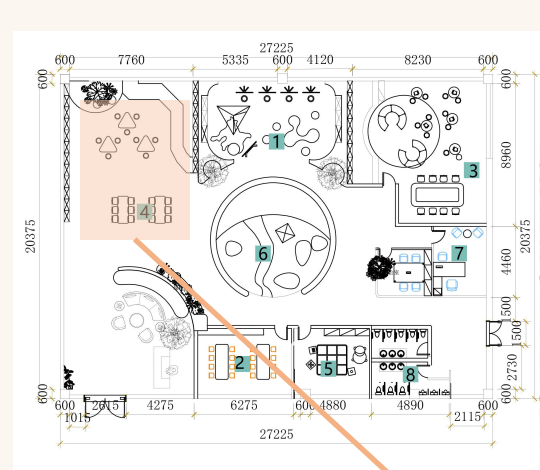
1.Art Creation



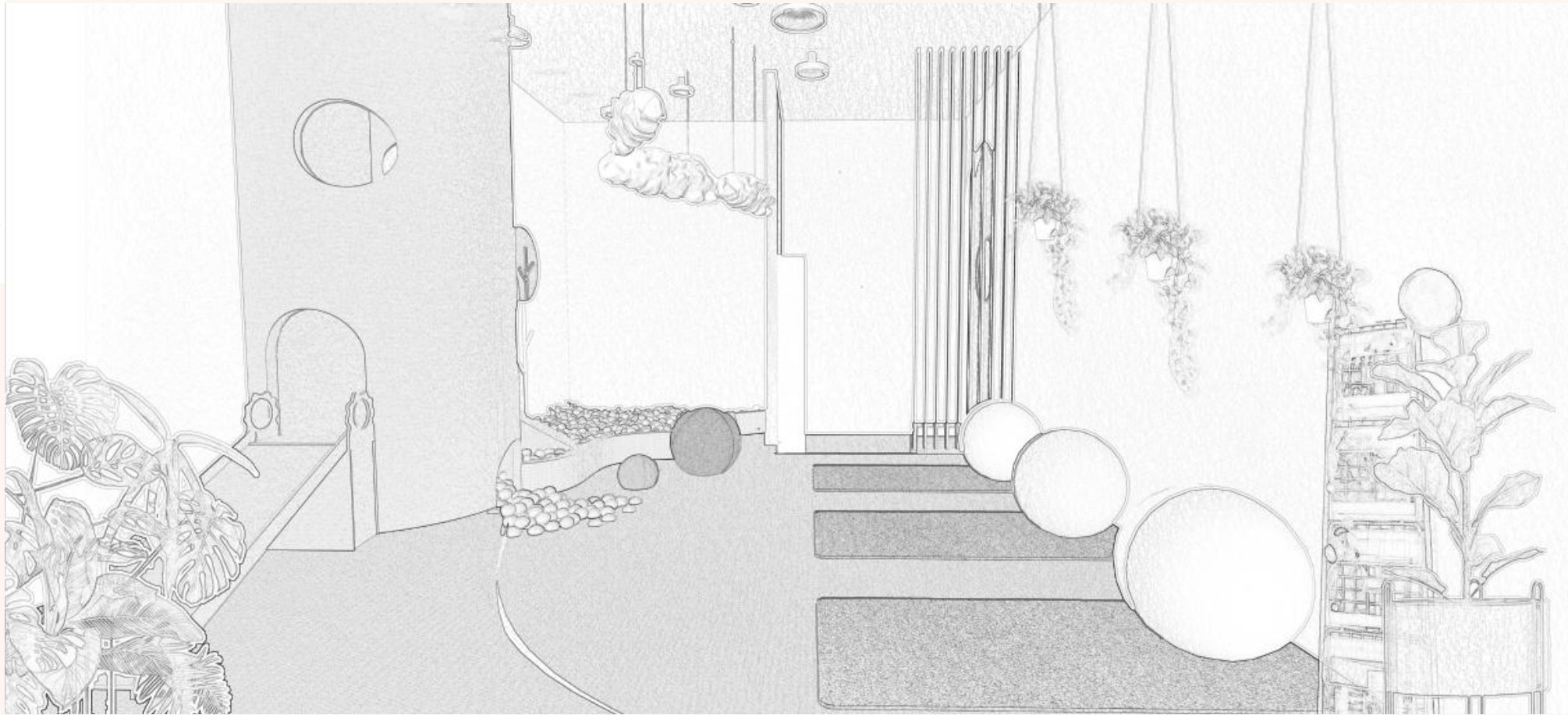
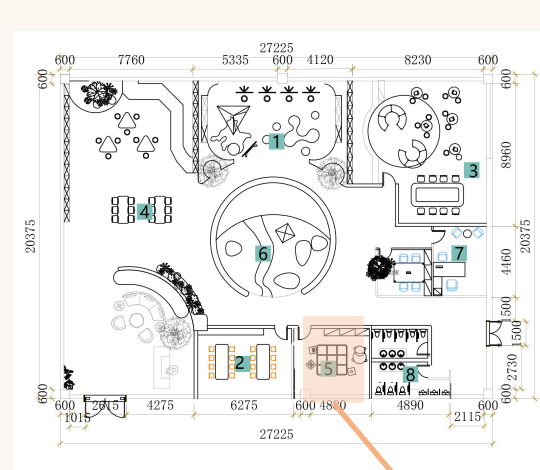
2.STEAM Experiment Area



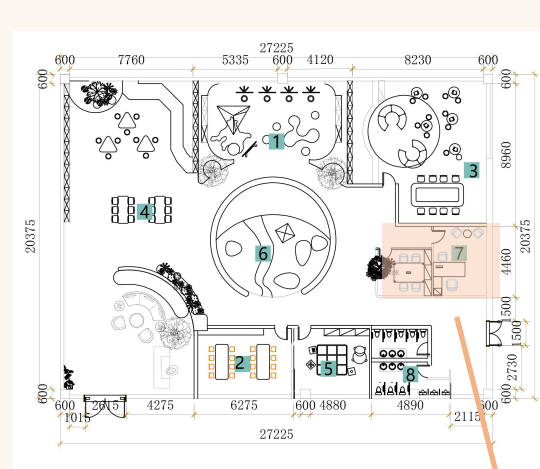
3. Multi-functional Display and Interaction Area



4. Collaborative Learning and Communication Area



5.Flexible Adjustment and Reflection Area



7.Office Area



Reception

Display of effect drawings for
children's space

Flexible Adjustment and
Reflection Area



Art Creation

Display of effect drawings for
children's space

4. Collaborative Learning and Communication Area



Reception

Display of effect drawings for children's space



09 Research Value and Prospects

Promoting Teaching Innovation

It provides solid physical support for the deep integration of aesthetic education and STEAM education, breaks the physical boundaries and disciplinary barriers of traditional classrooms, and turns interdisciplinary learning from an abstract concept into a tangible and operable field.

Empowering Children's Growth

It creates an exploratory, interactive and inspiring learning environment. Here, children's curiosity is naturally stimulated, imagination roams freely, and immersive growth experiences are gained through hands-on practice and peer collaboration, returning education to vivid life itself.

Leading Industry Development

It provides a vivid example with both theoretical depth and practical value for the construction of future schools in China. It redefines the function and meaning of educational space, promotes the upgrading of educational space design standards, and offers forward-looking innovative references and reform ideas for the industry.

Environment is a silent teacher.

Space is not only a physical container for educational activities, but also a third teacher that actively stimulates teaching and subtly nourishes children's hearts, allowing growth to occur naturally in every corner.

Thank you, respected teachers!