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

Qualification work for obtaining a Master's degree

in specialty 022 Design

EPP «Innovation Design»

The qualification work contains the results of one's own research.

The use of ideas, results and texts of other authors must be referenced to the appropriate source.

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(sign)

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INTRODUCTION

Introduction

Education today is undergoing a fundamental transition from knowledge transmission to competency cultivation. Within this context, the integration of aesthetic education and STEAM education has become an unavoidable topic in the reform of basic education. Aesthetic education emphasizes sensory experience, creativity, and aesthetic judgment, whereas STEAM education—an interdisciplinary approach integrating science, technology, engineering, arts, and mathematics—focuses on problem-solving across disciplinary boundaries. Although the two paradigms share considerable common ground in terms of creativity and integrated learning, their genuine interaction is often constrained by limitations in the physical learning environment. Traditional classrooms, characterized by fixed spatial layouts and a predominantly lecture-based pedagogy, are ill-suited to support project-based learning, collaborative inquiry, or the diverse requirements of artistic expression. Consequently, how to meaningfully integrate aesthetic education and STEAM education through spatial design has emerged as a pressing practical issue within current research on educational spaces.

Based on this starting point, the present study adopts “flexible space” as a design strategy to address the aforementioned dilemma. Specifically, the objectives of this research are threefold. First, to clarify how aesthetic education and STEAM education mutually influence each other in terms of spatial requirements. Second, to propose a set of methods for constructing an art space centered on flexible design. Third, to conduct a case study at Changzhou Gaoxin Second Primary School, in order to evaluate the feasibility and effectiveness of the proposed design strategy in authentic teaching contexts.

The subject of this study is an art space within Changzhou Gaoxin Second Primary School that requires either renovation or new construction.

This space must be capable of accommodating a variety of subject-based courses while also supporting interdisciplinary project-based learning. Accordingly, the research focuses on flexible design elements such as spatial partitioning, boundary treatment, furniture system design, and the regulation of materials and lighting. Through spatial flexibility, multifunctionality, and rich sensory experiences, the study aims to respond to the need for seamless transitions between different teaching scenarios, while also taking into account the cognitive developmental characteristics of children.

Regarding the research methodology, this study adopts an approach that integrates design practice with theoretical analysis. The theoretical foundation is drawn from three primary sources. The first is the theory of flexible space, which in architecture concerns spatial adaptability and variability, emphasizing how a space can dynamically adjust in response to changes in time, function, and users. The second is the design principles of STEAM education spaces, such as the need for modular layouts in project-based learning areas and convenient connectivity between collaborative and display zones. The third is environmental aesthetics and child developmental psychology, focusing on how color, material, and natural elements can stimulate children's aesthetic perception and creativity. The specific methods employed include comparative case analysis, post-occupancy evaluation (POE), design action research, and space syntax analysis. This combination enables a relatively complete—from problem identification and design development to implementation and feedback.

Finally, regarding the practical value of this research, I believe it is embodied in three dimensions. From the perspective of teaching practice, it can provide Changzhou Gaoxin Second Primary School with a genuinely flexible space that supports the integration of aesthetic education and STEAM education, thereby enhancing the quality of curriculum integration and improving children's learning experiences. From the perspective of the design discipline itself, it fills

a gap in design strategies concerning "how aesthetic education and technology education interact" within primary school learning environments, offering theoretical references and operational approaches for subsequent related designs. From the perspective of social dissemination, this case can also serve as a demonstration of spatial innovation in primary education in China's urbanizing areas, responding to national policy directions such as the "simultaneous development of five forms of education" and the construction of "future schools." Ultimately, through the medium of spatial design, I hope to advance the understanding that the environment is not merely a passive adapter to teaching, but can also actively stimulate teaching.

The relevance of the topic / Topicality

This study is first grounded in a critical review of existing research. A systematic review reveals that current studies on educational space design can be broadly divided into two categories. The first category focuses on general "future school" or "open classroom" spatial models, such as Herman Hertzberger's "polycentric learning environment" and Peter Lackney's principles of "educational spatial adaptability," which emphasize spatial flexibility and student autonomy. The second category concerns dedicated spaces for STEAM education, such as modular workshop and display area designs developed from the "STEM laboratory" movement in the United States, with representative scholars including Christine Chaillou and Anthony Pellegrino. However, most of these approaches either regard aesthetic education as a subsidiary component of the "Arts" in STEAM, or place art and music classrooms alongside traditional subject spaces in a parallel manner. They fail to genuinely start from the "interaction mechanism between aesthetic education and STEAM education" to explore how a space can simultaneously support aesthetic experiences and interdisciplinary logical inquiry.

In domestic research, explorations by Professor Bao Shidu in basic education spatial environment design, as well as Professor Li Zhimin's discussions on the adaptive design of primary and secondary school buildings, although involving the concept of flexible space, mostly remain at the level of general classrooms or the overall school building, lacking specialised research on "art + technology" composite spaces.

In contrast, the design strategy proposed in this study—"the integration of aesthetic education and STEAM education within flexible space"—is not a simple superposition of the above approaches. Rather, it critically points out that existing schemes often presuppose "disciplinary boundaries," tending to rigidly separate different activities even within the same space through zoning or time schedules. This study, through the adaptability and variability mechanisms of flexible space, attempts to simultaneously satisfy, within the same spatial continuum, the immersive atmosphere and sensory richness required by aesthetic education, as well as the tool manipulation and collaborative circulation required by STEAM education. This concept differs from the traditional "multifunctional classroom"—the latter is typically fixed in multi-purpose use but incurs high switching costs, whereas this study emphasises dynamic responsiveness and alignment with children's cognitive rhythms.

From the perspective of disciplinary significance, this topic carries threefold importance. First, in theoretical terms, it fills a research gap concerning the "spatial interaction mechanism between aesthetic education and technology education," providing a bridge for interdisciplinary dialogue between environmental psychology and pedagogy. Second, in practical terms, it offers an actionable spatial solution for implementing China's new curriculum standards (2022 edition) in primary schools, directly responding to policy requirements such as the "simultaneous development of five forms of education" and "interdisciplinary thematic learning." Third, in methodological terms, by

combining design action research with space syntax analysis, it explores an educational space evaluation paradigm that gives equal weight to quantitative and qualitative approaches.

The purpose / aim/ goal of the research

This study aims to take spatial design as an intermediary to eliminate the separation between aesthetic education and STEAM education in real teaching contexts and summarize replicable design models and implementation approaches through case analysis.

1. Clarifying the relationship between phenomena: to reveal the mechanism of interaction between aesthetic education and STEAM education in terms of spatial requirements within primary schools, and to identify both the common demands and the differentiating characteristics of the two educational paradigms with respect to spatial flexibility, functional integration, and sensory experience.

2. Conducting generalising analysis to identify universal patterns and establishing a classification system and typological framework: based on the theory of flexible space, to propose a set of flexible design strategies and a spatial typological framework applicable to art spaces in primary schools, thereby providing a referential design paradigm for the renovation or new construction of similar educational spaces.

These two objectives collectively point to a core task: using spatial design as a medium to bridge the physical divide between aesthetic education and STEAM education in actual teaching environments, while extracting generalisable models and methods from the individual case study. This core task is to predict the results and identify optimal problem-solving approaches when selecting research methods and techniques; this constitutes the intended final outcome of the research.

Research tasks are defined in accordance with the formulated goal of the qualification work and represent specific, consistent and logically interconnected steps aimed at solving the research problem and achieving the expected result. Each task should reflect a separate aspect of the research and ensure systematicity in the approach to organizing the theoretical and practical parts of the work.

1.Synthesise the theoretical foundation: Systematically review the literature on flexible space theory, design principles of STEAM education spaces, and environmental aesthetics, in order to clarify core concepts and design rationales.

2.Analyse the current situation: Identify deficiencies in the existing art space at Changzhou Gaoxin Second Primary School in supporting the integration of aesthetic education and STEAM education, through on-site investigation and post-occupancy evaluation.

3.Propose design strategies: Based on the theoretical review and situational analysis, develop a method for constructing art spaces centred on flexible design, specifying key parameters for spatial partitioning, boundary treatment, furniture systems, material selection, and lighting regulation.

4.Complete the spatial design: Produce a feasible design proposal for the art space at the designated site of Changzhou Gaoxin Second Primary School.

5.Evaluate and provide feedback: Assess the effectiveness of the proposed design strategies through design action research or simulated usage evaluation, and summarise a transferable typological framework.

Research Object

Taking the art space renovation and practical teaching construction project of Changzhou High-tech Second Primary School as a typical research case, this paper focuses on the long-standing separation dilemma between aesthetic

education and STEAM education existing in the front-line primary school interdisciplinary teaching scenarios. In current domestic primary school teaching practice, aesthetic education overly focuses on perceptual artistic creation, visual aesthetic appreciation and emotional cultivation, while STEAM education attaches more importance to rational logical thinking, scientific inquiry, engineering practice and mathematical analysis. The two educational models are independent of each other in curriculum arrangement, classroom space setting and teaching logic, lacking effective connection points and integrated teaching carriers, which leads to the disconnection between students' artistic creativity and scientific rational thinking, and fails to meet the core requirements of holistic quality-oriented education for primary school students. Against this practical educational background, this paper mainly explores how architectural and environmental spatial design, as an intuitive and on-site educational medium, builds an effective bridging mechanism to break the barriers between aesthetic education and STEAM education, and summarizes universal and generalized spatial design models suitable for primary school interdisciplinary teaching spaces. Centering on the above core research objectives, this study carries out systematic hierarchical analysis from three core research dimensions: the realistic pain points and practical problems of separated interdisciplinary teaching in primary schools, the carrier function and educational intervention value of campus art space as a physical teaching medium, as well as the universal design methodology and operable design tools for integrated art-STEAM teaching space. Combined with the field investigation data, spatial design drawings and post-use teaching feedback of Changzhou High-tech Second Primary School's art special space, this paper further discusses the internal interactive correlation between diversified physical spatial environments and interdisciplinary integrated education, and verifies the application effect of targeted design tools in optimizing primary school art space and realizing the organic integration of aesthetic education and STEAM education.

Research Subject:

This study consists of two categories of research subjects, namely interdisciplinary teaching spaces in primary schools, and teachers and students involved in aesthetic education and STEAM integrated courses. The spatial research objects cover diversified campus functional spaces including dedicated art classrooms, maker spaces, shared public art corridors and multi-functional learning areas, which carry both artistic aesthetic cultivation and scientific inquiry practices. The human research objects include frontline primary school teachers who implement integrated interdisciplinary courses, and student groups with different cognitive levels receiving hybrid teaching. Centering on the thesis topic Design tools in the formation of art space using the example of Changzhou High tech Second Primary School, this paper takes the art space renewal project of Changzhou High-tech Second Primary School as the dominant research case, and adopts three other typical primary school interdisciplinary spaces in Changzhou as auxiliary comparison cases. Clear case selection criteria are formulated to guarantee research validity and sample representativeness. All selected cases have official one-year-plus practice of aesthetic and STEAM integrated teaching, share the common defect of functional separation between art-oriented perceptual spaces and science-oriented practical spaces, and adopt targeted spatial design tools for educational space upgrading. By investigating practical space usage, curriculum matching degree, teachers' teaching feedback and students' immersive learning experience, this paper aims to summarize targeted art space design tools that can integrate aesthetic education and STEAM education for primary school campus environments.

Annotation

The annotation to the qualification thesis is performed in a foreign language (English by default) and has the following structure: title of the topic, keywords (6–8), description of the practical part, what was considered, on what material, etc.

The volume of the annotation is 500 words.

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