Inside the Studio: A Closer Look at Studio-Based Learning in Architecture Education

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ABSTRACT	Published Online: April 13, 2023

The studio has emerged as a preeminent approach in architecture education, offering students a hands-on opportunity to cultivate and apply their design talents. This review paper provides a comprehensive overview of the studio in architecture education. The paper starts with a brief historical overview of architecture education, tracing the origins of studio-based learning. The curriculum content of architecture education is scrutinised, and the different types of courses offered are analysed. The paper subsequently investigates the dual nature of the studio, both as a pedagogical approach and a physical space, highlighting the different studio learning models that have arisen. The paper also explores the characteristics of the studio, including its interactive design teaching and learning environment, its distinct culture, and its role as a design life space. The studio users are considered, including the interaction between peers, instructors, and students. The paper highlights the pivotal role of studio culture in shaping the education and values of future architects. Overall, this review paper provides a comprehensive account of the studio in architecture education, providing insights into its history, curriculum content, dual nature, learning models, characteristics, users, and culture. By providing a comprehensive overview of the studio in architecture education, this paper offers valuable insights for architects, educators, and policymakers seeking to enhance the quality of architecture education and its impact on the profession.

Keywords:
Architecture Education, Studio, Studio Culture, Studio Learning Model, Studio-Based Learning

1. INTRODUCTION

Architecture education has long been a cornerstone of the academic curriculum, requiring students to develop a unique set of creative and technical skills. Studio-based learning has emerged as the preeminent pedagogical approach in architecture education, offering students a hands-on opportunity to cultivate and apply their design talents. The studio environment represents a multifaceted social organisation and learning centre that engenders interaction between peers and between students and their instructors. The studio culture that develops within these settings exerts a significant influence on architecture education, shaping the values and practices of future architects.

This review paper aims to provide a comprehensive overview of the studio in architecture education. The paper commences with a brief historical overview of architecture education, tracing the origins of studio-based learning. Then, it scrutinises architecture education's curriculum content and the courses typically offered. The paper subsequently investigates the dual nature of the studio, both as a pedagogical approach and a physical space, analysing the different studio learning models that have arisen. The paper also explores the characteristics of the studio, highlighting its interactive design teaching and learning environment, its distinct culture, and its role as a design life space. Finally, the paper considers the various users of the studio, including the interaction between peers and between instructors and students, and scrutinises the pivotal role of studio culture in shaping the education and values of future architects.

II. THE ROOTS OF ARCHITECTURE EDUCATION

Architecture, both as an art and a science, has been a fundamental element of human society since ancient times. Humans built their first structures for protection and comfort from the weather elements [1], such as the Pyramids of Egypt or the Pantheon. These structures not only fulfilled their practical purpose but also served as cultural and artistic achievements of their time. With the passage of time, humans

began to organise their environment more systematically, leading to the rise of architecture as a profession.

The history of architecture education can be summarised into three phases [2-4]. In the first phase, candidates received their education from a master architect, who trained them through hands-on experience and practical education. In the second phase, schools replaced the master with practical training within an office. In the third phase, practical training was integrated within the institution, with design studios established within schools to provide students with theoretical and practical knowledge.

In the past, architects were individuals with great vision who had received education and training from their masters and were experts in their field. However, not all candidates had equal opportunities, as masters selected their students based on their ability to handle the quality of education provided. Specialised schools began teaching engineering and art courses focused on design and architecture in response to the need for more systematic education in architecture.

Architecture education is believed to have begun in the Middle Ages when architecture was a secret knowledge provided only to select members in private lodges within masons [5]. In Louis XIV's France, the Académie Royale d'Achitecture was established, which was the first school of architecture that separated construction from architecture [6]. Over the centuries, numerous changes have occurred in how architecture and design are taught in educational institutions worldwide. Today, architects are individuals who have received formal education and training in architecture and are capable of designing functional, aesthetically pleasing, and sustainable buildings [5, 7, 8].

III. THE EMERGENCE OF STUDIO-BASED LEARNING IN ARCHITECTURAL EDUCATION

Studio-based learning in architecture originates in two of the most renowned art movements: the School of Fine Arts, commonly referred to as the Ecole des Beaux-Arts, and the Bauhaus [3]. In the Ecole des Beaux-Arts system, the central premise was the "problem of design," where students developed their projects under the scrutiny of their instructor. The finished projects were placed in carts, known as "charrettes," and transferred for critique by the "master." The French Academy of Painting and Sculpture, established in 1648, marked the beginning of group-organised education [3]. Nevertheless, the value of education was perpetually dominated by the master's knowledge of the field.

The advent of the modern movement brought about the abandonment of the Beaux-Arts system and the establishment of the Bauhaus by Walter Gropius in 1925 [3, 9]. The Bauhaus system aimed to train students to be craftsmen by combining modern technology with art and teaching them the practical skills needed to build as soon as they entered the workshop. The instruction included hands-on and dynamic learning, with the studio model being the locus for every student activity.

Despite challenging the educational tradition taught in the Beaux-Arts, the fundamental learning approach within a studio remained unaltered. However, it was not until the 1800s that studio-based architectural learning began to be employed [10]. Today, studio-based learning continues to be a pivotal component of architectural education, imparting students with both theoretical and practical knowledge that is indispensable for achieving success as architects.

IV. THE CURRICULUM CONTENT OF ARCHITECTURE EDUCATION

Architecture education has always been a subject of debate and uncertainty regarding its academic classification, with some institutions classifying it as a branch of humanities while others place it within the domain of social and environmental studies or engineering and design [11]. The hybrid nature of architecture education makes it challenging to categorise. A good architecture education should integrate both theoretical and practical aspects rather than focusing on one or the other [12]. The curriculum content of architecture education can be broken down into four categories, namely fundamental courses, scientific and technological formation courses, design and communication courses, and design studio courses [13].

Fundamental architectural formation courses provide students with a theoretical knowledge base they will later draw upon when designing their work. These courses include The History of Architecture, Theory of Architecture, Architectural Design Principles, Environmental Psychology, and professional practices. While instruction focuses more on the theoretical than the practical, the emphasis is on developing a solid foundation for the study of architecture.

Scientific and technological formation courses include Construction, Building Technology, Structures, Materials, and Environmental Science, among others. These courses are both theoretical and practical in nature, with an emphasis on providing students with knowledge and skills that can be directly applied to practical work.

Design and communication courses like Architectural Graphics, Technical Drawing, and Model Making have an artistic focus. The use of computers in architectural design, such as Computer-Aided Design (CAD) and 3D modelling, also falls under this category. These courses are practice-based, with the desired end result being the ability to prepare and express design ideas. The curriculum content of these courses can vary widely based on the program being studied.

The studio is the most crucial aspect of any architecture education curriculum, where students attempt to merge all the knowledge and skills gained within all other courses. Students spend the most credit hours in the studio, giving them the knowledge and expertise to make effective, innovative, and creative architectural designs [13, 14]. The

studio provides practical design experience and teaches students to balance poetic and pragmatic thinking in their creations. The curriculum content of the design studio involves tackling educational, conceptual, technological, theoretical, and historical design problems.

All effective studio courses must have four things in common [15]: studio may never be skipped or replaced with a similar number of credit hours, students must learn how to design by actually designing projects, face-to-face interaction, and criticism must be the primary educational tools used in the studio, and finally, students must learn how to balance poetic and pragmatic thinking in their creations. Therefore, the curriculum content of architecture education is a seamless marriage of all four elements, namely art, science, craft, and technology, and demands a wide variety of skills to be successful [16].

V. DUALISTIC NATURE OF STUDIO

The studio in architecture education is a unique entity that embodies a dual nature. It is not merely a physical space but a pedagogical approach that nurtures aspiring architects' creative and technical development. As a physical space, the studio is an environment of concentrated activity where students engage in various design exercises, discussions, and critiques. It serves as a hub for collaborative learning and provides a setting for students to interact with peers, mentors, and industry professionals. The studio's physical attributes, such as lighting, ventilation, and ergonomics, are carefully considered to foster an atmosphere that is conducive to creativity and productivity [17, 18].

However, the studio's nature extends beyond the physical realm. It is an environment that is shaped by pedagogy - a structured approach to teaching and learning that aims to develop critical thinking, problem-solving, and technical skills [18]. The studio curriculum is designed to provide students with a comprehensive understanding of architecture and its many facets. Studio curriculum centers on the student and leverages project-based problem-solving as the primary instruction means. Typically, studio projects are derived from real-world problems or issue-based scenarios, providing a practical framework for students to develop their design skills. Students develop their design skills through coursework and individual projects, engage with architectural history and theory, and learn about construction and materials. Furthermore, the studio encourages students to explore innovative design approaches, challenge convention, and push the boundaries of what is possible. Studio pedagogy provides a dynamic and interactive learning experience that prepares students for real-world challenges by engaging students in the practical application of design principles.

The dual nature of the architecture design studio is a vital aspect of architectural education. It combines a physical space with pedagogy to create an environment that is rich in creativity, innovation, and learning. By providing students with a holistic understanding of architecture and design, the studio prepares them to become thoughtful, skilled, and visionary architects who can make meaningful contributions to the built environment.

VI. STUDIO LEARNING MODELS

There are different types of learning models for studio pedagogy and physical space. In this section, some well-known models of studio learning are discussed.

Studio as Office

One model is the studio as office approach, where students gain theoretical and practical knowledge through the design studio process. They learn to blend this knowledge with imagination to create designs [8, 13, 19]. The studio, a dedicated physical space, plays a crucial role in architectural education, providing a creative stimulus and promoting student interaction [20].

The studio environment resembles an architectural office, where buildings, real cities, and other structures are designed, refined, and transformed, mirroring the real-world conditions of architectural practice [11, 16]. However, the educational studio is not a mere replication of an architectural office since its primary goal is learning rather than earning [21]. Therefore, while there are similarities between the studio and an architectural office, they differ in certain aspects.

Studio as a Workshop

Norman Foster and many other architects view the studio as a workshop for developing creative projects [22]. According to Foster, a studio is not merely a space where design work is carried out but rather a place where individuals come together to participate in the design process [23]. In other words, the studio serves as a meeting and production place for people studying or working on a creative project or subject [20, 22]. The studio as a workshop encourages active design participation from various stakeholders rather than simply becoming passive audiences listening to design presentations in a meeting room.

The Foster & Partners studio, located on the Thames Riverside in London, serves as an excellent example of a studio as a workshop [22]. This studio includes a model workshop, graphics department, and photography studio, all under one roof. The studio is open 24 hours a day, seven days a week, accommodating over 550 architects working on various design projects. Most of the architects work on long tables in the main design studio, which is filled with sketches, drawings, models, material samples, and computers.

Vertical and Horizontal Studio

There are two primary types of studio settings in architecture education: horizontal and vertical [24, 25]. Horizontal studios consist of students of the same educational level studying together without mixing them with students from other academic levels. In contrast, vertical studios have students

from multiple academic levels studying together and may even include students from various disciplines.

Horizontal studios prioritise homogeneity, sameness, and mono-culture, while vertical studios emphasise diversity, multiplicity, and multi-culture. Consequently, horizontal studios can be characterised by consistency, clarity, and stability, while vertical studios can be characterised by continuous development, accumulation, and liberation.

Vertical studios are considered to be micro-knowledge communities [24]. These studios provide an environment where both implicit and explicit knowledge can be more effectively generated, transferred, and applied. Moreover, vertical studio environments tend to produce better learning outcomes as they facilitate more collaboration among students from various educational levels. This creates more opportunities for instructors to apply specific architectural curricula and better define the hidden curriculum [26].

Studio Without Walls

Architecture students often spend long hours isolated in the studio, disconnected from the outside world [20]. Many architecture schools follow a traditional approach, confining students to specific spaces, times, and learning methods through either formal structures or informal socialisation processes. However, this approach may not fully prepare students for the practical world of architecture [14, 27]. In contrast, the studio without walls rejects the separation between theory and practice, education and profession [28], extending learning beyond the boundaries of the studio and the school.

By involving students in real-world projects with community, regional, or national organisations, the studio without walls provides opportunities for students to engage with various stakeholders in the design, including clients, users, architects, engineers, contractors, statutory authorities, and others. With traditional studio boundaries removed, students can learn from those with first-hand knowledge and experience in multiple fields of study.

The key to the success of the wall-less approach is to enable students to deal with real problems and solve them in real time, allowing them to be creative within real-world constraints. Working on real projects also helps to develop collaborative techniques and skills in communication and participatory practice, which are essential for future architects.

Virtual Studio

The concept of a studio can now extend beyond physical spaces to virtual spaces. With the rapid development of 2D and 3D design programs along with advances in information and communication technology, the virtual studio experience has reached a new level. The virtual studio provides a platform where students from different locations can participate in solving the same design problems or working on the same design projects without any temporal or spatial restrictions [29].

Virtual studio supports online cooperation and enables sharing of intellectual resources for architectural education beyond the geographical limitations of physical studios [30]. It also eradicates cultural, ethnic, and time zone differences, facilitating real-time worldwide collaboration. In fact, the virtual studio enables continuous online information exchange with parties from different corners of the world. This helps students keep up with the rapid changes in architecture and technology. However, studies show that virtual studios are seen as an alternative to traditional studios rather than a replacement [30-32] despite their many advantages.

Future Studio

The rapid development of technology has revolutionised architectural education, and the future studio is expected to be no exception. The new generation of architecture students is already leveraging information and communication technology (ICT) in their design process. Future studios may take advantage of ICT to integrate information and facilitate collaboration for decision-making in the design process [30]. It is anticipated that future studios will be a place where students not only design but also live, build and assess their work. While it is challenging to predict the exact nature of the future studio and how it will integrate with new ICT, it is clear that technology will play a crucial role in enhancing studio-based learning [29, 30]. The emerging role of ICT in remodelling the future studio as both pedagogy and physical workspace is intriguing, particularly in architecture education, where the studio is primed for a rebirth to keep up with new technological developments.

VII. CHARACTERISTICS OF STUDIO

The studio is a unique learning environment that offers a high level of interactivity, design life, and social reflexivity. Unlike the typical classroom setting, the studio allows students to live and breathe design and adapt to their working styles and pace of work. There are four main characteristics of a studio as an architectural learning environment.

Firstly, the studio is an interactive design teaching and learning environment. Ledewitz [33] describes the studio as a physical environment in which students are taught three fundamental aspects of design education. They are trained to think architecturally, learn and practice a new language, and learn and practice new skills such as representation and visualisation. The studio offers a platform for students to learn these three aspects simultaneously and in relation to each other. Moreover, the studio's educational experience supports the cognitive abilities of designers as an instrument theory through the open-ended process of problem-solving and design theory.

Secondly, a studio is more than an ordinary classroom. Brandt et al. [34] suggest that the studio is a great learning environment but offers much more than an ordinary classroom. Unlike learners of other modern subjects, architecture students spend far more time in these environments. The extra time spent in the studio can comprise up to one-third or one-half of the educational experience [35]. Students may work on a single project over a continuous period of time in the same studio setting. Therefore, the student has the opportunity to adapt their work area to their own needs, working style, and pace of work.

Thirdly, the studio supports design life. Design life is an essential characteristic of the studio as it offers a platform for students to live and breathe design [36, 37]. Students may work at their desks, use the studio for a quick meal, or simply meet with friends. The studio is open for students to engage in different activities, including work and social activities, during the day or night. The studio provides a unique space for design students to develop their ideas, create, and learn.

Lastly, the studio offers a high level of social reflexivity. The studio is a learning environment that embraces a high level of social reflexivity where users actively shape their unique culture, norms, and so forth [38]. The students and instructors meet around a table to discuss the project at hand. The space becomes very familiar, and students can leave work in progress rather than having to set up anew each time. Moreover, as the project deadline gets closer, students and instructors routinely spend time in the studio before and after regularly scheduled hours, including weekends, nighttime, and even during holidays.

VIII. USERS OF STUDIO

In the realm of architecture, the studio serves as a vital learning space where students and educators interact in a setting that facilitates teaching and learning activities [39]. The user group of the studio is diverse, including educators, students, administrators, technicians, visiting critique panels, and visitors, among others. However, the primary users are mainly students and educators, who spend the majority of their time in the studio.

As Kopec [40] notes, a user group is a defined set of individuals who will be utilising the space for a predetermined function. In the case of an architecture studio, this function is the preparation of students for real-life practice in the field of architecture. The way theoretical concepts are covered and the process of preparing architecture students for practice depends on human relationships that occur inside the studio.

The interaction between peers is a crucial aspect of the learning process in the studio. Students learn from one another, and the studio provides a space for the occurrence of sharing and peer learning activities. Students spend the bulk of their time in the studio, interacting with their peers and engaging in group activities, which can positively or negatively affect their learning experience [18].

In addition to peer interactions, the interaction between lecturers and students is also an essential component of design learning. Faculty members play a key role in shaping the studio's cultural ethos and teaching style [41, 42]. Lecturers are influenced not only by their own experiences of life, interests, and personalities but also by the kind of education they receive as architecture graduates or undergraduates.

Desk critiques are a crucial dimension through which interactions between lecturers and students occur. As pointed out by Austerlitz et al. [43], desk critiques are a complicated interweaving of design processes that are interrelated for both the lecturer and the student. These interactions happen not only during formal critiques but also while strolling to the studio and in hallways, among other informal settings. Studio interactions are much more complicated compared to traditional lecture formats, and several interpretations happen simultaneously, sometimes by different people and other times by the same people, in both a physical and psychological context.

The user group of the studio includes diverse individuals who utilise the space for the purpose of preparing architecture students for real-life practice. The interaction between peers and between lecturers and students is a crucial aspect of the learning experience in the studio. The studio provides a setting that facilitates a frank exchange of thoughts between both teachers and students, making it an indispensable element of the architecture learning process.

IX. STUDIO CULTURE

In the world of architecture, the studio model is an integral part of education that helps students develop the necessary skills and knowledge to become architects. The teaching methods of Ecole des Beaux Arts and the Bauhaus influence the studio culture that shapes this model [7]. The design studio encapsulates studio culture in a meaningful and memorable manner [44-46], showcasing lasting friendships, late nights working, and harsh critiques. The studio culture is defined as the unstated values, attitudes, and norms within architecture education, which can sometimes override the anticipated output of architecture learning when left unchecked [47].

The studio culture takes time to nurture and develop, and it is primarily influenced by modern forces such as globalisation, complexity, and information explosion [7]. The studio culture is simultaneously individualistic as it is dynamic and transmitted from generation to generation of students, lecturers, and architects. Students act as carriers over time which can only be expected to pass the infectious culture on to the next batch in a never-ending fashion.

The studio environment is a home and a workspace that students can freely explore with or without a guiding hand [20, 48]. Instructors come and go as they may or may

not be needed. After instructions are given, students are free to choose if they wish to make a go of it independently or with a guide. However, some scholars argue that the studio culture can also be the leading cause of dysfunctional behaviour, resulting in poor eating and sleeping habits and higher stress levels in the learning environment [49, 50].

The critics of the studio culture argue that it is the leading cause of unhealthy work habits and that students immersed in the culture spend too much time inside the studio cocoon, leading to higher stress levels[51]. In defence of the studio learning model, it is argued that spending excessive hours inside the studio culture shell is up to the student [52]. It is a matter of individual volition, and no one is compelling the learner to live inside the studio.

Fisher [53] adopts the radical point of view by noticing patterns of exploitation in the design studio. It is widely cited that architecture students congregate primarily among themselves, confining themselves to the studios where the lights are constantly on, leading to a perception that they are highly eccentric [49].

Studio culture is a complex and dynamic culture that uniquely shapes architecture student education [48, 54, 55]. While the studio model provides valuable learning experiences within a studio context, it can also cause unhealthy work habits and dysfunctional behaviour. As such, it is essential to strike a balance between the positive and negative aspects of studio culture to ensure that students are given the best education possible.

X. CONCLUSION

This review paper provides a comprehensive overview of the role of the studio in architecture education. It offers valuable insights into how studio-based learning has become essential to architectural education by exploring its history, curriculum content, dual nature, learning models, characteristics, users, and culture. Therefore, the review paper offers important theoretical and policy implications for designing and implementing architecture curricula. Firstly, it highlights the importance of studio-based learning in architecture, which has a long history and has been shown to be effective in nurturing design skills and creativity in students. Secondly, it emphasises the dual nature of the studio as both a pedagogy and a physical space and provides insights into the different studio learning models and characteristics. Thirdly, it sheds light on the role of users in the studio, including the interactions between peers and between lecturers and students, as well as the unique studio culture that shapes the learning experience. These insights can inform the development of effective policies and strategies for architecture education that prioritise studio-based learning, incorporate diverse learning models and environments, and foster a supportive studio culture that encourages innovation, collaboration, and growth. Overall, this review paper contributes to understanding the importance of studios in architecture education and underscores its relevance in

preparing future architects to meet the challenges of a rapidly changing world.

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