


Article

Beyond Preservation: Heritage as an Educational Practice Process at 141 Neil Road, Singapore

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Abstract: Over the past two decades, the concept of heritage has been significantly broadened, with an increasing number of scholars viewing it not as a set of static objects with fixed meanings but as a social process consciously endowed with commemorative functions through human creation. This research illustrates and empirically supports this perspective through a case study. Initially, the paper reviews the development of the heritage concept through the literature review and elaborates on the idea of “heritage as process”. Subsequently, it examines Singapore’s enriching exploration and successful implementation of heritage conservation, particularly since 2000, when the local government shifted from preserving historical buildings to a comprehensive conservation strategy that embraces a sense of place, identity, and memory and encourages a bottom-up participatory approach. Finally, this paper takes the transformation of the century-old townhouse at 141 Neil Road in Singapore as its focus. After being renovated into an urban architectural heritage conservation laboratory, the house has gradually become a place of heritage on Neil Road by training professionals’ construction skills, transforming its function, introducing technological explorations, and enhancing public interaction. This process has developed the abilities of heritage conservation professionals in desktop research, reuse design, and practical construction skills while simultaneously promoting community participation and heightening awareness of heritage conservation among local residents. Through daily practices, this historical townhouse gradually became a place of heritage on Neil Road, exemplifying the research theme that “heritage is a comprehensive and dynamic practice encompassing social, cultural, and technological dimensions”. From being preserved for renovation in 2020 to being approved as a “Heritage Show House” by the Urban Redevelopment Authority (URA) in 2023, the case of 141 Neil Road offers a new perspective in the heritage conservation field that “heritage is always in the process of becoming, rather than a constant given”.

Keywords: built heritage; heritage in Singapore; heritage conservation; heritage practice; heritage as process



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1. Introduction

Heritage and its conservation have consistently been mainstream topics within academic research and public media domains, with the concept of heritage undergoing dynamic changes over the past two decades. The manner in which heritage is understood and regarded has seen significant shifts, transitioning from a singular focus on material preservation to a more diverse and dynamic practice of conservation [1]. Concurrently, as an integral component of national cultural “soft power”, architectural heritage conservation has garnered increasing attention from numerous countries, each embarking on rich explorations tailored to their unique contexts, leading to various developmental paths and models, presenting many cases worth emulating [2,3]. Among them, Singapore, despite its relatively late start in architectural heritage conservation, has employed mature, precisely targeted methods, achieving commendable implementation results [4]. Particularly

notable is the shift post-2000 towards a more participatory and inclusive conservation approach—where the government devises detailed heritage conservation plans and fosters partnerships to encourage societal involvement. This more inclusive conservation framework transcends physical preservation to include memories and traditions tied to a sense of place, emphasizing the public's ownership and management awareness of urban heritage [4]. During this period, various cases, such as the Golden Mile Complex, led by community efforts for heritage preservation, have emerged [5].

Case study research, aimed at gaining insights through evidence-based activities, offers a concrete, intuitive, and perceptible method to investigate abstract theoretical issues by systematically studying the design process, decision-making process, and outcomes of a particular built environment or project [6]. To better illustrate the theme of “heritage as a process of educational practice”, this article selects 141 Neil Road, located in The Blair Plain Conservation Area of Singapore, as a research case. This townhouse, built in the 1880s, transformed into the Architectural Conservation Laboratory of the National University of Singapore (NUS ArClab) after more than a century of residential use. Unlike the traditional process of assessment followed by renovation, 141 Neil Road has gradually become a living urban heritage through a step-by-step process involving functional transformation, on-site construction, and community participation in heritage education practices. In March 2023, this historic building was endorsed by the Urban Redevelopment Authority (URA) of Singapore as a “Heritage Show House”, demonstrating the transition from “being” (a static historical legacy) to “becoming” (a dynamic process continuously reinterpreted, endowed with new meanings and values through current social practices, cultural activities, and educational processes) heritage. This process addresses the relatively underexplored issue of “heritage as a process of people's own understanding, practice, and experience on-site”, contributing a new perspective to heritage conservation theory that “heritage is always in the process of becoming rather than a constant given” [7].

The research is structured into seven sections. Section 1 introduces the background of this study. Section 2 reviews the progress of heritage studies, emphasizing the significance of understanding heritage as a process. Section 3 explores the history, systems, and policies of architectural heritage conservation in Singapore. Section 4 outlines the background of the case study at 141 Neil Road. Section 5 examines heritage as an educational practice process from four perspectives. Section 6 discusses the insights derived from the 141 Neil Road case from three angles. Section 7 summarizes the main findings and discusses the contributions of this case from the perspective of heritage education practice to the concept of “heritage as process”.

2. Interpreting Heritage: Heritage as Process

As a broad concept, “heritage” has been defined in many ways, and as Harvey points out, “there seem to be as many definitions of the concept of heritage as there are heritage practitioners” [8,9]. Within the cultural sphere, the concept of “heritage” has experienced dynamic shifts, with its connotations and denotations continuously expanding. The 1964 Venice Charter was the first to define “cultural heritage”, reflecting heritage notions that evolved in England and France from the 18th to the 19th century. This traditional view of heritage conservation focuses on preserving the physical material of buildings to prevent decay and maintain authenticity [10]. Subsequently, influenced by global shifts such as globalization, democratization, economic expansion, and the rise of mass tourism, the scope of heritage has broadened significantly, both in terms of typology and scale and in relation to the time interval between creation and preservation. The theoretical and practical domains of heritage conservation have rapidly evolved [11]. Groups striving to gain recognition for their cultural values challenged the traditionally expert-driven process known as the “Authorised Heritage Discourse (AHD)” [12], highlighting how different social classes imbue heritage sites and objects with varied meanings [13]. Historian David Lowenthal, for example, has said that national monuments, family heirlooms, and children's toys all have the same value for different social groups [14]. The emphasis on social values and collective

memory has prompted consideration of heritage's intangible dimensions. In recent decades, an increasing body of research has shifted away from viewing heritage as a collection of static objects with fixed meanings. Instead, heritage is seen as cultural material creation actions that reflect memories, identities, lifestyles, and the relationships between people and places [15] and as a societal process that consciously imparts commemorative functions, including the identification and delineation of heritage, usage norms, focal points of value, and modes of interpretation [16,17], as well as the continuously evolving, future-shaping creative processes [18].

As the notion that "different social strata endow heritage with distinct meanings" gains widespread acceptance, academic discussions on heritage authenticity have shifted from expert evaluations to the perspectives of emotions and personal memories [14]. Despite Singapore's emphasis on the value of community landmarks and place heritage since the 2010s to strengthen Singaporeans' identity, the country's heritage research predominantly targets grand narratives. For instance, many studies concentrate on well-known historical districts such as Chinatown and Little India [19,20], the cultural and creative district Kampong Glam [21], and thematic parks as tourist landscapes [22]. And the research content mainly revolves around heritage values, including discussions on how Singapore's monuments and conservation areas are selected to elucidate the politicization of heritage [23]. Community heritages that are not grand or commemorative, like the private residence and everyday use building at 141 Neil Road, hold significant cultural value but are less mentioned in the literature. Furthermore, regarding the perspective that "heritage is a created process", some scholars within the architectural heritage field have offered interpretations. For instance, the transformation of Singaporean playgrounds from community landscapes into community heritages has been examined from the perspective of everyday geography [9]; heritage conservation is understood as a social process facilitated by participatory methods, with frameworks developed to explore people's views, attitudes, and behaviors towards cultural heritage [24]; "heritagization process" of industrial heritage from its inception, through intermediary phases to its culmination, has been delineated [25]. Yet, the number of such example-based studies, remains limited at this stage.

High-quality heritage education and training are crucial means to achieve the goal of "linking the past, present, and future". In this regard, the importance of practice is emphasized, and the significant complementarity between reflection and action makes it desirable to promote the use of "reflective practice" in heritage education [26]. In addition, heritage conservation education has been recognized as encompassing fieldwork, partnerships, interdisciplinary collaboration, local values, and community participation [15]. In specific heritage conservation practices, Widodo took the community heritage of Ban Panthom, Bangkok, as an example, demonstrating that the maintenance of community heritage should view conservation as managing differences, changes, and diversity and that heritage education for the community and younger generations should achieve synergy between global and local, professional, and broad education [27]; Cheah explored the adaptive reuse of two shophouses on Heeren Street in Malacca, turning the shophouses into spaces for teaching and practice, where students learn and simultaneously become creators of heritage [27]. Therefore, this study, by taking the everyday use building at 141 Neil Road as a case, not only adds to the attention on atypical heritage objects but also demonstrates how educational practices can be integrated into the heritage process, offering a new perspective for exploring and understanding the multidimensional value of heritage.

3. The Evolution of Heritage Conservation in Singapore

Singapore's journey in heritage conservation has transitioned through five distinct phases: the origin period (1960s–1970s), the formative years (1980s), the turning point (1990s), the new frontiers (2000s), and the closer partnerships period (2010s to present). From the early focus on national monuments to the conservation of districts and historical sites, and now the emphasis on identity, Singapore's practice in heritage conservation has

significantly evolved. Although the concepts of “Conservation”, “Rehabilitation”, and “Rebuilding” were introduced in the 1960s as part of urban renewal principles, the primary focus remained on urban development and housing [28]. In 1986, the URA launched Singapore’s first Conservation Master Plan, expanding the concept of conservation from individual historical buildings to entire historical districts. This marked a new phase where heritage conservation progressed alongside urban development, gradually unveiling the touristic value of urban heritage [28]. Following this, the Singapore government maintained cooperative partnerships with private owners to enhance infrastructure and improve the living conditions in historic districts. In the early 2000s, with changing political climates and public desires, the government gradually shifted from a top-down approach to heritage conservation towards a more participatory strategy, aiming to foster a sense of identity and responsibility towards heritage among Singaporeans [29]. As many historical buildings were preserved, restored, and adapted for modern use, the 2010s saw a shift towards valuing “place” in heritage conservation. This phase highlighted the significance of landmark buildings to residents’ identity, memory, and sense of place. Important architectural heritages were transformed and reused as homes for the arts, meeting the public’s desire to strengthen connections with Singapore’s history and heritage. Meanwhile, the government, through the “Architectural Heritage Season”, held various art and cultural heritage promotion activities, such as film screenings, public lectures, guided heritage trails, and street festivals closing roads, signifying a policy shift from tangible “hardware” to intangible “software” aspects of heritage conservation [28]. Concurrently, a growing public interest in participating in heritage conservation led to government policies gradually moving towards a more comprehensive, collaborative approach. This included promoting traditional and cultural activities that enhance “place” and placing greater emphasis on the social value of heritage to the community [29]. Individuals and communities gained more say in establishing architectural heritage, with civil groups making architectural heritage easier to understand and access through methods such as lectures and filmmaking. The journey of heritage conservation in Singapore is shown in Table 1.

Table 1. Heritage Conservation History of Singapore.


| Period | Phase | Conservation Concept | Impactful Events | Representative Cases |
|--------|--|--|---|---|
| Origin | 1960s | Urban planning prioritized reconstruction needs, designating certain buildings for preservation. | 1963: The UN’s second technical assistance on urban renewal to Singapore focused on conservation, rehabilitation, and rebuilding. | 1970: Government quarters renovated into offices by URA.  |
| | 1970s Why Preservation is Necessary | | 1971: Establishment of the Preservation of Monuments Board (PMB). 1974: Establishment of the Urban Redevelopment Authority (URA). 1977: Restoration of 14 three-story Art Deco-style shophouses on Murray Street. | |

Table 1. Cont.

| Period | Phase | Conservation Concept | Impactful Events | Representative Cases |
|---------------------|---|---|---|---|
| Formative Years | 1980s Development and Preservation Coexistence | <ol style="list-style-type: none"> 1. Develop feasible conservation area plans. 2. Implement pilot projects. 3. Draw on international experience to allow for adaptive reuse. | <p>1984: Setting up of the Tourism Task Force.</p> <p>1986: Development of the Central Area Structure Plan.</p> <p>1987: URA launched its first shophouse conservation project in Tanjong Pagar.</p> <p>1989: URA becomes a national conservation authority through amendments to planning laws.</p> | <p>1987: Demonstration projects at 9 Neil Road and 53 Armenian Street.</p>  |
| The Turning Point | 1990s More Meticulous Protection Efforts | <ol style="list-style-type: none"> 1. Pair low-density conservation zones with high-density development areas. 2. Guide and incentivize private sector participation in heritage preservation. 3. Establish an Architectural Heritage Award to promote awareness of heritage conservation. | <p>1991: Development of the Private Owner Scheme.</p> <p>1993: Establishment of the National Heritage Board (NHB).</p> <p>1995: Launch of the Architectural Heritage Award by URA.</p> <p>1997: The PMB became an independent statutory board under the Ministry of Information, Communications and the Arts.</p> | <p>1997: Renovation of China Square in Chinatown.</p>  |
| New frontiers | 2000s Developing the Necessary Infrastructure | <ol style="list-style-type: none"> 1. Modernize historic districts through infrastructure renovation. 2. Balance infrastructure development with neighborhood aesthetics, flexibly navigating the relationship between safety regulations and architectural integrity. | <p>2000: Setting up of the Urban Redevelopment Concept Plan Review, open to groups from all sectors.</p> <p>2002: Implementation of the Identity Plan to strengthen citizens' connections with local history.</p> <p>2002: Establishment of the Conservation Advisory Panel.</p> | <p>2005: Redevelopment of Clarke Quay.</p>  |
| Closer partnerships | 2010s- Intangible Heritage and Greater Public Engagement | <ol style="list-style-type: none"> 1. Beyond the physical conservation of heritage, emphasizing intangible cultural heritage. 2. Highlight the contribution of social and historical memory to heritage value. 3. Heritage and Identity Partnership and greater public engagement. | <p>2013: PMB becomes the Preservation of Sites and Monuments (PSM) division under the NHB.</p> <p>2015: Singapore Botanic Gardens designated as a UNESCO World Heritage Site.</p> <p>2018: URA establishes the Heritage and Identity Partnership (HIP).</p> | <p>2010-: Multiple community activities during the Architectural Heritage Season.</p>  |

Picture source: Past, Present and Future: Conserving the Nation's Built Heritage [28].

In recent years, the Singapore government has increasingly valued the social significance of heritage, leading to the emergence of “Place Heritage”, a comprehensive form of heritage that encompasses both tangible architectural environments and intangible aspects,

such as communities, lifestyles, and natural ecologies. This strengthens identity and closely links residents with their place [29]. Based on this philosophy, several key community landmarks have been preserved, capturing Singaporeans' memories, especially from the post-independence era. For example, the Golden Mile Complex, a modernist building completed in 1973, once attracted a large number of locals and tourists for leisure and entertainment, becoming a memory for a generation and a community center for the Singaporean Thai cultural group. Despite facing demolition risks in 2018, through collective advocacy from various sectors of society in 2020, it was officially designated as an "architectural heritage" site, securing its preservation and refurbishment [30]. In 2022, the National Heritage Board of Singapore, after extensive consultation with residents, developed the "Our SG Heritage Plan 2.0", outlining the vision and detailed plans for heritage conservation from 2023 to 2027, emphasizing the crucial role of community efforts and enhancing cooperation with community groups, cultural heritage NGOs, and volunteers [31]. In the same year, the URA awarded the "Architectural Heritage Awards" to six heritage projects, including 5 and 7 Gallop Road, to recognize their contribution and feedback to the community's public spaces or cultural resources, recognizing well-restored monuments and conserved buildings in Singapore, and the people behind them [32]. Recognizing the long-term value created by local heritage for the community, the public has actively engaged in heritage conservation actions, with grassroots initiatives and plans emerging continuously. The case study to be discussed in this article—141 Neil Road—highlights its value against this social backdrop. By transforming into a place for teaching, enhancing students' hands-on construction experience, and encouraging public participation, 141 Neil Road has become a vivid example of urban heritage conservation.

4. Place Heritage: The Historical Background of 141 Neil Road

Before becoming the NUS ArClab, 141 Neil Road was a typical Singaporean townhouse. These narrow and deep terraced houses, iconic to Singapore's architectural identity, date back to the 1840s. Their slender frontages were designed to maximize the number of storefronts along the streets, enhancing commercial viability, and by the 1960s, they formed the urban fabric of the old city center [28].

4.1. Historical Context of Blair Plain

Constructed in the early 1880s, 141 Neil Road is situated within the Everton Estate of the Blair Plain Area, a traditional Straits Settlements terraced house district near the Chinatown neighborhood, which was gazetted for conservation in 1991 [5]. Figure 1 shows the location of 141 Neil Road, Blair Plain, and Chinatown. In the 1880s, Neil Road attracted a number of influential businessmen to live there, including the prominent overseas Chinese industrialist and banker Lim Yew Teok. He is the earliest recorded resident of 141 Neil Road (then known as Neil Road 56–5) and purchased the townhouse for residential purposes in 1913. By the end of the 19th century, the surging immigrant population led to overcrowding and chaos in Chinatown, prompting affluent Chinese families to relocate to nearby areas seeking better living conditions. Benefiting from the maritime trade boom, the Blair Plain Area, close to the port, saw improved infrastructure and became a preferred location for these families. The district saw its first major development at the end of the 19th century, with the construction of shophouses and townhouses continuing into the 1960s, resulting in a blend of facade styles and architectural forms showcasing a mix of Chinese, Malaysian, and European design elements. Photographs of Neil Road at different times are shown in Figure 2. An overview of the history of 141 Neil Road and photographs of its current condition are shown in Figures 3 and 4.

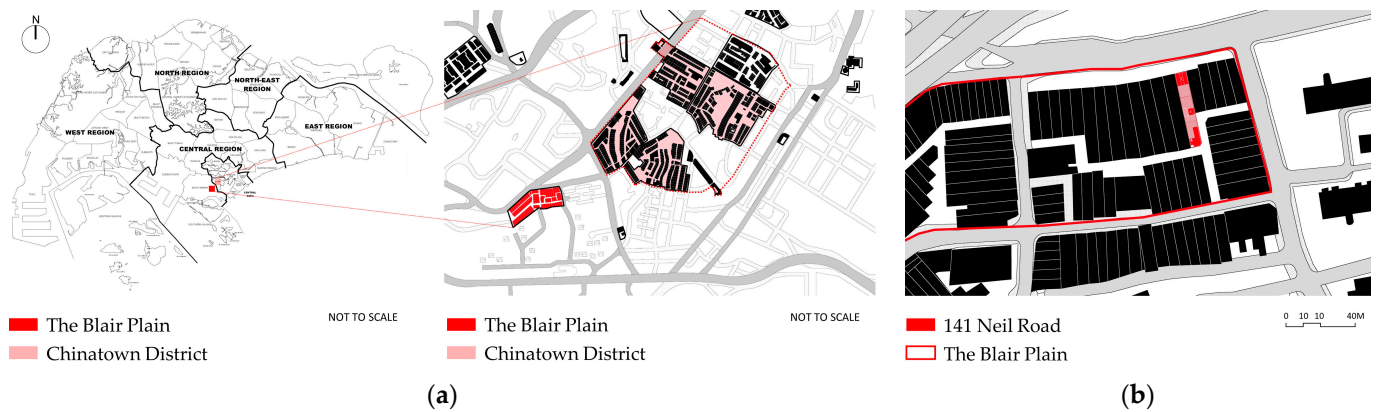


Figure 1. Location of the study case: (a) location of the Blair Plain and the Chinatown District (Picture source: <https://www.ura.gov.sg/Corporate/Planning/Master-Plan>, accessed on 12 March 2024); (b) location of 141 Neil Road.



Figure 2. Neil Road Neighborhood Past and Present: (a) Neil Road Street View 1990 [28]; (b) Neil Road Street View 2023 (photos by authors).

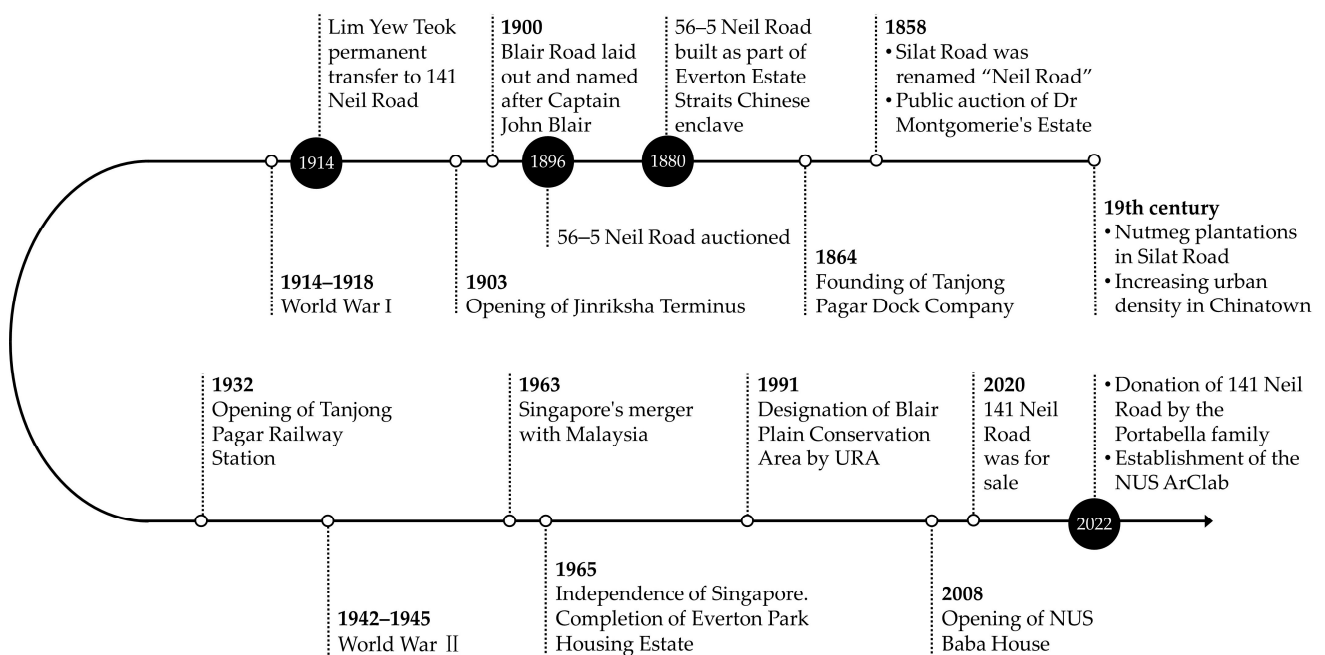


Figure 3. Historical background of 141 Neil Road.



Figure 4. Photograph of 141 Neil Road in current state (photos by authors).

4.2. Architectural Overview of 141 Neil Road

Oriented north–south, 141 Neil Road exhibits typical townhouse characteristics: a narrow and long layout with a width of 6.9 m, a depth of 50 m, covering an area of 297 m², and a total built-up area of about 447 m². The building features a small courtyard at both the north entrance and the south end, with an airwell in the center; it has a two-story main structure with a partial third floor. The general plan, floor plans, and internal spaces of 141 Neil Road are shown in Figure 5. The townhouse displays the “First Transitional” style, characterized by its relative simplicity and restrained decoration, yet it is filled with eclectic aesthetics. At the entrance to the townhouse courtyard, there is a Malaysian wooden half-gate known as Pintu Pagar. The facade is partially decorated with fine reliefs and Qianci decorations, with a “Fortune” Chinese character plaque above the door, and the interior floors are laid with Art Nouveau-style tiles. The elevation and section of the townhouse are shown in Figure 6.

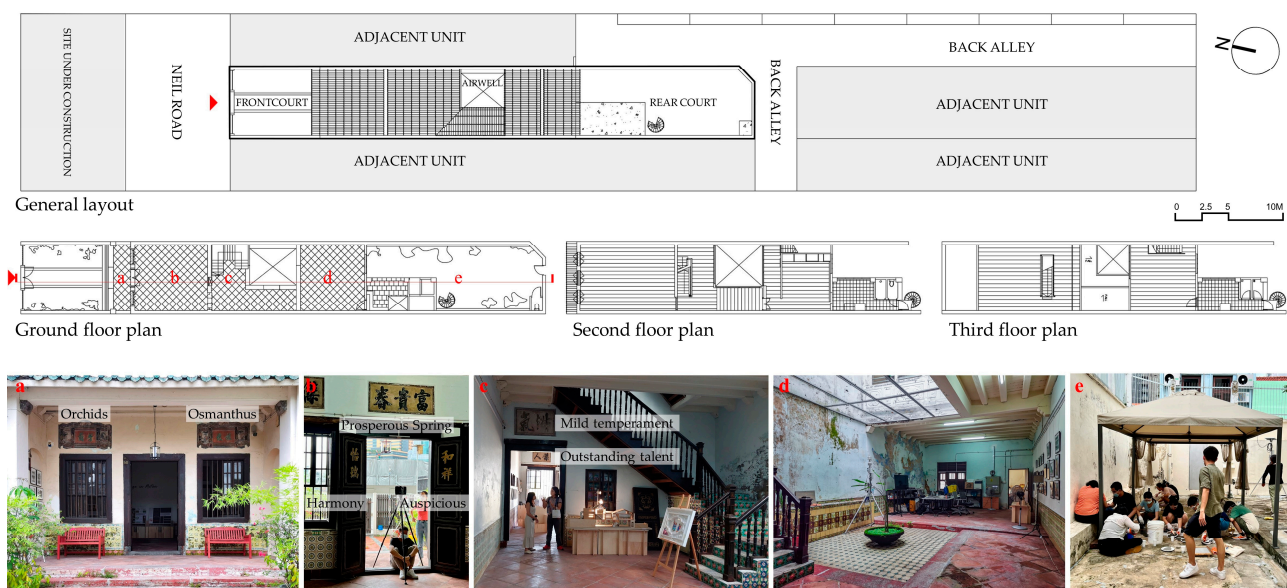


Figure 5. The general plan, floor plans and internal spaces of 141 Neil Road (photos by authors).

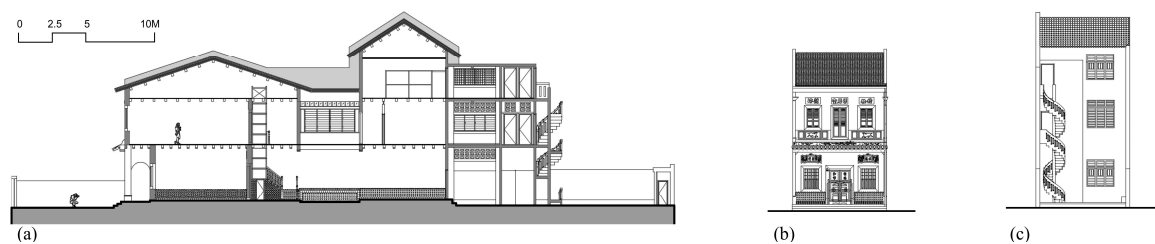


Figure 6. Elevation and section of 141 Neil Road: (a) section of the townhouse; (b) north elevation of the townhouse; (c) south elevation of the townhouse.

141 Neil Road bears witness to the thriving entrepôt trade and increasing Chinese immigrant population in late 19th century Singapore, as well as the entrepreneurial and leadership spirit of the local Straits Chinese, who propelled the local industry's transformation from agricultural plantations to entrepôt trade. The exquisite Chinese reliefs, Art Nouveau decorative tiles, and fence doors reflect the multicultural fusion prevalent in Singapore at the time. As a building with a long history and aesthetic value, 141 Neil Road holds significant cultural importance for the local community.

In 2020, following its acquisition by the Portabella family, 141 Neil Road was donated to the National University of Singapore to serve as an architectural conservation laboratory. Its purpose is to enhance the training of professionals in the field of heritage conservation through documenting and maintaining historical buildings, developing innovative technologies and creative designs, and conducting broader social research. Additionally, it introduced exhibition functions to promote interaction with community residents and evoke the public's historical memory of the Blair Plain Conservation Area, achieving synergy between specialized and wide education [33].

5. Managing Heritage: The Practical Process at 141 Neil Road

By 2022, after minimal organization and refurbishment, 141 Neil Road was transformed into an urban architectural heritage conservation laboratory, serving as a venue for education and training among Singapore's young professional generation. To cultivate professionals' abilities in desktop research (including study, evaluation, decision-making, and management), reuse design creativity, and hands-on construction skills with various building materials [34], and to awaken community awareness and identity towards Blair Plain, 141 Neil Road initiated a practice process involving both architecture students and the community.

5.1. Construction: A Structure for Students to Probe and Work On

The importance of learning about and understanding traditional building materials, construction techniques, and craftsmanship for the repair and conservation of historical buildings is undeniable. To address the challenge of a shortage of trained craftspersons for historic building conservation and traditional building materials in Singapore, 141 Neil Road not only serves as a place for research but also transforms itself into a "living laboratory", a structure for heritage conservation students to explore, allowing them to have a deeper understanding of material compositions during architectural maintenance training practices.

Facade conservation, critical due to its vulnerability to aging and damage, plays a significant role in the transformation process at 141 Neil Road. Like many old buildings on Neil Road, it initially used porous building materials, allowing walls to "breathe" by slowly solidifying through carbon dioxide absorption and expelling moisture through joints. Modern damp-proofing techniques, which trap water outside the structure, compromise this breathability, making it challenging to address internal damp issues. Unfortunately, skilled artisans who worked with lime, kilns, and lime disappeared from Singapore around the mid-20th century [5]. To tackle the compatibility issues between modern building materials and historic structures, 141 Neil Road explored the use of original or similar

materials for restoration by conducting various lime tests and mixture trials, applying them to the townhouse's deteriorating old walls, and tracking the actual effects of various lime plaster mixtures as a way of understanding traditional construction techniques through practical training. Beyond plastering techniques, the venue served as a training ground for activities such as cleaning, restoring bas-reliefs and tile finishes, learning Qianci crafts (a technique of decorating the exterior of buildings with small, polished pieces of colored porcelain), and repairing colored glass. These activities foster practical skills among heritage conservation students through hands-on experience. The heritage conservation curriculum emphasizes the significance of traditional building techniques and advocates for deepening the learning of heritage conservation through practical training. In this process, 141 Neil Road is a teaching venue and an important resource for learning and practicing heritage conservation. In this process, hidden historical elements of 141 Neil Road were uncovered, and students became creators of heritage through construction practice.

5.2. Design: Functional Transformation from Residence to Heritage Education Classroom

Typically, architectural transformations should adapt to the history, characteristics, scale, and interior layout of the original building to minimize interventions and ensure the best preservation of heritage values. The spatial layout of 141 Neil Road underwent no significant changes, with only minor repairs and performance improvements at certain structural nodes. Currently, its ground floor indoor and outdoor spaces serve as educational venues, imparting knowledge on historical building management and maintenance to students. The small entrance hall is used for exhibitions and explanations, displaying the building's history, students' heritage initiatives, and transformation visions, often serving as a showroom for students' heritage conservation coursework. The space around the airwell becomes the main teaching area, open and unfurnished, primarily for lectures and group discussions. The backyard serves as an outdoor experimental site for activities like cement mortar mixing, plastering experiments, and tile repairs. Additionally, the Architectural Conservation Laboratory is open to the public, planning short courses for heritage management professionals to equip them with the necessary skills and knowledge.

Besides its educational functions, 141 Neil Road itself is an object of study. Situated in a historic district that was once part of Singapore's colonial urban center, the land's transition from large plantations to residential areas, coupled with the rise of entrepôt trade and its identity as a Straits Chinese enclave, reflect Singapore's industrial transformation and rapid development. In the 1990s, the entire district was designated as a conservation area by the URA, with 141 Neil Road serving as a window into the area's history. Examining the building itself and its relationship with the townhouses and district helps the public better understand the material culture and social activities of past Straits Chinese and contemplate urban planning and social structures.

5.3. Technology: Utilizing Innovative Tech to Optimize Heritage Recording and Monitoring

In the conservation process, 141 Neil Road embraced new technologies not only to restore the building's function but also to create an open-access digital archive for research and education, thereby enhancing understanding and experiences of heritage. Students used 3D scanning for spatial surveys, improving accuracy and efficiency, and developed a digital archive of 141 Neil Road, including drawings, models, and architectural elements. Restoration efforts also explored combining traditional craftsmanship with new technologies like 3D scanning, modeling, and printing to document, study, and restore architectural elements of various sizes and materials within the building. For instance, heritage conservation students captured the intricate details of a bas-relief panel near the airwell with a portable scanner, built a digital model using a handheld LiDAR scanner, and, after careful comparison and material selection, printed the panel with a 3D printing technology. Researchers also explored the practical use of nanocoatings, which offer pollution resistance, UV protection, and elasticity, extending the life of 3D-printed

components [35]. Finally, the bas-relief panel was seamlessly installed after cleaning, assembling, and sanding.

Technology has also enhanced the heritage experience. 141 Neil Road utilizes an energy management system for building energy consumption monitoring, data analysis, and management. Three small environmental monitoring stations were established in the front yard, backyard, and airwell to track outdoor meteorological parameters in real time, including temperature, humidity, wind speed, direction, cloud cover, and rainfall, and to monitor the impact of nearby construction vibrations on the historic building. This facilitated simulations of 141 Neil Road's outdoor thermal environment and helped professionals understand how dense environments affect the microclimate of historic districts. Monitoring both indoor and outdoor air environments also enables timely adjustments inside the historic building, improving the experience for heritage users. The innovative technology used at 141 Neil Road is shown in Figure 7.

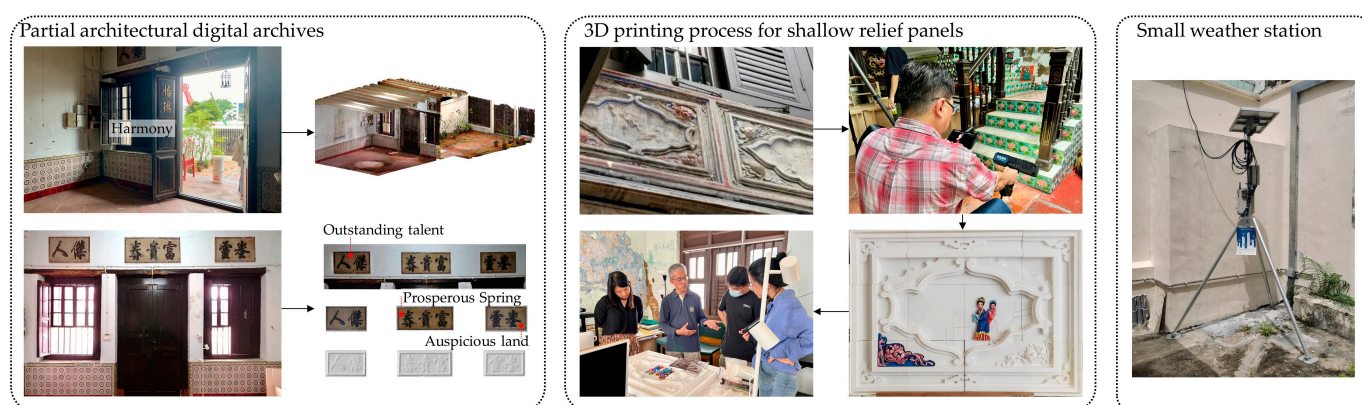


Figure 7. New Technologies in Heritage Recording and Monitoring at 141 Neil Road (Picture source: <https://www.arclabnus.com/>, accessed on 12 March 2024).

5.4. Operation: Expanding Public Conservation Awareness through Community Interaction

Through educational activities and exhibitions, 141 Neil Road, serving as a “classroom in the city”, not only fosters the next generation of heritage conservation professionals but also broadens community members’ understanding and appreciation of heritage conservation. For architectural heritage without grand historical narratives, opinions at the community level are significant. Concepts like “sense of place” and “belonging” and their significance to daily life offer another avenue through which urban architectural heritage is recognized [25]. To maintain positive interaction with the community, 141 Neil Road organizes heritage education lectures for local middle school students, helping young learners understand the nation’s cultural heritage and fostering a sense of place and identity. Additionally, 141 Neil Road frequently opens to the public for exhibitions, which are based on the coursework of heritage conservation students, and provide opportunities for the public to explain the history of the historical district, as well as the interpretation of heritage values, and to interact with each other. In April 2023, students from the National University of Singapore’s historical building conservation specialisation hosted a “Sustainable Heritage, Livable Future” themed exhibition at this location, presenting their explorations of continuity and regeneration in the Chinatown district and Pearl’s Hill through drawings, models, and multimedia. The exhibition attracted many visitors, effectively raising public awareness of heritage conservation. The practical process of 141 Neil Road is shown in Figure 8.

Although 141 Neil Road is still in the early stages of becoming a community museum, it forms a complementary relationship with NUS Baba House at 157 Neil Road. As a typical residence of 20th-century Peranakan Chinese, NUS Baba House has now become a small museum on Neil Road, displaying over 2000 antiques and items that reflect the immigrant culture of the Neil Road district amidst the urban and societal changes of

Singapore. These items include furniture and wood carvings, ceramics, photographs, documents, books, clothing and textiles, paintings, lacquerware, etc., documenting the integration and development of the immigrant culture of the Neil Road district against the backdrop of Singapore's urban and societal transformations. Together, these two locations significantly enhance interaction between historic buildings and the public, expanding public knowledge and understanding of heritage.

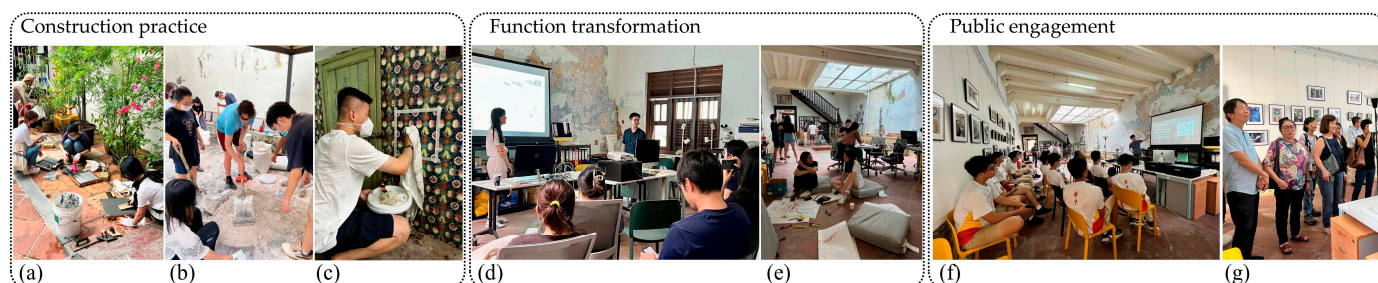


Figure 8. Practical processes at 141 Neil Road: (a) wall plastering experiment, (b) cement mortar ratio formulation, (c) replication of decorative ceramic tiles, (d) lectures, (e) group discussions, (f) heritage lectures for secondary school students, (g) community residents' visit (Picture source: <https://www.arclabnus.com/>, accessed on 12 March 2024).

6. Discussion

Efficient planning and execution have positioned Singapore as one of the world's fastest countries in urban renewal. However, the rapid urban development and the increasing gentrification of historic districts pose challenges to the city's character, identity, historical, and cultural heritage [36]. To appropriately maintain the relationship between the old and the new, the Singapore government has established a comprehensive framework for heritage conservation. After a period of static conservation, there is a growing realization that protection is not about separating heritage from the people. A process-oriented dynamic approach offers a more forward-looking direction for guiding architectural heritage conservation. The case of 141 Neil Road demonstrates how heritage can transcend traditional physical conservation to become a process that encompasses social, cultural, and technological aspects, offering the following insights:

6.1. Heritage as Dynamic Process

For a long time, heritage implied how certain values were prioritized, dominated by the AHD led by architectural and art history experts. Yet, life and history are always more multifaceted than a single story suggests. Architectural heritage survives because it adapts to changing societies, demands, and identities. The struggle against AHD has made more people realize that heritage is a dynamic, diverse, evolving, and socialized process known as dynamic authenticity, involving perception, action, experience, and social practice [37].

Over more than a year, 141 Neil Road transformed from a townhouse into an Architectural Conservation Laboratory. This historic building became both a venue and subject for training heritage professionals, advancing its own restoration from wall diagnosis to detailed repairs of bas-reliefs and decorative tiles through the everyday practice of students receiving heritage education. Functionally, it underwent a transformation to meet contemporary societal demands, integrating teaching, research, and exhibition activities, and actively engaging with the community to enhance public understanding and appreciation of historical heritage. Overall, the case of 141 Neil Road demonstrates the dynamic process of heritage as an educational practice. Initially, its value was recognized by a few and preserved, marking the starting point of heritagization. The transformation process not only restored the building itself but also brought about diverse societal benefits, leading more and more people to regard it as worthy of long-term protection, representing an intermediate state of heritagization. Finally, it was officially designated as a "Heritage

Show House” by the URA, achieving a consensus as everyone’s heritage, and secured against demolition through public authority, marking the culmination of its heritagization.

6.2. *The Multifaceted Social Value of Place Heritage*

Throughout Singapore’s heritage conservation journey, the core intention has always revolved around shaping the Singaporean identity, creating a strong sense of national belonging, foundation, and inclusivity. Thus, cultural heritage naturally became one of the channels to achieve this vision, serving as a tool to express and strengthen Singaporeans’ identity and bridging the gap between the public and the nation [38]. The concept of “Place Heritage”, composed of “collective memory” and “local features”, made people realize that everyone could play a role in heritage management.

141 Neil Road breaks away from the gentrification phenomenon of local historic buildings. Based on its historical and aesthetic values, it transforms into an educational venue, nurturing the next generation of heritage professionals and leveraging the educational value of heritage. In terms of identity, through public lectures and exhibitions, it maintains close ties with community residents, articulating the history and culture of the community, fostering local interest in the history and culture of the Straits Chinese, and helping the public understand and appreciate identity and belonging, thus fostering a genuine appreciation and attachment to a place from past to present [29]. As community residents gradually realize the long-term value heritage brings to the community, they are more likely to actively participate in heritage work, laying a foundation for future bottom-up heritage conservation efforts in Blair Plain.

6.3. *Experiences in Heritage Education Practice*

The cultivation of professional talent is crucial for the sustainable development of heritage, and towards this end, NUS ArClab serves as a teaching venue, fostering professional talents’ capabilities in desktop research, transformation design, and practical construction from both theoretical and practical operational aspects. Specifically, this includes: the sensitive understanding and application of traditional building materials, the fine restoration of architectural elements, demonstrating the importance of hands-on practice; the exploration of advanced technologies to assist in the detailed repair and conservation, showing the interdisciplinary nature of conservation work; tracing the history and culture of Blair Plain, emphasizing the integration of global norms and local values; and public interaction and communication, showcasing the long-term value of heritage to the community. Notably, during the conservation process at 141 Neil Road, a digital architectural archive was established, and technologies such as LiDAR scanning, digital reconstruction, and adaptive manufacturing were used to replicate details of bas-relief panels that could not be restored due to the current lack of artisans and traditional building materials in Singapore. In addition, the building health monitoring system guarantees the optimal indoor condition of the historic building and supports scientific research.

The exploration of new technologies, the reenactment of craftsmanship, the reaffirmation of the advantages of traditional building techniques with minimal intervention to restore the building’s appearance, and the expanding public knowledge of heritage are experiences from 141 Neil Road that are worth emulating in training local heritage professionals. 141 Neil Road continues to maintain interaction and communication with the community, not only conducting heritage conservation lectures for young people but also regularly holding heritage conservation exhibitions. Alongside the neighboring Baba House, it showcases the integration and development of immigrant culture in the Blair Plain, emphasizing Neil Road’s significance to identity and memory. This enhances public awareness of heritage conservation, reflects the long-term value of heritage to the community, and embodies the synergistic development between specialized and wide education. The heritage practice path at 141 Neil Road is shown in Figure 9.

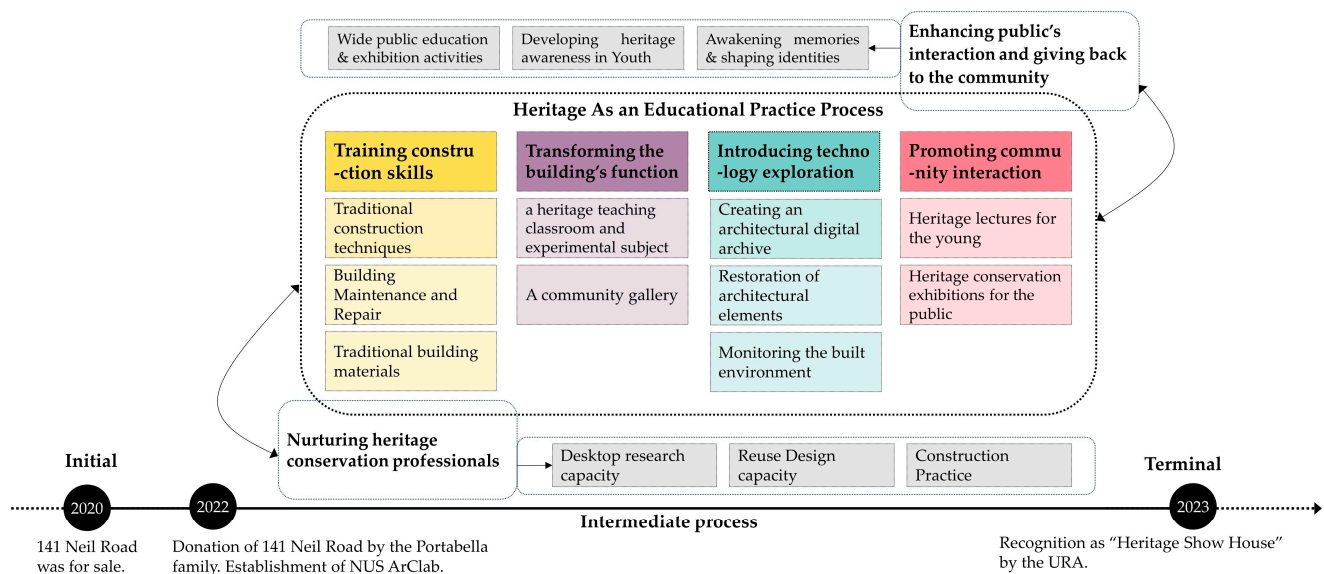


Figure 9. Heritage Practice Pathway at 141 Neil Road.

7. Conclusions

This study initially explores the expansion of the concept of “heritage”, where the struggle against “Authorised Heritage Discourse” has led people to view heritage not merely as a set of static objects with fixed meanings but as a social process consciously endowed with commemorative function during human creation [16]. Following this, the research reviews the evolution of heritage conservation in Singapore, observing a shift from top-down to bottom-up conservation strategies, with NGOs and communities gradually becoming significant forces in heritage conservation efforts. Intangible factors such as history, events, and communities form people’s sense of place, gradually shaping the concept of “Place Heritage”. “People and stories” have become essential resources in exploring heritage values, with person-centered and process-oriented dynamic methods emerging as new perspectives for assessing heritage values [39]. Building on this foundation, this paper discusses the dynamic, practical process beyond the physical aspect, as 141 Neil Road transformed from a townhouse into an Architectural Conservation Laboratory. To cultivate specialized talents in heritage conservation with capabilities in desktop research, transformation design, and construction practice, 141 Neil Road functionally became a teaching venue and a structure for students to probe and work on. It actively explores the role and efficacy of new technologies in heritage conservation, strengthens interactions with community residents through lectures, exhibitions, and other forms, and promotes public awareness of heritage conservation and identity recognition, achieving synergy between specialization and wide education. In March 2023, 141 Neil Road was approved by the URA as a heritage show house in Singapore. Over more than a year, this townhouse has gone through the start, middle, and end points of heritagization, showcasing the process of transforming from a historic building into a place of heritage, embodying the dynamic process from “being” to “becoming” of heritage.

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