A Revolutionary Study Commons and University Library Extension, The Chinese University of Hong Kong

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Abstract. The Library Extension completed in 2012 featured a minimalist, sustainable, preservative and conservative design that cleverly integrates a love of nature with respect of history. It echoed with the University’s Campus Master Plan and demonstrated how development needs were balanced with preservation concerns. The iconic University Mall and Garden dating back to the 1960s were preserved with an innovative design to provide about 4,500 m² of study area and car parking at basement level. The new extension thus maintained a similar height to the original library building and aligned to the iconic axis along the University Mall. The Mall Garden and Landscape were well preserved with skillful design of skylights under the existing pool. Garden features were surveyed and restored to their original appearances after the basement construction. The campus’ much loved house swifts, residing previously on the eaves, were also migrated to the south façade with the introduction of artificial nests. While Green Building design and renewable energy innovations were fully adopted to achieve the highest HKBEAM Platinum standard, the project has provided generous Learning and Research Commons with advanced IT infrastructure which promote causal interactions and knowledge transfer.

Figure 1. Underground Learning Garden with under-pool skylight
1. Introduction

As mother-nature, natural resources and heritages worldwide are threatened by the rapid pace of urban growth and development, The Chinese University of Hong Kong (CUHK) has demonstrated her commitment to develop a “Sustainable Green Campus” through intensive studies, engagements and design innovations.

The Library Extension project completed in 2012 featured a minimalist and sustainable design that cleverly integrated a love of nature with respect of history, and demonstrated how development needs were balanced with preservation concerns. The tough challenges of the project included the following aspects:

- Preserving CUHK’s history, values and collective memories
- Design for quality learning environment
- Exploring opportunities for developing underground space
- Green building design and efficacy
- User-oriented design and knowledge sharing

While the iconic University Mall and Garden dating back to the 1960s were preserved with the innovative design of a generous Learning Commons in the basement, the much loved swifts habitat on the existing Library building was successfully preserved through careful studies and measures. The project has obtained the highest HKBEAM Platinum rating for her sustainability and energy conscious design and was honoured with Green Building Award in 2014.

2. Preserving our history, values and ecology

The University Library Complex consisted of three independent buildings with little interactions with each other as the original 1970’s main library, its 1980’s annex, and the latest new extension were built decades apart. This project involved the construction of a new Extension and spatial re-organization of the two existing buildings; merging together and transforming into a coherent whole where different learning activities could come together in the open and free planning spaces.

The new Extension annexed to the iconic University Library preserved the spatial quality and ambient of the University Mall with complimentary massing and height same as the adjacent buildings. To minimize the visual impact, an extensive basement was developed under the historical Roman-style garden and the ‘Beacon’ on which the sculpture ‘Gate of Wisdom’ stood. The project featured a minimalist and sustainable design that integrated nature with respect to its history.
**Figure 3.** Design principles and sustainability targets

**Figure 4.** University Library, Mall and Garden – 1983 and 2012

**Figure 5.** Layout of Library Extension and University Piazza / Mall Garden

**Figure 6.** Mall Garden restored with Pools & Skylights

**Figure 7.** Restored Landscape

**Figure 8.** Section of Library Extension
Inside the Extension, the historical façade of the University Library was preserved to become a feature wall for the atrium space, lighting up by the skylight above, serving as a visual articulation of Meeting the Old and the New. Double glazing façade panels provided effective acoustic insulation from the adjacent road traffic to create a quiet learning ambience. Variable air volume (VAV) A/C system was also adopted to minimize noise generation in the interiors. The noise level was mitigated effectively from 80dBA road traffic noise with busy school buses to 35dBA inside the library spaces.

CUHK is also home to the largest colony of house swifts in Hong Kong and the eaves of the University Library house over 500 house swifts. To minimise the impact on the house swifts due to the construction of new Extension, CUHK invited consultants to carry out ecological study and was suggested to incorporate bird-friendly glazing for the new Extension and to install artificial nests to allow birds’ migration to the south façade of the University Library before the construction.
Figure 14. Swift habitat on Library eaves and bird-friendly façade of the new extension

3. Environmental quality
The project aimed at creating quality space conducive to the physical, psychological and emotional needs for learning and interactions. External walls of the Extension with low-E double glazing reduced solar heat gain and maximized daylight penetration. It invited lovely nature environment into the study areas during daytime and displayed the indoor study life to the external campus at night.

Figure 15. Section “the new meeting the old”

Figure 16. Interior view of Library Extension
As part of the spatial reorganization for the entire Library complex, a central void with a new grand staircase platform, the ‘Reading Garden’, was inserted into the existing library. This physical connection not only opened up the interiors but also enhanced the inter-floor communication and interactions among students for an active learning environment. The existing skylight above further brought daylight into the renovated library floors for both environmental comfort and energy saving.

4. Innovative development of underground space

With an innovative design, the extensive basement of about 4,500 m² was designed into a colourful ‘Learning Garden’ which presented a new image for library interiors: spacious, cosy and bright. While chairs in vibrant colours and ‘Bubble’ shape workrooms were available for students having small group discussions or studying alone, the ‘Learning Garden’ opened up its interiors to glittering daylight and green surroundings above through an extensive glass ceiling of under-pool skylights. These innovative skylights consisted of a thin layer of water on top of laminated double glazing; the assembly provided desirable thermal insulation for the ‘Learning Garden’ below.

“Inside the Learning Garden, one could find the long, sinuous, wavy, S-shaped table, the ‘Learning Path’, weaved students together through its curves and defined a series of study zones. This ambiguity between public and private, openness and enclosure, allowed for different modes of study and flexible
use of spaces. Subtle variations in the height, width, and shape of the Learning Path provided a datum line for students to discover new ways of learning.” said Ms. Angela Pang, interior design architect.

Figure 20. Plan, model, interior photo and planning diagram of the Learning Garden

5. User-oriented design
This project aimed to develop a people-oriented study space and to provide a healthy and comfortable study environment. Besides making good use of natural daylight and the surrounding greenery, the highly flexible design of the learning commons and its IT backbone further encouraged users to explore their own ways of study with unlimited possibilities. After her completion, the Library Extension has provided CUHK with a Living Laboratory for case studies and data analysis throughout her life cycle.

6. Efficacy
As to align with CUHK’s sustainability policy, many energy efficient features were adopted in the project. Miniature district cooling system to share a centralised chiller plant among adjacent buildings to reduce the peak electricity demand. Central collection of rainwater and condensate to serve cooling, flushing and irrigation purposes. PVC panels to generate energy for landscape lights; high efficient heat pump units for dehumidification and space heating; heat pipe for heat recovery of exhaust air from building. Different types of sensors were adopted: carbon dioxide sensors in study spaces to control the fresh airflow, nitrogen dioxide and carbon monoxide sensors to control car park ventilation.
Façade area was reduced effectively by designing the new Extension as an attachment to the original University Library. Extensive basement construction of about 4,500 m² also reduced materials consumption considerably versus conventional superstructure and building envelope construction. With the objective to preserve the historical Mall Garden, every granite stone of the historical Mall Garden was surveyed, dismantled and reinstalled after the basement construction.

Figure 22. Mall garden and pool during construction and after completion

_Futurarc Green Leadership Award 2016 Juror’s Comments:_ “A project must tell the story of where it is, of people and space … The entries display a good cross section of innovative and ecologically responsive designs that respond to different social, cultural and climatic contexts…articulate a genuine sense of sustainability, blending in neatly with its surrounding environment; harnessing the use of natural resources a topography…. achieving exquisite spatial qualities, fitness for purpose; and a comforting environment.”