

Landscape Practicum : Constructing Experiential Learning



Matthew PRYOR
Division of Landscape Architecture
October 2013



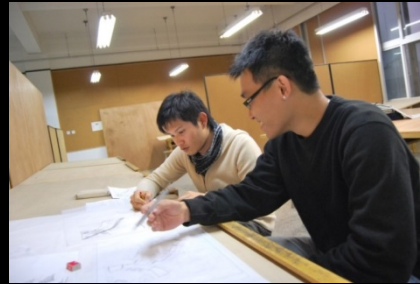
The realisation of design ideas in physical form through site construction is a fundamental tool in learning and understanding within the design disciplines, and especially in the landscape and architectural design professions.

Landscape Practicum



Traditional forms of experiential learning such as apprenticeship and internship can be problematic due to difficulties in structuring the experience towards specific learning outcomes and in assessing student learning.

Experiential learning has long been incorporated into the teaching of design, but typically in small-scale, ad hoc ways .



Landscape Practicum Definition

Practicum

“A course in a professional or specialized field that gives students supervised practical application of a previously studied theory”.

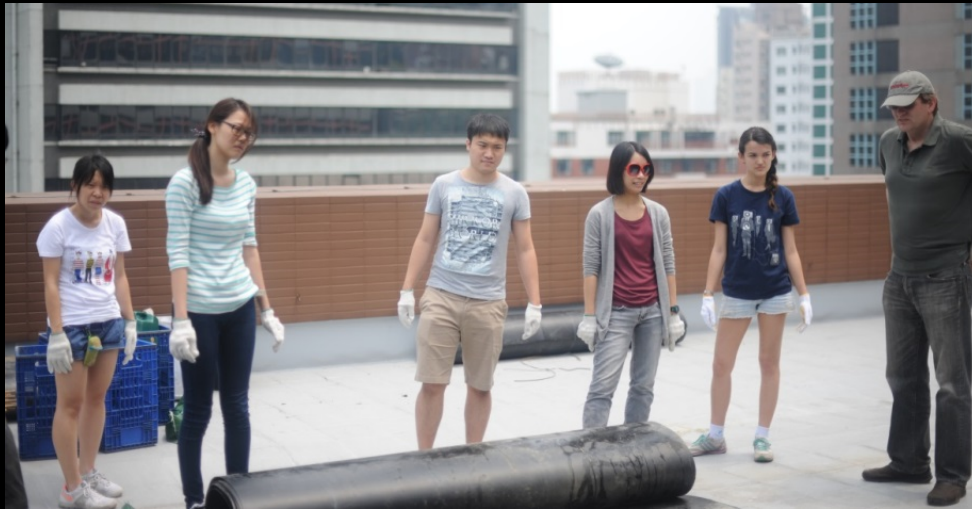
Constructed experiential learning

“A taught course in a specialized field in which students are guided by experienced professional practitioners in the practical application of a theory or technique, through a specifically designed project”.



Landscape Practicum
ARCH7042 Landscape Practicum

A prototype course was developed under a TDG as an elective course in the final year of the old 3-year BA(LS) curriculum, in Spring 2013, with a view to it becoming a core course in the new 4-year curriculum



Landscape Practicum Learning Outcomes

Course learning outcomes were:

1. Understand the process for designing, fabricating and constructing a specific project
2. Work effectively with practicing professionals (suppliers, contractors, site supervisory staff, design professionals, site owners etc.) to collaborate within a design and construction team to achieve common built objectives.
3. Understand the material, technological, and constructional issues relating to green roofs, and the practical application of associated theories and concepts
4. Understand and promote issues of sustainability and particular recycling / upcycling in landscape works



Landscape Practicum Pedagogy

The practicum course is centred on a project to research, design, fabricate and install a common landscape element, under the guidance of outside professional practitioners and using commercial landscape contractors and suppliers.

The project is essentially led by the students and guided by the instructor and supported technically and logistically by outside practitioners.



Landscape Practicum
Project for the class of 2012/13

Students were asked to create a prototype productive green roof system, on the Runme Shaw Building roof deck, to comprise a series of planting structures (and other elements), to grow vegetables, herbs etc.

The area available was approx. 900 sq.ft with a target growing area of approx. 400 sq.ft.



Landscape Practicum

Roof greening



Landscape Practicum Participants

- Students** **BA(LS)3 Class of 2013.** Small group size (9) helped promote collaboration but limited the scope of what could be achieved. Class size will rise to ~25 in the coming years.
- Instructor** **Matthew Pryor**
- Practitioners** **Lori Gibbs** – specialist in sustainability issues and green roof systems
Andres Ibanez - researcher in green roof systems
Rob Walters – professional landscape construction site manager
Marcus Swetnam – roof top garden designer / contractor
Lucas Lai - Landscape contractor, supplier of materials / labour, off-site fabrication
Vivian Lai - Landscape nursery manager
Melissa Cate Christ, Connie Chiu, Yang Ye, Chris Zhang - Helpers from 'Edible Roofs'



Landscape Practicum

Teaching and learning activities

Lecture	Sustainable values, technology and green surfaces (green roofs / green walls). General introduction to green roofing.
Site visit	Observations & impressions of Centennial Campus green roofing projects
Discussion	Green roof systems, technologies, applications, functions, design rationale, operational framework
Lecture	Green surfaces as building technologies: Anatomy of Systems, Loading and Basic Structural Principles
Class discussion	Green building systems. Green roof assessment,
Site visit	Evaluation and observations of HKU Library green roof
Lecture	Proprietary systems, suppliers, technical issues, materials, construction technologies,
Project site visit	Runme Shaw Building Roof, identifying site parameters, constraints, construction issues
Site visit	Australian International School Green Roof
Workshop	Developing a project proposal for Runme Shaw Building roof. Selecting a green roof system (non-proprietary), choosing materials, construction method, sequence, possible costs
Interim Review	Technical panel review of project Proposal with invited landscape architects, contractors
Lecture	Green Surfaces as ecological sites
Workshop	Revising the project proposal. Layout plans, construction details, material and workmanship specifications, Defined construction method / sequence, costs and sourcing of materials, operation and testing criteria
Working session	Procurement, fabrication
Working session	Procurement, fabrication in contractor's workshop
Working session	Assembly and installation on the Runme Shaw roof
Working session	Operation and testing on the Runme Shaw roof
Final Review	Constructed project review with panel landscape architects, contractors

4 Lectures
4 Site visits
4 Classroom sessions
4 Onsite fabrication sessions
2 Review sessions

Landscape Practicum

Teaching and learning activities involving practitioners

Lecture	Sustainable values, technology and green surfaces (green roofs / green walls). General introduction to green roofing.
Site visit	Observations & impressions of Centennial Campus green roofing projects.
Discussion	Green roof systems, technologies, applications, functions, design rationale, operational framework.
Lecture	Green surfaces as building technologies: anatomy of systems, loading and basic structural principles.
Class discussion	Green building systems. Green roof assessment.
Site visit	Evaluation and observations of HKU Library Building green roof.
Lecture	Proprietary systems, suppliers, technical issues, materials, construction technologies.
Project site visit	Runme Shaw Building Roof, identifying site parameters, constraints, construction issues.
Site visit	Australian International School green roof .
Workshop	Developing a project proposal for Runme Shaw Building roof. Selecting a green roof system (non-proprietary), choosing materials, construction method, sequence, possible costs.
Interim Review	Technical panel review of project proposal with invited landscape architects, contractors
Lecture	Green Surfaces as ecological sites.
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Working session	Procurement, fabrication.
Working session	Procurement, fabrication in contractor's workshop.
Working session	Assembly and installation on the Runme Shaw roof.
Working session	Operation and testing on the Runme Shaw roof.
Final Review	Constructed project review with panel landscape architects, contractors.

12 (of 18) sessions had direct involvement of outside practitioners

8 sessions in the field

Landscape Practicum Assessment

Assignments	Weighting	Mode
Site visit reports	20%	Individual work
Green roof materials & technologies database	20%	Team (2 or 3) contributions to a whole class submission
Proposal for, and construction of a productive green roof	20%	Teams (2 or 3)
Documentation of the design and construction process and	20%	Individual work
Reflection on the project	20%	Individual work

Assessment and Grading

1. Quality, clarity, originality, and synthesis of research
2. Clarity and depth of verbal explanations and graphic representations during presentations
3. Demonstration of critical thinking
4. Demonstration of their understanding of core technical information and theoretical concepts and their application in their project proposal, design, built work, and work on the operation and testing of the project, and with respect to capabilities of landscape professionals working in the industry
5. Quality of their documentation of the project and the processes followed to create it
6. Participation in the course and contribution to discussions, site visits, working sessions and discussions with practitioners
7. Robustness and efficacy of the green roof installation

Landscape Practicum Outside practitioners

Practitioners were briefed on the course objectives and their contributions to the student's projects, but were not directed in their actions so that their participation could be that of an 'actual' practitioner in a real-life situation.

Occasionally practitioners were directed to emphasize key points, but always in their own language.




Landscape Practicum Feedback

Feedback on student work was given:

- Directly during the workshop sessions
- Within formal reviews with practitioners
 - Reviews of research and design in the class room
 - Reviews of fabrication and built work in the field
- As marking of submitted assignments

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3. Photographic record of the completed work



200 words about this!

4. Statement on the horticultural operations that are required to maintain the planting, going forward. Irrigate the plant regularly to prevent plant drought in hot weather, plant will not grow well with the lack of water. On the other hand, may apply fertilizer to the plant if needed. Regular checking of plant is important, visit the roof once every couple of weeks to clear out weeds. This would reduce the weed taking over the whole plant. In case of emergence like imminent by being blow up, or replace the plant!

appropriate protection measures should be done to avoid the plant from the typhoon hits. Such as?

Reflection (with 400 words)

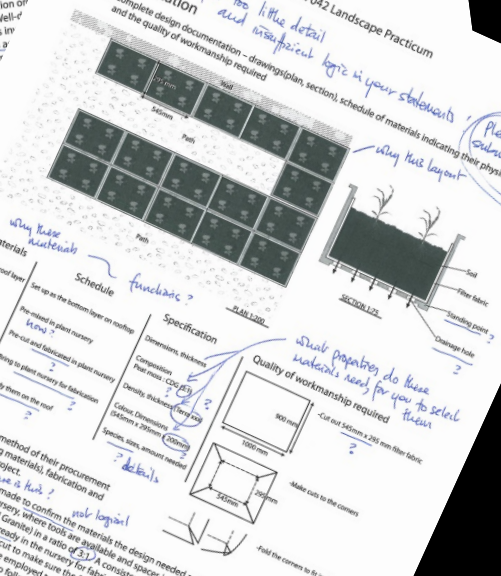
- Describe five things you have learned during the course

Actual operation: make sure yourself construction or output. Well-organized materials in front of you to have to?

Documentation

- Complete design documentation - drawings (plan, section), schedule of materials indicating their physical qualities and the quality of workmanship required

ARCH7042 Landscape Practicum



way these materials?

Need much more detail!

using these materials?

functional?

Quality of workmanship required

Make cuts to the corners

fold the corners to fit in the scale

2. Description on the method of their procurement (sourcing and buying materials), fabrication and installation of your project.

Firstly, a planting design was a head!

more is bought from plant nursery, fabrication and installation of your project.

CRATES =

the industry name for plastic crates?

not logical!

use resistant forms

Does this just magically appear?

explains

how did this happen?

use resistant forms

Please to do and submit by 7th June!!

way this layout?

More things do these materials need for you to solve them?

Make sure you have a lot more detail in your statements

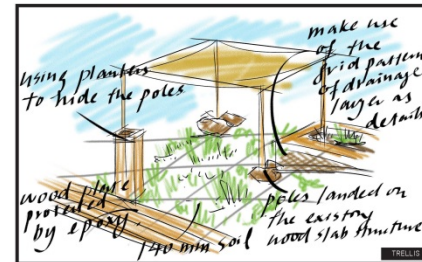
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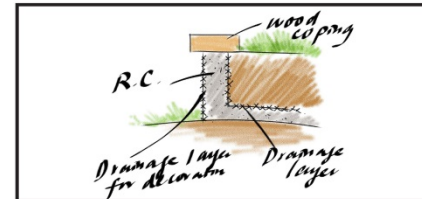
Landscape Practicum Research

Students conducted case studies on constructed green roof systems in HK, which included site visits to the Centenary Campus, HKU Library roof and to the AIS school roof where they met (and interrogated) the designer, contractor and facilities manager



DETAIL DESIGN

- TO UTILIZE EXCESSIVE MATERIALS (THE DRAINAGE LAYERS) AS A DECORATION DETAILS OF THE PLANTER, MASKING THE CONCRETE CORE. THIS CAN ALSO SERVE AS EDUCATIONAL PURPOSE TO SHOW STUDENTS THE STRUCTURE AND MECHANISM OF DRAINAGE LAYERS.
- TO USE PLANTERS TO WRAP AROUND THE POLES OF THE TRELLIS, HIDING THE DETAILS OF HOW THE POLES MEET WITH THE GROUND.
- THE WEIGHT OF THE TRELLIS IS NOT TOO HEAVY THAT THE POLES DO NOT NEED MUCH SUPPORT ON THE GROUND. THE POLE IS ANCHORED ON A RUBBER SUPPORT WITHIN THE EXISTING GLASS STRUCTURE, SO THAT THE POLES WILL NOT DAMAGE THE WATERPROOFING LAYERS.
- THE WEIGHT OF THE TABLE IS HEAVY ENOUGH THAT IT WILL NOT BE BLOWN AWAY. EDGE OF THE TABLE IS KEPT MINIMAL TO REDUCE THE LIFTING FORCE OF WIND. ANCHOR BOLT IS APPLIED TO THE WOOD PLATES OF THE TABLE TO STRENGTHEN THE STRUCTURAL STABILITY.
- MOST OF THE WOODEN LANDSCAPE FURNITURE IS PROTECTED WITH A LAYER OF EPOXY FOR WATERPROOFING IN THE EXPOSED ENVIRONMENT.



The main feature that magically convert the whole roof into a green retreat is the making of a topography. Despite its subtleness, the rooftop is perceived and characterized as an picturesque undulating nature. The addition of a small stream, fake rocks, rusty iron structures and some sculptures of little animals even help in constructing a mimicry of Australian landscape as well. Almost all the drainage trenches, pipes, culverts, electricity cables, undesirable structures that visually contradicts the artificial greenery are purposefully hidden either under the wood floor or pushed to the edges of the site.

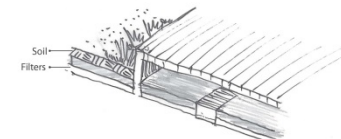
The green roof in Australian International School succeeds in activating the space by making it appealing to people through a series of design: hiding the undesirable infrastructure, introducing activities (e.g. planting students' own vegetables, having a barbecue area) and on top of all, installing some facilities that is fun to play with and fun to use (solar panel, art showroom, dvd sets, etc)



Topography is made to make the terrain more undulating and the space more intimate



Tanks that used to supply the water for the stream



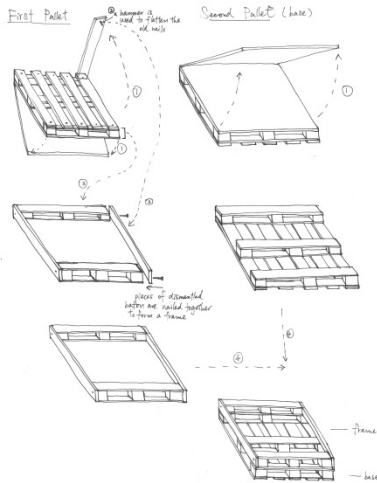
Under Woodslab, there is this hidden drainage trench

Landscape Practicum Design

In the same teams, students then went on to develop their own ideas about how to create a productive green roof element. Through a typical iterative design process, they were able to test their ideas against the instructor and outside practitioners.



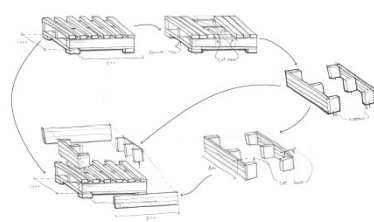
Construction of Pallet B (on Knowles Building 6/F):



Pallet B final product

- Steps
- 1: separate the wood pieces and boards with a cat's paw
 - 2: flatten the exposed nails with a hammer
 - 3: nail the pieces baton together to form a frame
 - 4: combine the frame with the base piece

Construction of Pallet A (on Knowles Building 6/F):



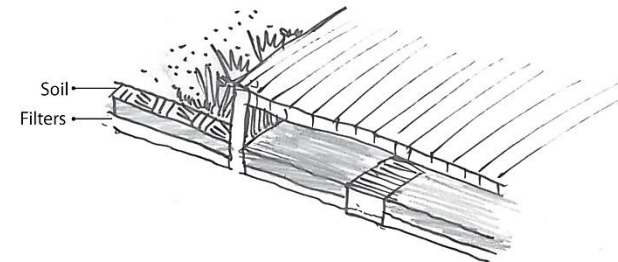
Landscape Practicum Design

The need to plan, design, negotiate their way around these technical problems, (as in real life):

- weight, loading restrictions (soil + water) (depth and planting requirements)
- wind loading
- water supply / drainage
- existing building fabric – waterproofing, surface finishes
- operational use of the building, access to parapet, exhaust fans, plant rook access
- construction access - by hand, in lifts, up steps, (>8.0 tonnes of soil)
- existing neighbours – working through interior spaces, resident neighbour, oversight from the SCR.



Tanks that used to supply the water for the stream



Under Woodslab, there is this hidden drainage trench

Landscape Practicum Procurement

Possibly the most difficult for students. Much of this very alien to students, and there are few ready source of information

Need to research and contact different suppliers of building materials and equipment and negotiate availability, qualities, deliveries, payment etc.

Particular problems relating to recycled and upcycled materials.



Landscape Practicum Off-site fabrication

Students were required to get themselves dirty and build stuff with their hands. The tactile element was essential in reinforcing learning.



Landscape Practicum Off-site fabrication

Students made two visits to a contractors workshop (which was kindly made available by some of the practitioners) to allow students to fabricate some elements in the nursery.

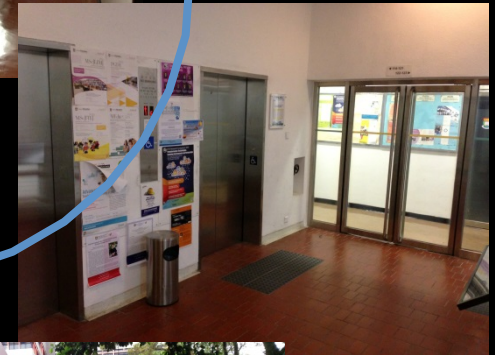


Landscape Practicum
Off-site fabrication



Landscape Practicum Installation

The students were involved in coordinating the delivery and installation of materials. As the site was a roof top location with access through internal lift lobbies and stair access this required a lot of effort and focus.



Landscape Practicum Installation



Landscape Practicum
Finished works

Their time keeping was awry,
and they were late and didn't
finish everything, but the
students were generally happy
with what they built.



Landscape Practicum Assignments

In addition to their constructed projects, students had to submit their case study reports and the full documentation of the design and the construction processes (drawn, written, photographed)

design documentation: plan

design documentation: sections

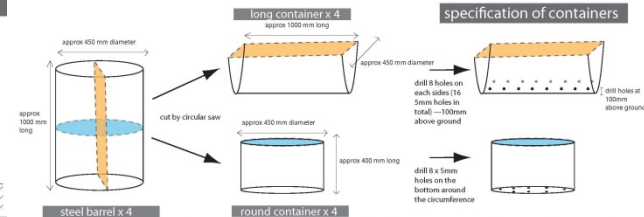
bill of materials

specification of containers

design documentation: bill of materials & specification of workmanship

MATERIALS SCHEDULE			
ABBRE.	SIZES (Width x Length x Depth) mm	QUANTITY (nos.)	REMARKS
Steel oil barrel	450 x 1000 x 450	4	Sliced half to 8 containers of 300 x 300 x 300 by electric saw
Concrete bricks	203 x 102 x 57	12	To support two sides of the barrels
Growing medium (CDG and peat moss)	0.477 m ³ mixed soil		(a) LONG CONTAINER: 450 diameter x 1000 length x 4 containers = 0.318 m ³ (b) ROUND CONTAINER: 450 diameter x 250 length x 4 containers = 0.159 m ³
	0.159 m ³ CDG		
	0.318 m ³ peat moss		
Free draining materials (stones/ leca)	0.081 m ³		(a) LONG CONTAINER: N/A (b) ROUND CONTAINER: 450 width x 450 length x 100 depth x 4 containers = 0.081 m ³
Terram filter fabric	710 x 1450	4	For the long container
Terram filter fabric	1250 x 1250	4	For the round container
bamboo container (standard trash bins)	standard size	20	For packaging soil
Anti-Rust Paint	1 Liter	2	Hammerite 防锈漆 to paint thoroughly all the containers esp. the drainage holes and edge
Thinner	1 Liter	1	To dilute the Anti-rust paint
Tiles		24	To lift up the containers for drainage

PLANTING SCHEDULE								
ABBRE.	BOTANICAL NAME	ENGLISH NAME	CHINESE COMMON NAME	SIZES (Height x Spaced) mm	SPACING mm	LOCATIO N	REMARKS	QUANTIT Y (nos.)
	Rosemary	迷迭香	迷迭香	200 x 200		Round container		3
	Basil	罗勒	罗勒	200 x 200		Round container		3
	Thyme	百里香	百里香	200 x 200		Round container		3
	Chives	葱香藤	葱香藤	200 x 200		Round container		3
LAN. MON.	<i>Lantana moribundus</i>	Weeping lantana	小葉黃荊	200 x 300	200	Long container	Heliotrope in colour	15
PHY. MYR.	<i>Phyllanthus myrtilloides</i>	Myrtle-leaved Foilage	刺葉黃荊	300 x 300	200	Long container		15
POR. GRA.	<i>Portulaca grandiflora</i>	Time flower	紅蓮華下丹	150 x 300	200	Long container	Double Flowering Mixture	12
LIR. SPI. VAR.	<i>Liriodendron spicata</i>	Lily turf	寶門草	250 x 250	150	Long container		3
ASP. DEN. MYE.	<i>Asplenium densiflorus Myrsal</i>	Foxtail fern	鼠尾草	200 x 200	200	Long container		15



design documentation: bill of materials & specification of workmanship

Landscape Practicum Assignments

They were also asked to reflect on their experience

LESSON LEARNT

1. The recycled materials came in a quality worse than expected

The pallets were used for supporting goods while being lifted by a pallet jack. However, there is no telling what kind of goods have been placed on the pallets. When we acquire the pallets from the logistic shops, some of the pallets were in poor shape and the batons themselves were rotting. Also, some of the pallets apparently were used for lifting some seafood and it smelt notoriously fishy. We have to dispose these pallets after moving to our working place (studio), though a lot of effort had been already taken carrying them back.

2. The designs of pallets vary from one to another

As shown below, the pallets have different designs. When we did our preliminary designs for our "testing planter", we thought all the pallets would come in the same dimension and same with no. of batons. However, it turns out that they were all different. Some of the pallets were nailed together so hard that it is unable to reclaim the batons. Some of the woods were too soft and it broke easily during the process.



3. During the transportation, the screws kept coming off

There were many limitations installing a planter on the roof. The most difficult one was that there was no electric plugs up there rendering any power tools useless. Because it was uneasy to move those heavy pallets and we have to stop every once in a while, the screws kept coming off and the whole thing was collapsing by the time it was moved to the roof. Yet, no power tools could be used to screw them back together. Finally nails were drove in brutally by hammering

4. On site construction was more challenging than expected

The outdoor working environment on the roof harsh. hot sunshine and the pouring rain makes it very exhausting working there. For that design should be kept minimal whenever possible and avoid redundant labor. A well-planned logistics is essential. Never improvise.

5. The planting design was just as important

Frankly we did not give the plants design much thought and just picked a few species that we liked from the roof gardening plant list. However, our experience this time taught us that it is also important to consider how shrubs will look when massed together. Matching foliage with different texture and different color makes the installation more appealing

PHOTOGRAPHIC RECORD



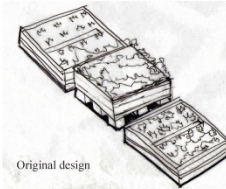
IMPROVEMENTS

Plant design

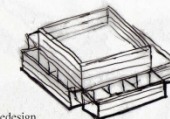
Before the plants were chosen, their characteristics like the foliage texture and flowering should be well understood. Attempts should be made to mix different plants with different characteristics. For instance, for a planter box as large as 800 x 1200, two species of plants can be planted to create a more interesting look.

Pallet planter box design

We built three separate planter boxes mainly due to the convenience of simple design. But it was not very visually appealing because the structure for the other two boxes are not compact enough. Further thought of the design has been put in for it to become more of a focal point of the garden while reflecting the special materiality of the pallets



Original design



Redesign



Redesign

Logistics

Firstly, calculate how many pallets we actually need instead of jumping to a haste decision to pick up as many waste pallets as possible from the company. I believe in the project we ordered two times more pallets than we need. Not only is it a waste of energy to carry so many of them up and down, there is also insufficient space in the studio to store all of them. Secondly, we assemble everything in the studio before taking the planters up to the roof. However, as mentioned earlier, the planter collapsed all the time with screws kept loosening out. Because the pallets were heavy, assembling should be done on the roof so that the parts can be carried up easily piece by piece.



Landscape Practicum

What next for the productive garden ?



The productive gardens has been combined with another productive garden built by a team from General Education and is now run and managed by the student led HKU Rooftop Farming Project.



<http://rooftopfarmhku.wordpress.com/>

Landscape Practicum Student Feedback

The positives:

- Gain a practical understanding materials
- Real-life experience ... “it is not easy”
- Practical help and feedback
- Great site visits with practitioners
- Opportunity to put knowledge into practice
- Hands on experience – lacking in other courses
- Gaining access to instructor’s experience and knowledge ... not just in the classroom, but by practical demonstration
- Teacher provided opportunities to interact / collaborate in the course
- The value of feedback
- Inspired me to pursue further learning in the subjects / skills
- Teacher was supportive when I needed help

Where the course might be improved:

- Want more site visits
- Bigger goals and challenges .. maybe

Student Evaluation

Course effectiveness 83.3 (ave. 67.3)

Teacher effectiveness 83.3 (ave. 68.0)



Landscape Practicum Benefits to students

From the student responses there is a clear indication that the practicum was successful in helping to strengthen student learning.

- clearer understanding of the technical landscape design and construction knowledge, and their relationship to the work of practitioners.
- allowed students to engage with different kinds of practitioners, and understand how they think and see issues.
- alerted them to the need to think through situations, look for the hidden problems, and to plan ahead.



Landscape Practicum Impact on other teaching

The course has had benefits for the Division, as well, in:

- Engaging practitioners in the work of the program
- Providing opportunities for outside review of the Divisions teaching (scope and methods),
- Provide an alternative channel for commentary and feed back to students, and validating the content of the teaching

Some of the experienced gained from the Practicum has already been fed back into other courses such as the Division's CDLA Summer School, ARCH7510 MLA pre-requisite course, and the new studio courses. It has also given rise to new KE activities such as the forthcoming student-led Upcycle:Recycle Workshops at the HKICC School of Creativity (October – December 2013)

Although it was created for a particular project based design discipline, the concept of constructed experiential learning should be directly transferable to other programs.



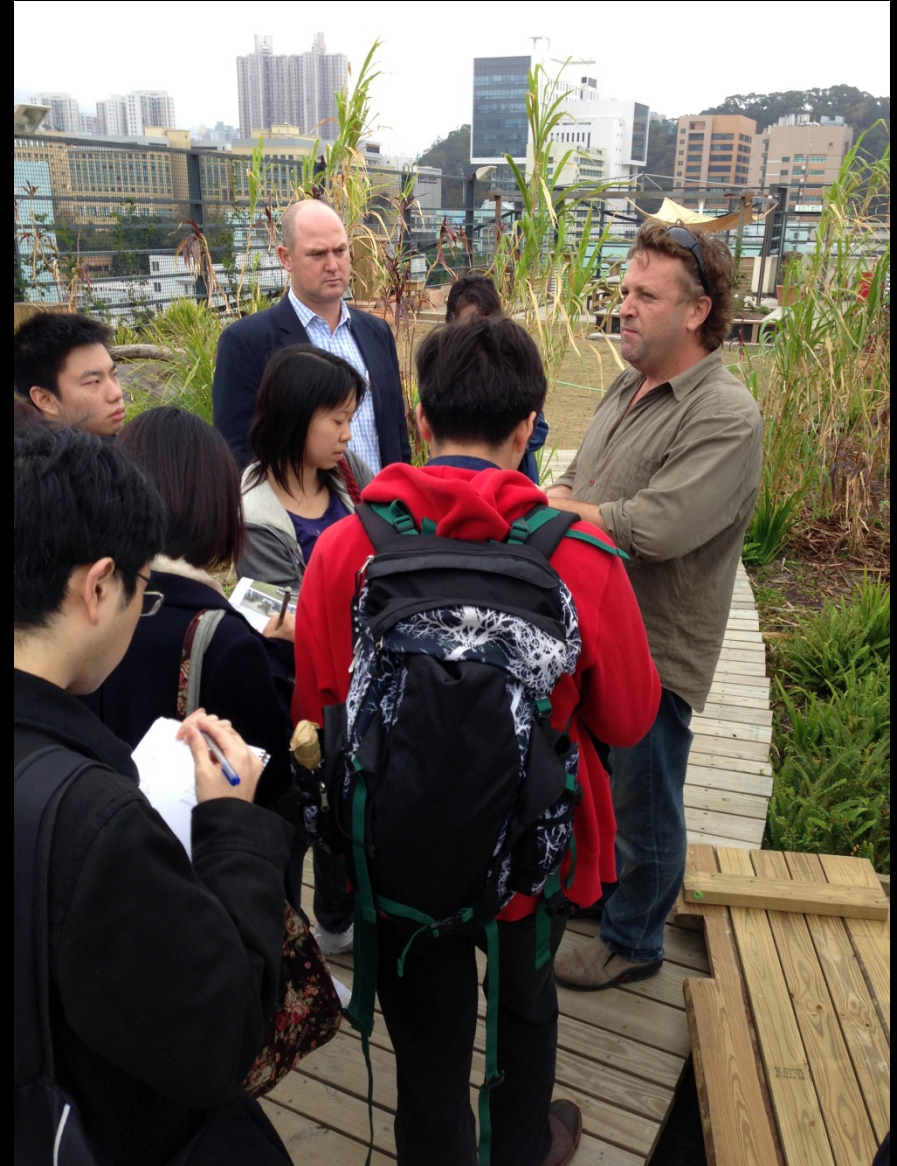
Landscape Practicum

Other impacts

Knowledge gained from the Practicum can also inform the further development of the undergraduate (and MLA) curriculum, and the coordination and focusing of other experiential learning exercises in future studio projects and technical courses

Highlighted the need for development of infrastructure for experiential learning

- Contacts with industry
- Supply of materials and equipment and labour
- Off-site physical fabrication facilities



Landscape Practicum Practical issues

Need for the instructor to act as 'the boss' to be responsible for tasks where failure would fundamentally affect the project, or due to timing, or where specific authority was needed

- negotiating approvals (access arrangements),
- commercial contracting (capacity to contract)
- addressing any serious problems (damage – Estates)

Funding for materials and labour is required

Need friends – most activities undertaken within the Practicum are not at a commercial scale or level, and friends were need to enable things to happen (e.g. borrow working space in the metal workshop), and for the donation of time and equipment.

Reminder that student safety is paramount, especially where they are involved in physical work e.g. lifting heavy objects



Landscape Practicum What I learnt

It was not nearly as easy as I had imagined.

There are significant practical and logistical issues in using real sites, and in the involvement of outside practitioners and commercial parties but the course was very rewarding for all involved.

- Need for a clear focus and direction, breakdown into stages, clearly defined goals for each stage to maintain student engagement
- Timing of activities and coordination of participants are essential.
- Maintaining the schedule of the course and not be side-tracked by small issues
- Using my experience to overcome technical problems only when absolutely needed, and allowing students to work it out for themselves



Landscape Practicum

What I learnt

- Using outside practitioners to deliver messages
- Allowing for design creativity, not just functional result. Having a flexible approach especially when students are a long way out of their comfort zone
- Giving meaning to the end product so that it doesn't become just another student exercise
- Willingness of students to take on challenges, where they feel they are in charge of the process
- Students like to learn little things, small pieces of knowledge make them feel skilled



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