

Landscape project design for undergraduate students enrolled in Ornamental Horticulture in Oman

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Abstract - The Sultanate of Oman is located on the southeastern coast of the Arabian Peninsula. It is the second largest country in the Peninsula, with an area of 212,460 sq km. Most of the country is a desert and the climate is generally hot and arid for most of the year. Therefore, Oman is suitable only for arid landscape, or xeriscape, that utilizes mostly native plants. Sultan Qaboos University is the only public university in the country. Landscape program is a new field that is now being established in the College of Agricultural & Marine Sciences. As a beginning, the students were enrolled in an introductory course in landscape architecture with two credit hours. They have to practice applied landscaping as a requirement of an undergraduate course in Ornamental Horticulture. The procedure and results that will be discussed in this paper will include the three stages of site selection, concept and computer-aided landscape designs, and evaluation of the student work by local experts in the field of landscape horticulture. Reflections of the student landscape learning abilities and outcomes will be discussed.

Key-Words: Sultanate of Oman, Landscape, Architecture, Horticulture, Design, Ornamentals, Teaching, Education

1 Introduction

Landscape architecture is the art of composing landform, water, vegetation, buildings, paving and climate to make good outdoor space. Landscape architecture is generally defined as the art, planning, design, management, preservation and rehabilitation of the land and the design of human-made constructs. The term "landscape architecture" was coined by Gilbert L. Meason in 1828 in his famous book entitled *The Landscape Architecture of the Great Painters of Italy*. It uses the ancient skill of garden designers to compose landform with water, vegetation, structures and paving) and applies this skill to the man-made landscape.

A review by Yamick (2007), Nanda (2008) reiterated that humans are aesthetically attracted to natural contents and to particular landscape configurations. These features are also found to have positive effects on human functioning and can reduce stress. According to Matsubara *et. al.* (1991), the term landscape means architecture, gardens or greenery and land use. These landscapes, which have vegetation and/or water, are very important elements to ease the rising temperature or to clean air from the

pollution. Landscape designs can influence environmental quality and have ecological benefits (Helfand *et. al.*, 2006) and that landscape planning, a sub-discipline of the field of landscape architecture has helped define the profession over the past twenty five years (Rodiek., 2006). There are specific landscape architectural methods and techniques, developed over these years, which have upgraded much older garden architecture approaches and distinguished the profession from other related disciplines.

Landscape architecture encompassing two distinctive fields of creative work: planning and design (Ogrin, 1994). This dual nature of landscape architecture is largely established and is of crucial importance to the future evolution of the profession and its strategic position in society. The scope of the landscape horticulture and architecture profession includes architectural design, site planning, housing estate development, environmental restoration, town or urban planning, urban design, parks and recreation planning, regional planning, The unique character of the landscape horticulture and architecture profession requires landscape horticulturist and architects to be familiar with both a wide range of knowledge from

the field of natural sciences and artistic creativity at the same time (Gazvoda, 2002).

Ornamental plants are used for landscaping, and for cut flowers. Similarly, trees may be called ornamental trees. This term used when trees used as part of a garden setting, for their flowers, their shapes or for other attractive characteristics. By comparison, trees used in larger landscape effects such as screening and shading, or in urban and roadside plantings, called amenity trees. Summit *et. al*, (1999) stated that, trees are important in theories of environmental perception and landscape aesthetics. Logically, because trees are an important landscape feature whose form and other characteristics reflect environmental adaptations. They mentioned three studies examine preferred tree shapes in relation to theories of landscape aesthetics. The results add support to functional and evolutionary theories of landscape preference. Psychological theories of aesthetics applied to tree form; studies of tree shape combined the basic laws of proportion and the harmony of parts with natural processes of growth and development (Summit *et. al*, 1999). Nature scenes have more positive physiological impact on people than do scenes containing constructed scenes such as cityscapes (Ulrich, 1993).

Technology plays an important role in landscape horticulture and design - allowing today's professionals to use advanced tools to map out projects, perform detailed analyses, run businesses efficiently, and quickly revise and update designs and business plans. Changes in world's social finance, particularly in developing nations, and better attitude toward healthy and relaxing life style throughout the world have created a demand for horticulture and landscape architecture professionals. For example, the economic changes in Hungary in recent years, have changed the picture of the landscape, and the practice of land use in certain areas (Füleky and Major, 1993). New alternative economic strategies in the environment of the given settlement are suggested, with emphasis on the reduction of problems of crisis areas and moderation of advantageous differences; better use of natural resources; strengthening of the agricultural heritage.

Therefore, there is a greater need for trained landscape architects with adequate background in ornamental horticulture.

This paper explains the practical teaching process of learning the basics of landscape horticulture and architecture through a student project as a requirement of an undergraduate course in Ornamental Horticulture at Sultan Qaboos University, Oman. The aim of the project is for the students to apply theoretical knowledge of landscape design and ornamental plants into redesign of real landscape sites on campus. It presents a unique view of the future of landscape horticulture and architecture in a developing country with an arid climate.

2 Materials and Methods

2.1 Course Description:

Ornamental plants belong to Horticulture, which is dealing with plants of certain uses to humans. At Sultan Qaboos University, horticulture falls under the department of Crop Sciences at College of Agricultural and Marine Sciences. The department offer a course (CROP 2011 Ornamental

Horticulture) as an introductory course to the science of growing plants for their aesthetic value, encouraging the development of both creative design skills and practical link between the design and soft-and hard-scaping.. Thus the course explains the basics of landscape and home garden design, plant selection, and management and maintenance of ornamental plants. The objectives were to learn the basics of ornamental horticulture, study the concept of landscape horticulture and floriculture and to practice the basics of landscape design. This course is a prerequisite to Landscape

Horticulture and Design major in which can graduate students who are able to: evaluate sustainable practices related to the preservation of the environment; analyze the ways in which people, plants and soils interact with the overall environment so as to promote the conservation of natural resources; analyze plant and soil processes at the landscape scale; create clear and articulate oral and written presentations; analyze the role that plants and

soils play in human experiences so as to promote the responsible management of the environment; and evaluate the applications of horticulture and design to the broader regional, national and global context.

Students were provided with lecture notes and supplemental reading materials from printed research articles, online resources and other media. Furthermore, the course was developed on Moodle course management system platform (<http://moodle.squ.edu.om>) allowing the students to interact with and utilize Moodle features while reviewing course design and delivery materials.

The course outline addressed horticultural classification of ornamental plants based on their adaptation, seasonality & growth habit. The course taught elements and principles of landscape design to build-up students' background. The elements landscape addressed line, shape, direction, size and texture, while principles landscape included; unity, contrast, movement, harmony, rhythm, balances (symmetrical & unsymmetrical). Principles of design were taught the student to build their background. The principles were; unity, contrast, movement, harmony, rhythm, and balances ((symmetrical & unsymmetrical). Also, the course exposed students the management of ornamental plants.

2.2 Landscape Design Project:

Twenty – eight students were enrolled in the course in the Fall semester of 2007. The students were requested to design a landscape project on campus utilizing design materials to draw sketches and maps on paper as well as on simple computer-aided design software. Garden Planner software (Artifact Interactive, 2007, <http://www.smallblueprinter.com/garden>) software was utilized for this purpose. The goal of this project was to enable the students to (i) understand the basic requirements of landscaping projects, (ii) examine student imagination and artistry, (iii) plan a project using basic tools (sketch, PC software, field work). The students were provided an example of 'real-world' application conducted by Muscat Municipality in the capital of Oman (Figures 1a and 1b). To carry on with the project, the students formed a team, decided on a project location on-

campus, created a project concept plane and a final design using the computer software. The students were required to prepare a final report and a public display and presentation of their designs.

2.3 Site selection and plant materials

The on-campus site was selected by the students and was photographed from different angles. A survey of native and exotic landscape plants was carried out by the students to identify trees shrubs, turf grass, and floral plant to determine types of plant that suitable for their project. A sample of the data collection and plant characteristics shown in Table 1.

2.4 Project evaluation:

The procedure in course project included the three stages of site selection, concept and computer-aided landscape designs, and evaluation of the student work by 8 of local experts in the field. They scored each project on a scale of 1 to 10 (Table 2) according to five different criteria; creativity, design, plant selection, interest and overall. Then jury was made and evaluates the student works and describes them for their weakness and at the same times their strength and beauty of their design.

3 Results and Discussion

Students selected plant adapted to hot and arid climate to incorporate in their design. Chosen plants included trees, ground cover, and bedding flowers (Table 1). Example of these plants are neem (*Azadirachta indica*), Bermuda grass (*Cynodon* spp) and zinnia flower ((*Zinnia* spp). Following site selection, students drew a sketch using paper and cryon pencils. Design principles applied were mainly balance (symmetry) on the walk way to help to see the focal point plant they created. Hardscaping elements were also added such as long woody chair for rest. The student then started to design their work on the software (Gardner Planner version 2.2). Prebuilt shapes and forms of plants and also different types of construction materials were available from the software menu. All three stages were publicly displayed for critical review by experts and the

public. The student gained useful experience and they were commanded for their work. The winning designs included a sketch of a walkway (figures 1a-1d). This was adopted by the university to be constructed in the near future.

4 Conclusions

Utilizing basic and low-cost materials proved to be effective in educating undergraduates about landscape horticulture and architecture. Public and expert feedback and suggestions were very helpful to the students and to the development of the course. The critics agree on the importance of this newly emerging field at Sultan Qaboos University, Oman.

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Tables

Table 1. Example of plants surveyed and selected by students of CROP 2011 at SQU campus during Fall-2007.

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Plants type	Temperature (°C)	Drought tolerance	Salinity tolerance	Tree diameter(cm)	Growth habit
Neem (<i>Azadirachta indica</i>)	120	High	High	15-20	evergreen fairly dense
Bermuda grass (<i>Cynodon</i> spp.)	> 24	High	High		Turf grass
Zinnia (<i>Zinnia</i> spp.)	warm	mild	mild		Cut Flower

Table 2. Evaluation Criteria sheet for students project design of CROP 2011 at SQU campus, Fall-2007.

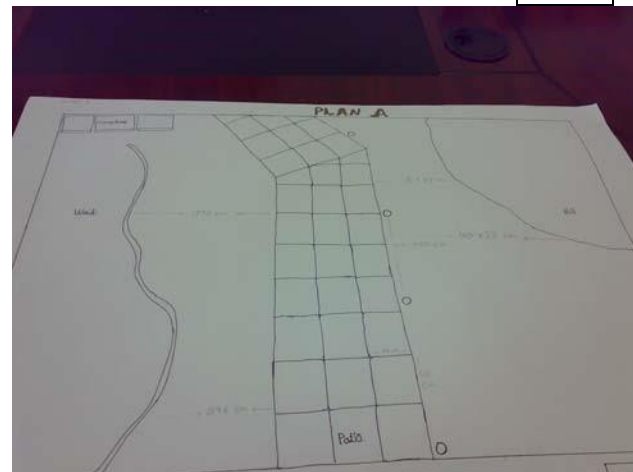
Group #	Category	Score (1 to 10)
	Creativity	
	Design	
	Plant Selection	
	Interest / Participation	
	Overall	



Figures 1a& 1b. Example of real – life design. (Photos courtesy of Muscat Municipality)



2a



2b



2c



2d

Figures 2a, 2b, 2c & 2d. The student project a; site selection, (b) sketch map, (c) concept map and (d) computer-aided design.