

Optimisation of undergraduate horticulture course design at Charles Sturt University (Australia): A structure for the future

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Abstract

Australian agricultural and horticultural industries are facing a major shortage of graduates at a time when enrolments in these courses at most Universities are in decline. This paper reports on the optimisation of the horticultural curriculum at Charles Sturt University, Australia to adapt to this changing environment and to ensure good graduate outcomes. Two main strategies were adopted: (1) A strategic vision which combined two horticultural courses into a single degree with specialisations (“Production Horticulture” and “Environmental and Amenity Horticulture”) with consequent rationalisation of subjects, and (2) The adoption of a flexible web-based learning environment, *CSU Interact*, to facilitate cross campus subject delivery, improve efficiencies and enhance student learning. Academic staff from the Bachelor of Horticulture degree have developed new skills to optimise the delivery of fully electronic teaching material to on-campus and distance education students to complement the traditional face to face classes and practical sessions.

INTRODUCTION

Australian agriculture and horticulture is a high-tech and business-focused primary production sector annually accounting for \$AUD 80 billion and 33% of exports. At 12% of Australia’s Gross Domestic Product, the farm dependant economy is the largest sector (Econotech, 2005). Although much is being done to highlight the real importance of primary production to Australia, the sector is experiencing an extraordinary paradox.

On the one hand, there is a major shortage of skilled workers in Agricultural and Horticultural industries. Rout (2007) reports that a shortfall of 123,000 land managers and agricultural scientists is expected to arise within the next 6 years as farmers battle with new challenges such as climate change and sustainable land management. Job growth to 2013 in Australia is predicted to increase by 45% in environmental management, 44% in forestry, 41% in fisheries, 35% in horticulture and 32% in agriculture. Pratley (2008) reports a minimum of 2,000 graduates are needed each year to meet industry demands.

On the other hand, high school senior students are less attracted to primary production related careers than in the past, even in the context of starting salaries for graduates up to \$AUD 55,000 (Potter, 2007). Figures collated from the 12 Australian Universities producing agricultural and horticultural graduates suggest that there are only approximately 800 graduates entering the job market each year. Of these, only around 80 graduate from horticultural or viticultural programs. With figures showing a 24% decline in graduates from 2001 to 2006 (Pratley and Copeland, 2008), the decline has been most evident at the metropolitan Universities with much less decline from rural Universities like Charles Sturt. Unfortunately, agricultural professions suffer from a negative public perception, although considerable efforts are underway to redress this.

In view of the lack of interest in agricultural careers by high school senior students, these data suggest a deep shortage of trained specialists and an urgent need for graduates in the near future. This is particularly serious in light of the imperative to increase global food production to feed a world population expected to increase from the current 6.5 billion to 9.3 billion by 2050. In a changing and variable climate, this represents a significant challenge.

While official Government data (DEST, 2006) show that Charles Sturt University (CSU) had the second largest headcount of undergraduate students enrolled in Agricultural related studies in 2006, the University is responding to the challenges of the demands for graduates and the changing skills required by reaffirming its long term association with agricultural and horticultural education, and emphasising in its Strategic Plan the importance of these programs. To achieve this, the university has recently embarked on restructuring the way it delivers its courses.

This paper describes the pro active approach adopted at CSU to address the challenges facing agricultural and horticultural tertiary education providers.

STRATEGIC VISION

CSU is a multi campus organisation with strong historical links to agricultural studies. Agricultural and horticultural degrees can be undertaken on campus or using a distance education mode enabling students to study at home while they are working. In 2006, 68% of undergraduate agricultural students were distance education students.

In 2005, the management of the Orange campus was transferred from the University of Sydney (Faculty of Rural Management) to CSU, and in 2007 further restructuring brought together all the agricultural, horticultural, viticultural, wine science and agribusiness courses together in the one School with campuses at Wagga Wagga located in a broadacre agricultural region, and at Orange located in the heart of a major horticultural region. The horticultural programs have been consolidated to the Orange campus to complement several agricultural undergraduate degrees with a strong focus on agricultural management, horticulture and ecological agriculture, while the agricultural science, viticulture and wine science courses are taught from the Wagga Wagga campus. Undergraduate agricultural courses at CSU are typically structured as a 3 year full time or 6 years part time program. Students must complete 192 credit points which is the equivalent of 24 subjects each of 8 credit points.

The number of students enrolled at CSU in agricultural and horticultural undergraduate degrees was relatively stable until 2003 but in common with all Australian education providers has displayed a steady decrease since then (Fig. 1). This reduction in student numbers is extremely pronounced in tertiary horticultural education (Fig. 2).

To redress this decline and to ensure industry relevance, good graduate outcomes and improved efficiencies in course and subject delivery across programs and between campuses, a review of the horticulture degrees offered was conducted in 2007-2008. The combining of two previous horticultural courses into a single degree with specialisations (“Production Horticulture” and “Environmental and Amenity Horticulture”) builds upon a successful “streaming” strategy applied to the Bachelor of Agricultural Business Management and Bachelor of Science (Agriculture). This integration is of particular importance in view of CSU’s multi campus organisation. The Wagga Wagga campus focuses on the “Environmental and Amenity Horticulture” stream, and the Orange campus focuses on the administration of the course and the “Production” stream. This cross campus delivery makes best use of available expertise, resources, research effort and proximity to industry.

The Bachelor of Horticulture (24 subjects) has seven core subjects common to the “Production” and “Environmental and Amenities Horticulture”. Students in the Bachelor of Horticulture (Production) then undertake 11 specific subjects (with a strong production and management focus) and six electives. Students in the Environmental and Amenities specialisation undertake 13 specific subjects (with a strong scientific foundation to landscape design) plus four electives in addition to the seven core subjects. Such a large number of elective subjects were purposely designed within the specialisations to enable students to capture some of the opportunities offered to them. Students can choose subjects which will equip them for a wide range of careers in production industries, as consultants, in banks, with local councils, in product marketing, or in the service sector. Some students may select subjects that will equip them with the necessary skills to undertake further studies at honours, Masters or PhD levels. This flexible structure accounts for students’ personal interests and is positively perceived by them. Details of course structure can be found at <http://www.csu.edu.au/faculty/science/saws/>.

The course structure and University policies facilitate enrolment and advanced standing for Australian and international students who have already completed relevant studies and who wish to retrain in horticulture or upgrade their skills and qualifications. The Bachelor of Horticulture is serviced by a multidisciplinary team of academics although in general, academics servicing the Bachelor of Horticulture are also involved in teaching in other courses. For example, academics located on the Orange campus service the Bachelor of Horticulture as well as the Bachelor of Agribusiness Management and the Bachelor of Viticulture. Such cross pollination by academics is designed to encourage students from one degree to explore subjects from a related degree as part of their elective, hence reducing the list of subjects offered by the university. This sharing of subjects enhances efficiencies and student numbers in subjects.

The multi campus setup of CSU presents some challenges as we move to sharing subjects between courses and delivering them in different locations. For example, students based on the Wagga Wagga campus may undertake subjects taught from the Orange campus (or vice versa) in a distance education mode or tutorial mode. In common

with other courses within the University, we have had to re-evaluate how we deliver subjects and the level of support we give students, and to adopt new teaching technologies to ensure students have a good learning experience and desirable graduate attributes.

A FLEXIBLE LEARNING ENVIRONMENT

As CSU continues to evolve its teaching strategies, it has recently implemented a generic, cross campus, web based learning environment called *CSU Interact* (Fig. 3) to complement the more traditional face to face lectures and hands-on practical work. The *CSU Interact* suite of tools is based upon the open source Sakai project (<http://sakaiproject.org/>) and replaces a learning environment previously developed by CSU.

CSU Interact currently has 16 tools available to subject coordinators, ranging from traditional “Forum”, “Calendar”, “Chat”, “Group emails” used for communication purposes, to educational tools such as “Wikki”, “Discussion Groups” or “Quizz”. This flexible platform facilitates the delivery of a range of learning materials and resources together with tools which enhance student centred learning.

Of particular interest to the Bachelor of Horticulture and its academic staff, is the use of the “Web content” (Fig. 4) and “Modules” tools. The former is simply the capacity to embed in the subject’s Interact site, one or several links to web material, without cost to the students. Although this tool is traditionally used to complement class teaching with non academic information (such as the Department of Primary Industries web site), some academics with web editing experience use it as the equivalent of an electronic study guide with embedded study notes and assessment tasks. The “Module” tool is similar to the “Web content” tool in that it provides to academics with no web editing experience, a framework for the creation of structured teaching modules. Modules can be reviewed, saved and exported from one session to another. These tools empower academics to readily update information and integrate recently released material into the study resources thereby reducing the need to maintain and manage billboards and subject based forums and time consuming updating of print resources.

The use of electronic resources enables rapid dissemination of new information to all students (internal and distance), and the interaction among students and between students and lecturer helps to create a feeling of community. The benefits to student learning and teaching efficiencies are considerable

It is envisaged that *CSU Interact* will permit a transition from traditionally paper based teaching (particularly with distance education students) to the supply of teaching resources for internal and distance education students alike using a fully electronic method. This transition is not without hurdles and requires a new set of skills from academics already under considerable time constraints from teaching, research and administrative demands. Such skills include a high degree of computer skills, web design, e-based pedagogy, and video teaching. Fortunately, CSU and the Orange campus have a long association with pioneering new technologies for distance education (McKenzie, 2001; Morgan & McKenzie, 2003). Academics with experience in deep strategic changes in subject structure will complement the support already provided by the learning advisors at CSU.

Optimisation of practicals (for application in 2009)

Practicals for the various dedicated horticultural subjects taught at CSU will now focus on a limited range of fruits, vegetables and flowers to enable more in-depth learning. These crops will be maintained on two campus-based horticultural centres. This transition from the extensive exposure of students to a wide range of crops previously maintained on campus, to the intensive involvement in a restricted range of crops will be complemented by regular field tours to commercial properties (Morgan, 2006). Distance education students will be expected to have access to local horticultural professionals, and carry out similar activities to that organised for on campus students, as well as attending on campus face to face block classes similar to a “short course”. All students are likely to be involved in a “class tour” at the end of the course.

The selection of professional collaborators for teaching purposes is a difficult task as these persons are required to showcase their technical, management and financial skills in a pedagogical manner with no formal training or relationship with the university.

The continuous exposure of students to specific crops is however expected to further their understanding of these crops and to create opportunities to introduce students to horticultural research. Furthermore, the course structure described in previous sections permits students to enrol in research related subjects and prepare them for careers as technical officers and researchers in horticulture.

CONCLUSIONS

While Australian agricultural and horticultural industries face a range of challenges, Charles Sturt University is building on its location and historical strengths to continue to provide and develop its horticultural, viticultural and agricultural education programs. CSU, in common with other Universities, has adapted to these challenges and declining student numbers by refining course structures and how students are guided in their learning. This has resulted in challenges for academic staff as they adapt to these changes.

The development of a Bachelor of Horticulture with specialisations in Production Horticulture and Environmental Horticulture, and the sharing of relevant subjects between courses, creates efficiencies while maintaining student outcomes. The consolidation of our horticultural programs into a single degree with two integrated specialisations has enabled the optimisation of the course structure. New web-based technologies for subject delivery have been introduced.

During periods of strategic changes, the role of academics is somewhat plastic. Adoption of new technologies and teaching approaches requires training and a review of one’s pedagogy. However, once mastered, these approaches deliver considerable benefits to both the academic and students. The academic staff have embraced the online learning environment recently released across CSU campuses to optimise the delivery of teaching

material to on-campus and distance education students. This change in pedagogy is likely to show fruition as the confidence and experience of the staff involved increases.

We are confident we have the foundation to ensure graduates have the knowledge and skills required in today's modern world of agriculture and horticulture. The challenge now is to continue the work of changing the public perception with regards to agricultural and horticultural professions to ensure there are sufficient graduates to meet industry needs.

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Figures

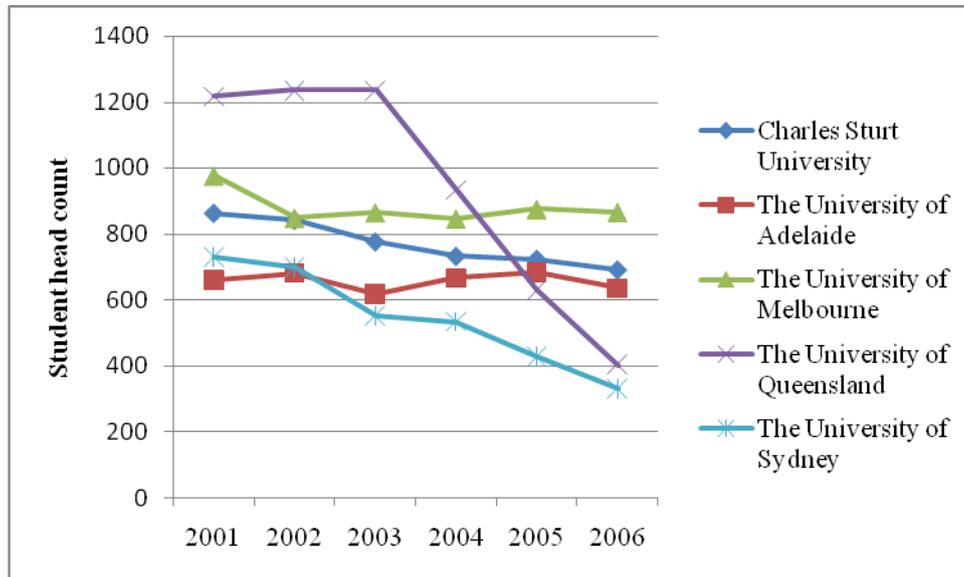


Fig. 1. Undergraduate student number enrolled in various Australian universities in agricultural studies (Field of Education (FOE) ranging from 050300 to 059999).

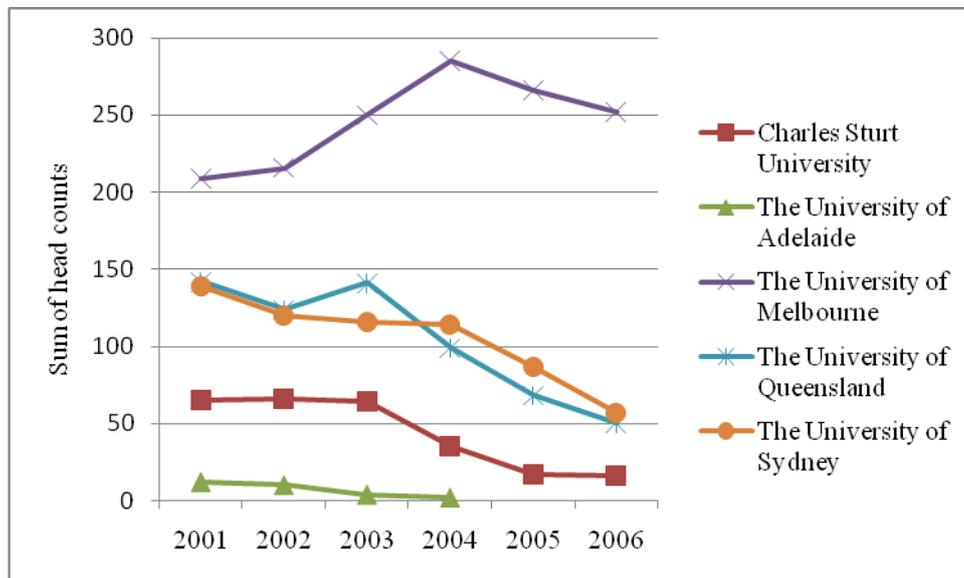


Fig. 2. Undergraduate student number enrolled in various Australian universities in the Field of Education (FOE) "Horticulture". Data adjusted to reflect the number of students transferred from the University of Sydney to Charles Sturt University in 2005.

CHARLES STURT UNIVERSITY **INTERact** A scholarly Community [Logout](#)

My Workspace | ABOUT ICT integration | AGB180 200840 OA I | **AGR156 200840 OA I** | - More Sites -

Home | Announcements | Calendar | EASTS | Evaluation | Forum | Modules | Resources | Site Info | Site Stats | Subject Outline | Web Content Tool | Help

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WORKSITE INFORMATION

Options

Welcome to AGR156 - Plants in Agriculture

Water lost by transpiration

Suction Pressure

Capillarity

Water absorbed by root hairs

CALENDAR

Options

May, 2008

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-----|-----|-----|-----|-----|-----|-----|
| 27 | 28 | 29 | 30 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

Lecture AGR156
 Date: 10:00 am - 11:49 am
 Event Type: Activity
 Description:
 Event Location: Computer Room 3
 Site: AGR156 200840 OA I
[Full details...](#)

Fig. 3. Example of a subject's CSU Interact web page, showing a variety of tools (left hand side of the screenshot, under "Home") offered to the students by the subject coordinator. A separation of student cohorts permits a choice of tools targeted to specific audiences.

Welcome To AGR 156

[Study Guide](#) | [Workbook](#) | [Assignment Cover Sheet](#)

Study Weeks

| | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|
| Week 1 | Week 2 | Week 3 | Week 4 |
| Week 5 | Mid Semester Break | | Week 6 |
| Week 7 | Week 8 | Week 9 | Week 10 |
| Week 11 | Week 12 | Week 13 | |

| Week | Date | Topic | Staff | Practical | Tutorial | Assessment Task |
|------|--------|--|-------------|--|--|-----------------|
| 1 | 18 Feb | Introduction Topic 1. Agricultural crops and Plant Products Topic 2. Seeds | PRH | 1 Seed treatments Germination tests Agronomy plots | Plant products | |
| 2 | 25 Feb | Topic 1. The Plant System Topic 2. Basic plant growth and development | DK PRH/ PM/ | 2 Basic plant growth – Plant families Seeds, seedlings, leaves and buds | Crop profiles Plant diversity and ID- Orange Botanic Gardens | |

Fig. 4. Example of customised web based information supplied to students by their lecturer using CSU Interact "Web content tool".