Acoustic Design at RMIT University

Robyn Lines and Neil McLachlan
Faculty of Environmental Design and Construction
RMIT, Melbourne

Abstract. The Australasian Soundscape Project in the Faculty of Environmental Design and Construction at RMIT University has introduced a new minor study in acoustic design for architecture and design students. The study seeks to emphasise the contribution of sound to the experience of space through a series of practical and theoretical design and analysis subjects.

The Faculty of Environmental Design and Construction (FEDC) at RMIT University has introduced a minor study in acoustic design. The study consists of three theory subjects and a design studio, and may be taken by students studying architecture, landscape architecture, interior design, and industrial design.

The three theory subjects are Constructing Sound, The Sound of Space and Acoustic Environments. Constructing Sound is an introduction to physical, physiological and psychoacoustic processes involved in the experience of sound, and is the only one of the theory subjects taught so far. The Sound of Space will explore sound in relation to architectural spaces and develop new methodologies for designing spaces for sound. Acoustic Environments will outline current cultural theory, legal responsibilities and planning implications relating to sound.

Design studios in sound have been run within the FEDC since 1993. These studios have focused on a range of areas such as class-room acoustics, the design and construction of acoustic installations for cultural events and soundscape analysis. Many of these studios have involved communities outside RMIT. For example, design proposals were developed for the renovation of a pre-school for hearing impaired children in Nathalia in northern Victoria, and a similar studio is currently underway for school rooms in the Aboriginal community at Yirrkala in Arnhem Land. Acoustic installations such as "Perfect Form", built around the De Kooning sculpture in the forecourt of the Victorian Arts Centre, were part of the Next Wave Youth Arts Festival.

The acoustic minor was designed by Robyn Lines, Neil McLachlan and Jonathan Mills. This team of people, with the addition of Peter Clark and Herb Jercher, is developing a program of activities at RMIT under the title of the Australasian Soundscape Project. This project was initiated by Jonathan Mills in 1993 when he joined the FEDC as the recipient of the Lady Beale Fellowship in the Acoustic Arts.

The Australasian Soundscape Project (ASP) seeks to raise the profile of acoustics as an essential part of the experience of space and integral to the practice of design. Its approach involves the generation of new acoustic understanding and practice through the synthesis of the generally discrete bodies of knowledge of architects, designers, acousticians, audiologists, composers, sound artists, cultural theorists and others. Specific outcomes include teaching programs, seminars, documentary and research publications, public exhibitions, installations and performances.

Members of the project have been involved in research on how architects and designers integrate acoustic knowledge into their practice, new educational strategies for acoustics within the design professions, musical acoustics and perception in non-western percussion ensemble music and the design and application to performance and installation of novel musical instrumentation.

To date the teaching program is the central concern of the ASP. It seeks to emphasise the contribution of sound to the experience of architectural spaces. Traditional approaches to acoustic education for
design professionals have resulted in a narrow conception of acoustics as noise control, or as an expensive, optional extra to the main concerns of architecture.

The neglect of sound in architecture may be traced to the dominance of graphical processes in design, which lead to a predominantly visual conceptualisation of architectural spaces. Quantitative acoustic evaluation of design concepts usually becomes relegated to (at best) limited remedies on pre-determined architectural forms.

The introductory subject to the acoustic minor, Constructing Sound, seeks to cultivate an ability in students to imagine the sound experience which would be generated by a given physical system. The vibrational behaviour, timbre, and sound resonating and radiating properties of reference sound sources such as air columns, metal plates, tubes and rods, electronic oscillators and loudspeakers, the human voice and musical instruments are described in a variety of ways. Simple physical and mathematical models such as springs and simple harmonic motion, visual and graphic representations including acoustic spectra and waveforms, musical conventions and textual descriptions of sound are all used. Basic bio- and psychoacoustic principles are also introduced.

Students are encouraged to develop an understanding of sound through the physical manipulation of these reference sources, and a capacity to describe and predict acoustic

behaviour (in a general sense) by developing an ability to link knowledge gained in separate experiences of the various contributing phenomena to sound sensations.

The Sound of Space is currently being prepared for the first semester in 1997. It will include the extensive use of case studies where students will make detailed qualitative and quantitative analyses on a range of architectural spaces. These spaces will be modelled using a room acoustic modelling computer program linked to 3-D auto-CAD, and redesigned to achieve specific acoustic design outcomes. A desk top auralisation program will be used to assist students to make qualitative acoustic evaluations of their designs. Simple physical models such as ripple tanks and some basic mathematical concepts and systems of approximation will be used to introduce the principles of room acoustics.

The acoustic minor and other programs of the Australasian Soundscape Project are in the early stages of development and professional input is welcome. Interested people may contact the ASP:
Telephone (03) 9660 1926
Fax on (03) 9660 1820
e-mail mclachlan@fedcmac.edc.rmit.edu.au