Undergraduate course lecturer, Harry Partridge, discusses the importance of developing the more intuitive and creative side of the brain — and describes how a short course in art given to final year civil engineering students at Sydney University has endeavoured to encourage students in this direction.

Typically, engineers receive little or no education in the arts. Very rarely do engineering faculties at universities offer courses in art history, architecture or the appreciation of beauty. This results in ‘one-sided brain’ learning, which limits a student’s ability to think and solve engineering problems holistically and creatively. It further restricts their fuller appreciation of societal issues, rendering them less able to fully understand and serve the needs of their community.

Students are most commonly attracted to engineering as a course of study and career because of their demonstrated High School skills in mathematics, physics and chemistry. Humanities subjects are not a prerequisite for university acceptance. This omission is compounded at tertiary level, with engineering courses concentrating on science based subjects — predominantly the study of the forces of nature, material properties and how these can interact safely. In their formulation, these courses are silent on human or emotional issues. This is almost unique within university faculties. All of the arts degrees, for example, deal with the human drama and its expression. Medicine, with its huge volume of information to be learned, ultimately comes up close and personal with the human condition. Even law and economics students consider the cause and effect of how humans behave with one another. Architecture considers the spaces and structure which are harmonious and give not only function and shelter, but beauty.

The need to develop both sides of the brain
This ‘left-side brain bias’ in engineering (and some science) courses produces graduates who are not ‘whole brain thinkers’, and to their detriment. As Betty Edwards, author of Drawing on the Right Side of the Brain puts it:

“The arts are essential for training specific, visual, perceptual ways of thinking; just as the ‘3 Rs’ are essential for training specific, verbal, numerical, analytical ways of thinking... both thinking modes — one to comprehend the details and the other to ‘see’ the whole picture, for example — are vital for critical-thinking skills, extrapolation of meaning and problem solving.”

A new study by a US engineer turned sociologist, Erin Cech, claims that an engineering education can lead to an increased level of indifference to broader social concerns. The study found that engineering students were less concerned about matters of social welfare following graduation, than when they first commenced their degrees.

‘One-sided brain teaching’ narrows the outlook and thus limits the range of potential solutions that may spring to mind when one is faced with technical issues and problems. This can ultimately lead to a built environment and infrastructure designs that are principally products of cost, functionality and expediency. Architects typically have to fight for the aesthetics of their designs... and their chief adversary in this is often their engineer! This inhibiting influence on our engineering profession is starting to be recognised. A number of universities in the US are beginning to offer art as part of an engineering degree and Sydney University’s current Civil Engineering Design course contains a short course on art. The experiences gained in teaching that segment of the course (for both student and teacher) are described here.

Teaching art in engineering design
The Civil Engineering Design unit of study at Sydney University is taken by students in their final undergraduate semester. It is fundamental to those delivering the course, that design is a creative activity and the course’s 12 weeks are designed around this premise. Hero engineers from old are referenced:

“[Design must] be firm... be commodious... and delight.”
Marcus Vitruvius
“Can one think that because we are engineers, beauty does not preoccupy us – aren’t the genuine functions of strength always in keeping with unwritten conditions of harmony?”
Gustav Eiffel

“A technical man must be able to appreciate life — and life is art and music and people.”
Fazlur R. Khan

“When I am working on a problem I never think about beauty. I only think about how to solve the problem. But when I have finished, if the solution is not beautiful, I know it is wrong.”
Buckminster Fuller

Students are challenged to think about ‘What is design?’ in the context of these inspirational statements of their forebears. The short course in art is at the heart of the Civil Engineering Design course and is intended to pave the way for students to challenge themselves to ‘think outside the box’.

The lecture
The lecture begins with the students being taken on a pictorial travel adventure, as the author recounts his leaving Australia — having graduated from Sydney University in 1969 — to travel through Asia, Russia and Europe. As this journey proceeds, a growing interest in the famous paintings and architectural marvels that he discovered along the way, such as St. Basil’s Cathedral, Moscow (Figure 1) becomes apparent.

Purposeful use is made of the drama in art. Picasso is introduced with his ‘Weeping Woman’ (Figure 2) and his famous quote: “Art is a lie. A lie that lets you see the truth.”

The students are then asked to examine various works in detail. Questioning, for example, what is really being painted in Monet’s ‘Haystack’ [answer: the light] (Figure 3), and comparing photos of real sun reflections with those depicted in Monet’s ‘Sunrise’ (Figure 4).

The students are shown Duchamp’s cubist ‘Nude Descending a Staircase’ (Figure 5) (note the movement), while the portfolios of abstract expressionists Jackson Pollock and Mark Rothko illustrate that neither pictorial representation nor drawing skill is an essential requirement in creating a work of art.

The lecture is interspersed with designed structures for film sets (Mad Max, The Matrix, Superman etc.) and ceremonial occasions (e.g. the Opening Ceremony of the Sydney Olympics in 2000 and the 2006 Asian Games held in Doha) as well as modern public art that the author has designed in his consulting practice. This emphasises that engineering is also part of this world of creative activity, and that engineers do in fact share in the creative process.

The assignment
Immediately following the lecture, students are presented with an assignment, to be completed within three hours, in the department’s drawing office (equipped with canvases, brushes and acrylic paints), to paint ‘an idea, a mood, a feeling or an emotion’ and write 50–100 words about their work. Skill in drawing is not sought, but much rather, self-expression.

A second assignment is sometimes given. In the past, this has involved an excursion to an art gallery or the annual Sculptures by the Sea exhibition at Bondi. The students are asked to write 50–100 words on the work which meant the most to them.

Typically, students respond in a good-natured, positive manner to these novel experiences. All of the works from the painting assignment are photographed and exhibited on posters hung in the School of Civil Engineering main stairwell throughout the following year. This fulfills a complementary function by exposing younger students to a permanent display of work by previous students, clearly proclaiming that art is part of their prescribed coursework.

Marking
Marking the students’ work is considered a real privilege. Suddenly there are no formulae to fall back on; no mathematics to underpin an approach of reasoning, no right or wrong. Everything is new, fresh, seeking, exploring — and this is true for both student and marker.

The majority of students paint autobiographically and honestly. A number paint intimate thoughts and emotions that they may not have been able to express in other ways. For some it even appears to
offer a cathartic opportunity to express an event or emotion hitherto concealed.

Many students from overseas (notably from Asian countries) paint their own family or scenes from their childhood home, depicting an idyllic portrayal of an earlier life, or a happy family celebration. Other students — and this has become, over the years, a common theme — paint scenes showing themselves to be lost and confused. Often there is an expression of some apprehension at leaving the comfort of university life and forging a life in the ‘real world’ which they often feel they will have to deal with alone. Occasionally, students have used the opportunity to express anger or frustration — painting aggressive and even violent images, such as skull and crossbones, swastikas, burning buildings, blood, fighting and death. Less frequently (and more prevalent among female students) some have expressed their grieving at the loss of a parent or loved one.

There are also students who can demonstrate that they have little to learn about ‘thinking outside the box’. These are already the inventive ones, who have not painted on the canvas but on its plastic covering (Figure 6), who have cut holes in the canvas or painted on its rear; who use their hands instead of brushes, who paint one canvas and then press it against another to reveal a mirror image. They are curious, adventurous and not afraid to ‘have a go’. These students already appear to be on the way to a rich and rewarding engineering career.

Concluding comments
Student feedback has been almost universally positive. The teaching staff firmly believe that this (albeit brief) exposure to art will have a beneficial effect on at least some engineering students; not only in helping to develop a more ‘balanced brain’ but also in unlocking the potential for an enriched cultural life, thus facilitating a fuller contribution to society in their engineering careers.

As noted by former Institution President, Professor David Nethercot, in a personal communication with the author:

“Engineers must be able to hold intelligent conversations with other professionals and with non-specialists. This does not mean that they should aim to be amateur architects or lawyers but should develop a receptiveness and empathy.”

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More information on the specifics of the course can be obtained from Robert Herbertson at: robert@wellstructured.com.au

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Harry graduated from Sydney University in 1969. Obtaining a Masters Degree following 10 years spent working and travelling, he founded Partridge Structural in 1982 and Artmap Studio in 2011. He has always had a passion for architecture and is an affiliate member of the Royal Australian Institute of Architects. He enjoys exploring innovative designs, sustainability and the relationship between structure and architecture.

References