

## ENGINEERING: A CREATIVE PROFESSION ?

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**Abstract** <sup>¾</sup> “Creativity” is highly valued in modern societies and is used for market positioning in different sectors. Professional engineers and engineering educators correctly identify creativity as important elements of their work. Yet engineering may not be perceived by the public or prospective students to be particularly creative. The paper presents results from a survey of secondary school students. On average, and perhaps not surprisingly, they rated engineering as more creative than accountancy or medical practice, but less creative than architecture or music. Their comments reveal a range of useful perceptions. The paper identifies four dimensions of creativity and notes that each has a framework of expression critical evaluation. The paper suggests that a focus on creativity can be used to portray engineering accurately to prospective students, and that increased focus on creativity in the curriculum will be motivating to students and will also improve employment outcomes.

**Index Terms** <sup>¾</sup> creativity, innovation.

### EXTENDED ABSTRACT

Creativity is essential in the practice of professional engineering. Do prospective students perceive engineering to be a creative profession in the same way as its practitioners? Can we use better understanding of these perceptions to increase student demand for engineering study, and to improve the quality of engineering education?

Creativity is at the core of humanity’s development. Today, creative artists and writers gain public honours and acclaim, and cultural festivals and events are exploited to lend identity and market position to cities and states. A new set of “creative industries” has emerged around the exploitation of IT-based media in the entertainment and infotainment sectors. But creativity, “characterized by originality of thought or inventiveness” [1], is exercised in every profession and in many different ways. In addition to the **artistic** domain, we may identify three further creative domains: **scientific** (discovery research), **constructive** (making new artefacts), and **entrepreneurial** (building new businesses). Creativity in each domain is exercised through a balance of divergent and convergent thought and practice. Each domain has its own framework and accepted methodology of evaluation and critique.

Practising engineers may identify closely with constructive creativity, and with the other three domains to lesser, but important extents. Evaluated on a single creativity axis, however, a reasonable expectation may be that engineering creativity would be generally perceived to be lower than other domains, particularly the artistic.

A study of 239 secondary school students’ perceptions of the creative content of a number of occupations confirms this expectation. Table I shows their average ratings on a 5-point Likert scale, from 1 (not creative) to 5 (very creative). The occupation of engineering is perceived to be around the “quite creative” part the spectrum. In their comments, many of these secondary school students affirmed that engineering creativity is “thinking outside the square”, identifying its divergent side. Others referred to “conformance to rules” as a necessity of practice. One student asserted that creativity can only be stimulated from “the arts”.

TABLE I  
SECONDARY SCHOOL STUDENTS’ RATINGS OF THE  
CREATIVE CONTENT OF VARIOUS OCCUPATIONS

Occupation	Av’ge Rating	St’d Dev	Occupation	Av’ge Rating	St’d Dev
Architect	4.26	1.00	School Teacher	3.27	1.25
Musician	4.25	1.21	IT Professional	3.26	1.26
Actor	4.02	1.25	Builder	2.59	1.17
Journalist	3.75	1.26	Doctor	2.18	1.24
Mechanical Engineer	3.46	1.18	Real Estate	2.13	1.10
Electrical Engineer	3.40	1.16	Shopkeeper	1.95	1.11
Research Scientist	3.32	1.41	Accountant	1.55	0.96
Civil Engineer	3.30	1.18			

Engineering educators must build on this general positive perception of creativity in engineering in their program promotion, and in curricula. With declining enrolment trends into engineering (in Australia) we should not turn off innovative and creative minds from engineering study by poorly-balanced and un-motivating curricula. Engineering courses at the University of South Australia currently include course material on creativity and innovation in the second year of undergraduate study, and of course, expect creativity in later project work.

Greater focus on developing students’ understanding of creativity, in all its forms, and related skills will result in improved engineering outcomes. And engineering will be perceived more widely to be a truly creative profession.

[1] “English Dictionary”, Collins London 1979

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