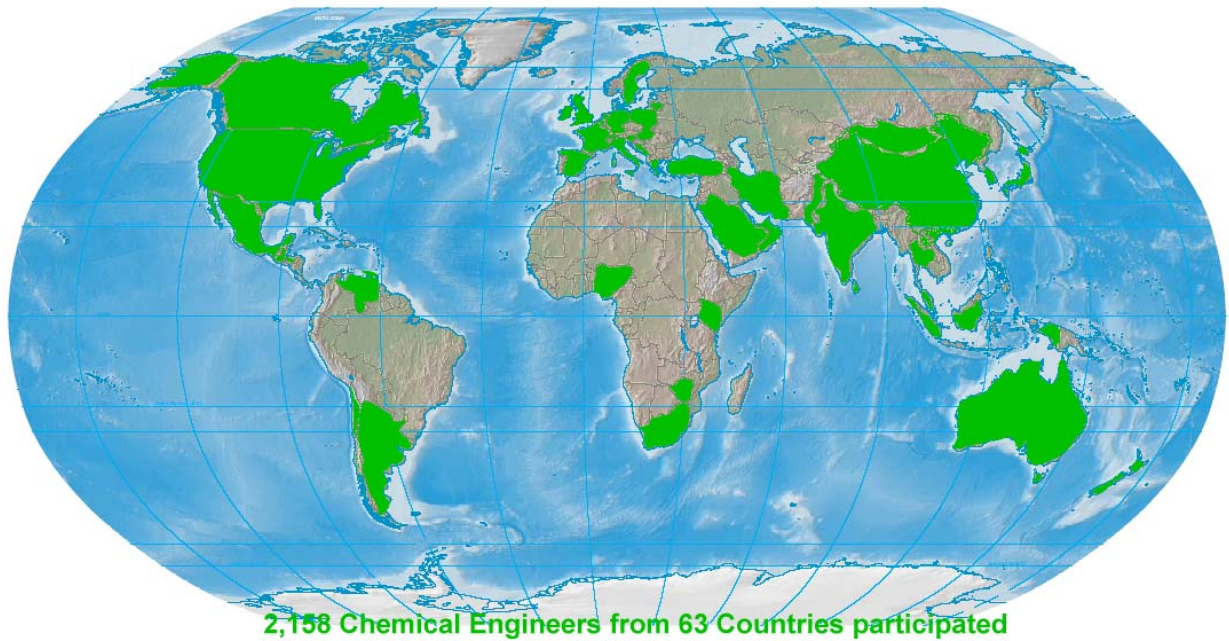


World Chemical Engineering Council WCEC

Executive Summary

How Does Chemical Engineering Education Meet

the Requirements of Employment ?



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First Worldwide Survey on Chemical Engineering Education

The WCEC World Chemical Engineering Council (www.chemengworld.org), founded in Melbourne in 2001, has just conducted the first worldwide survey among young chemical engineers entitled

“How does Chemical Engineering Education
Meet the Requirements of Employment?”

The focus was on general skills and abilities leading to a professional qualification, not the specific content of curricula.

2,158 young chemical engineers from 63 different countries took part in the survey. For seven countries (PR China, USA, UK, Mexico, Germany, France, Australia) the volume of data collected permitted a comparative evaluation by country in addition to the overall analysis. Some of the most important results are given in the following.

Study Fees and Duration of Study

Chemical engineering is no longer an exclusively male-dominated discipline. The share of females is approximately 30% worldwide, and in USA, France and Australia even 40%. Altogether 45% of all participants pay study fees in excess of US\$ 1,000 per annum. In USA, France and Australia over half of the students pay fees, whereas in Germany this is decidedly the exception. The mean value for study time up to a PhD degree is 8.7 years. In Germany the mean value is 9.4 years, in the US 9.2 and in France 6.7. For bachelor's and master's degrees the average study duration is 4.5 and 5.3 years respectively. The UK achieves the shortest study times (3.8 years bachelor's, 4.3 years master's degree). No evidence was found for a conceivable correlation between shorter study time and payment of study fees.

Best Chances on the Employment Market

The study of chemical engineering offers best chances on the employment market worldwide. 31% of all students (35.1 % of women, 26.1 % of men) commence their careers directly on completing their studies. 90% of all graduates find employment within 6 months of graduating. Women commence their careers on average 0.8 months (2.2 months after graduation) earlier than men (3.0 months after graduation).

Internationality of Study and Career

In countries, such as PR China, USA and Mexico students study predominantly in their own country and also commence their careers there. In Europe and Australia the tendency is far greater to study at least temporarily abroad and to embark on a career there.

Abundant and Wide Range of Employment for Chemical Engineers

The assumption that chemical engineers find their first employment predominantly in the chemical, petrochemical or pharmaceutical industries is either outdated or simply erroneous. The first professional employment of all participants was distributed over a total of 27 sectors.

In USA, PR China, France and Australia there is a strong tendency for branches outside the traditional fields to employ chemical engineers. This trend is least marked in Germany.

Education Still Too Strongly Research-Oriented

Participants were asked to rank the relevance of skills and abilities required during their education and then for their employment on a scale of 1 to 5. Only the attributes

- Appreciation of the potential of research, and
 - Ability to apply knowledge of basic science
- were rated as more important during education than for employment. This is a consequence of the broader range of employment for chemical engineers and of the declining number of openings in industrial research, a situation to which education has still failed to adapt.

Evident Shortcomings with Respect to Important Skills and Abilities

The most important abilities for employment were:

- Ability to work effectively as a member of a team
- Ability to analyse information
- Ability to communicate effectively
- Ability to gather information
- Self-learning ability

All these points indicated shortcomings, or at least room for improvement, in education.

The abilities manifesting the greatest deficits in education proved to be:

- Business approach
- Management skills
- Project management methods
- Methods for quality assurance
- Ability to communicate effectively
- Knowledge of marketing principles
- Sense of ethical and professional responsibilities

PhDs consider themselves to be distinctly less equipped for their careers than those with a bachelor's or master's degree. This, too, is a consequence of the declining demand by industry for research-intensive work.

Quality of Education

Participants attested the universities their efficient organization of study programmes and meaningful assessment methods and also adequate motivation and feedback by the teaching staff.

The lowest rating was for "excellent and inspiring lectures", from which it can be deduced that the proportion of mediocre academic staff is too high. Women rated the quality of their education more critically than men.

Satisfaction with Choice of Career

85% of all participants stated that they were satisfied with their decision to study chemical engineering. For PhDs the figure was 91.7 %, for those with a bachelor's degree 87.6 % and with a master's degree 85.1 %. Payment of study fees enhances participants' satisfaction with their choice of study by 6 %. For men the mean value for satisfaction with their choice of profession was 87.6 %, whereas for women it was only 81.5 %. The striking exception is female chemical engineers in Germany. Only a mere 40% are satisfied with their choice of career.