

Publishing and presenting: a cross-national analysis of engineering academics in Europe

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ABSTRACT: The international Changing Academic Profession (CAP) survey was used to compare several measures of research output in participating European countries. When looking at the output of books, articles, reports and conference presentations, results indicated variations between countries and between the engineering field of education and other fields of education. European university engineering academics produced relatively more research reports/monographs written for a funded project, but tended to produce at lower rates than academics overall in the other three forms of written research output.

Keywords: Publications, research outputs, CAP survey, EUROAC

INTRODUCTION

This article concerns academic publishing among European university engineering academics. It is based on an analysis of data collected in the international Changing Academic Profession (CAP) survey, which sought academics' opinions on a range of matters to do with governance, management, academic work and perceptions of change. Initially, the CAP survey was conducted in 19 countries on five continents during 2007 and 2008. It included seven European countries in addition to Australia, China, Hong Kong, Japan, Korea, Malaysia, South Africa, Argentina, Brazil, Canada, Mexico and the US [1], and the extended survey added Austria, Croatia, Ireland, Poland and Switzerland [2], increasing the number of European countries to 12.

The survey has now been completed by about 25,000 academics world-wide, including about 14,000 in the European participating countries. Some countries have binary systems of education, typically comprising universities and polytechnics or equivalent institutions. In this article, only academics from universities have been included, in order to maximise the comparability of responses across national borders.

This article considers university academics in the field of engineering, manufacturing and construction, one of 11 disciplinary groupings built into the survey. Respondents were asked to indicate the discipline in three contexts: their highest degree, their current academic unit and their current teaching. For this article, *discipline* has been based on *current teaching*.

As stated, responses were received from about 14,000 university academic staff members who identified their discipline, as summarised in Table 1. Of these, 2,056 (14.8%) stated their discipline/field to be *engineering, manufacturing and construction, architecture*; hereafter, described as *engineering*. The proportion of the national samples that comprised engineering academics varied between countries, from over 20% in the cases of Croatia, Poland and Portugal, down to below 10% of respondents in Ireland, the Netherlands, Norway, Switzerland and the United Kingdom.

A possible reason for these national variations is that some countries have binary systems of higher education, and it is possible that these polytechnic-style institutions provide a higher proportion of academic teaching and research in engineering than those countries' universities.

Table 1: CAP survey/EUROAC university respondents by discipline.

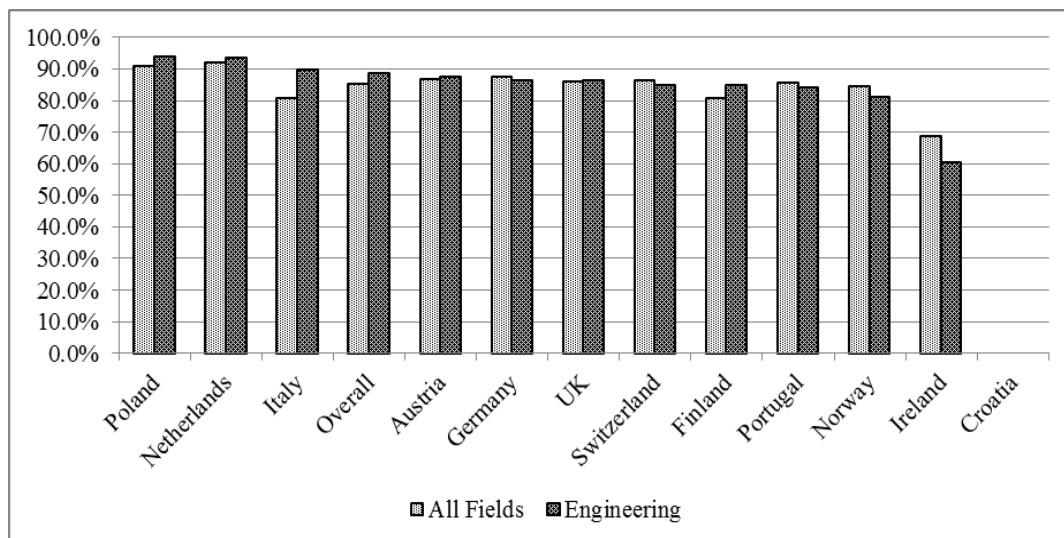
	Engineering #	Other disciplines/ fields	Total	Engineering % of Total
Austria	313	1925	2238	14.0%
Croatia	89	238	327	27.2%
Finland	92	753	845	10.9%
Germany	116	793	909	12.8%
Ireland	63	694	757	8.3%
Italy	253	1396	1649	15.3%
Netherlands	51	549	600	8.5%
Norway	63	735	798	7.9%
Poland	720	2226	2946	24.4%
Portugal	170	614	784	21.7%
Switzerland	49	950	999	4.9%
UK	77	948	1025	7.5%
Total	2,056	1,1821	13,877	14.8%

Source: CAP / EUROAC Survey 2007 - 2010

described in CAP as *engineering, manufacturing and construction, architecture*

WHO WRITES SCHOLARLY PAPERS?

One of the questions asked respondents to the CAP/EUROAC survey whether they had been involved in *writing academic papers that contain research results or findings* during the last two years. In some disciplines only refereed articles and scholarly books are recognised as ways of transmitting research [3], but in engineering, the scope is often broader, and can include conference proceedings, patents and computer software, as well as scholarly publications. Figure 1 summarises the responses by university academics, comparing responses by engineering academics and academics in other disciplines. According to responses, writing scholarly papers is an activity undertaken by over 80% of academics in most of the countries surveyed, with Ireland being reporting the lowest incidence. This question was not asked in the Croatian survey.



The Croatian CAP survey did not include this question.

Source: CAP Survey Question D3_4 *Have you been involved in any of the following research activities during this or the previous academic year? - writing academic papers that contain research results or findings*

Figure 1: CAP survey: proportion of respondents writing research-based papers, by country.

Figure 1 also shows that the incidence of writing papers was higher among university engineering academics in five countries (and in Europe overall), and lower in four others. More than 90% of both engineers and academics in other disciplines reported that they wrote academic papers in Poland and the Netherlands, with 80% or more academics from other European countries (except Ireland) reporting similarly. The variation between the writing propensities of university engineering and academics in all disciplines was quite small.

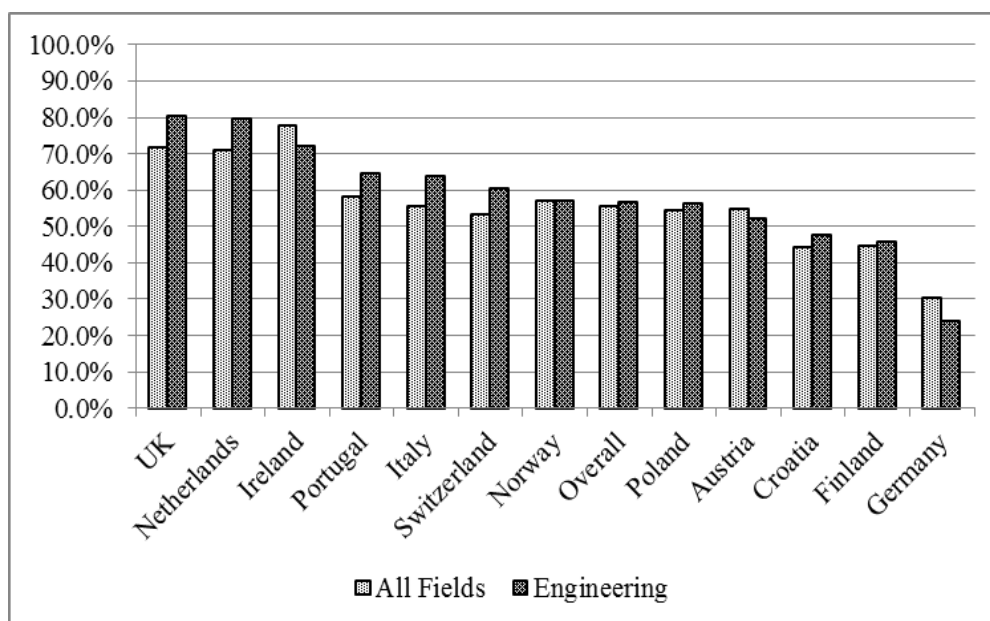
The gap between engineering and disciplines overall was greatest in Italy (with more engineering academics reporting that they wrote academic papers), and Ireland, where the pattern was reversed.

Another variable that indicates strong engagement with scholarly writing and publishing is whether or not academics are involved in peer review processes. One question from the CAP questionnaire asked whether respondents had served as a peer reviewer in the current academic year. Results have been summarised in Figure 2, which indicates a considerable variation in national patterns. At the top end of the scale, around 70% of academics in all disciplines from the United Kingdom and the Netherlands reported their involvement in peer review (and about 80% of engineering academics), down to a much lower proportion from Germany, where just over 30% of academics overall reported that they had peer reviewed in the current academic year, and less than 30% among engineers. The differential between countries in peer reviewing was 15-20% between Germany, and the next country, Finland. The Europe-wide average saw about 55% of university academics overall being involved in peer reviewing.

Comparing the responses of university engineering academics with university academics in all disciplines, Figure 2 shows that engineering academics are more likely to be involved in peer review processes than academics overall.

There could be a clear explanation for the national variation, and particularly the gap between German university academics and those from other countries. Perhaps the existence of a binary system of universities and polytechnics in Germany and Finland explains some of the variation from the overall pattern, but then academics from the Netherlands (which also has a binary system) reported the equal highest participation in peer reviewing. It is also possible that more English academics are involved in peer reviewing (particularly of journal articles) because of the pressure in many countries for academics to publish in English-language publications. These observations are mere speculation by the authors, but they serve as an indication of a trend which could be examined at a later time. The differential varies from around 10% in the United Kingdom, the Netherlands and Italy, but is lower in other countries. Only in Ireland and Austria was the peer review involvement by engineering academics lower than for academics in all disciplines.

It seems that in the United Kingdom, Netherlands and Ireland, more academics serve as peer reviewers for journals, sponsored research or institutional evaluations than in some other countries. Perhaps part of the reason could be that reviewing is undertaken by only senior researchers (in countries such as Finland and Germany, for example), but perhaps the review function is undertaken by less senior academics in other countries. This question, therefore, reports on the nature of academic stratification that exists in some countries.



Source: CAP Survey Question A13_2 During the current academic year, have you done any of the following? - served as a peer reviewer (e.g. for journals, research sponsors, institutional evaluations)

Figure 2: Incidence of peer reviewing by country.

WHAT DO ACADEMICS WRITE?

The CAP survey asked respondents to indicate the number of contributions of several types they had published over the past three years. Among the contributions responded about are books, articles and research reports authored or co-authored, and the number of conference presentations. These are summarised in Table 2, based on some of the responses to Question D_4.

Table 2 shows the proportion of respondents that had one or more contributions in each category shown. For example, among academics that had authored or co-authored a book, the Europe-wide average among the countries that

participated in the CAP/EUROAC survey was 20.3% of university engineering academics had that authored or co-authored at least one book, whereas 26.7% of academics in all disciplines had done so, in the previous three years. According to responses to the CAP/EUROAC survey, with the exception of Norwegian academics, engineers tend to be involved in authoring or co-authoring books at a lower rate than university academics in all disciplines. The differential between countries in terms of book production varied considerably. In the United Kingdom, 10.5% of respondents that reported having contributed at least one book, compared with 29.0% of university academics in all disciplines, a gap of nearly 19 percentage points. Similar comparisons reveal a gap in the Netherlands of about 10%, and in Portugal, one of about 6%.

There is considerable variation between countries in contributing books. In Poland, 7.0% of university engineering academics were involved in contributing books (10.9% for academics in all disciplines), whereas in Italy, 46.2% of university engineering academics produced books (47.7% of academics in all disciplines).

Table 2: CAP survey/EUROAC university respondents by discipline: proportion involved in publishing, by type of publication.

	% Written book		% Written paper		% Written report		% Conference paper	
	All fields	Engng.	All fields	Engng.	All fields	Engng.	All fields	Engng.
Austria	27.9%	22.2%	27.3%	32.1%	56.0%	67.3%	87.3%	90.1%
Croatia	34.5%	33.7%	81.6%	80.9%	26.3%	22.5%	85.0%	89.9%
Finland	25.3%	22.6%	81.8%	70.2%	36.0%	60.7%	82.0%	83.3%
Germany	27.9%	21.9%	88.6%	77.1%	61.8%	74.3%	81.9%	87.6%
Ireland	21.8%	19.6%	89.6%	82.4%	49.6%	52.9%	91.1%	88.2%
Italy	47.7%	46.2%	94.3%	91.2%	48.3%	61.4%	85.8%	95.2%
Netherlands	33.6%	23.3%	96.4%	96.7%	39.8%	43.3%	88.7%	93.3%
Norway	31.4%	36.2%	87.4%	82.8%	23.4%	39.7%	80.8%	93.1%
Poland	10.9%	7.0%	57.4%	53.6%	14.9%	23.7%	55.1%	54.4%
Portugal	34.8%	27.9%	85.1%	84.4%	55.7%	58.2%	87.8%	91.8%
Switzerland	24.3%	18.6%	82.2%	83.7%	52.4%	55.8%	79.6%	83.7%
UK	29.0%	10.5%	90.4%	87.7%	38.5%	57.9%	87.9%	93.0%
Overall	26.7%	20.3%	74.1%	66.9%	38.7%	43.7%	77.9%	76.0%

Engng. - means engineering.

Source: CAP Survey Question A4_x *How many of the following scholarly contributions have you completed in the past three years?* D4_1 *scholarly books you edited or co-edited*; D4_2 *articles published in an academic book or journal*; D4_3 *research report/monograph written for a funded project*; D4_5 *paper presented at a scholarly conference*

The situation for production of scholarly papers is similar, in that in most of the countries surveyed, the proportion of university engineering academics producing papers was lower than the proportion of academics in all disciplines. Again, there was a considerable difference between countries. Responding university engineering academics from Croatia (32.1%) and Poland (53.6%) were much lower than for their colleagues from the Netherlands (96.7%), Italy (91.2%) and the United Kingdom (87.7%).

The production of written reports by university engineering academics tended to be lower than it was for the production of written papers, but higher than the output of written books. A higher proportion of engineering academics from Austria, Ireland and Finland tended to produce written reports (more than 60%), compared with the Europe-wide average of 43.7%.

Presenting conference papers is the most common form of research output, with a European average of over three-quarters of academics having presented a paper at a scholarly conference.

The distributions of these forms of research output vary considerably between the types of output, but also between countries. For example, Polish academics reported much lower rates of involvement than academics from most countries. As was the situation in all countries, presenting papers at scholarly conferences was the most common form of research output in Poland, but only slightly more than half of CAP respondents from Poland said that they had done so. The Europe-wide average was 76%, and in several European countries, over 90% of academics had been involved.

Austrian university engineering academics reported relatively low participation in the production of written papers (32.1% of engineers), compared with the European average of 66.9%. Italian university engineering academics reported much higher than average production of books, written papers and conference presentations.

Comparing these forms of research output between engineering and the overall output also produces differences. Book production tends to be lower among university engineering academics than in all fields of education except in Norway. Similarly, engineers in Europe tended to produce relatively fewer written papers, with only Austrian university

engineering academics bucking the trend. However, the proportion of Austrian academics, whether engineers or not, was much lower than in other European countries. A higher proportion of engineering respondents produced written reports and conference papers. Only in Croatia (written reports) and Ireland (conference presentations) was the relative output of university engineering academics lower than academics in all fields of education.

There are several reasons why importance of scholarly publication varies among academics. National and discipline based differences are among those reasons: language and country of publication, levels of collaboration in published work, primary emphasis on research, levels of research involvement, research work and attitudes towards research [4].

The CAP survey does not provide the requisite level of detail to see if engineering and other academics prefer to target international publications rather than national ones. In Finland, for example, engineering academics prefer high impact publications, and national scholarly publications have had their importance downgrade [5], as Finnish academics operate within a system that follows the unscientific and subjective practice of ranking scholarly journals.

HOW MANY PUBLICATIONS AND PRESENTATIONS?

Table 3 considers the publishing output of university engineering academics over the previous three years. The Europe-wide average is that among academics authoring or co-authoring involved in contributing books, 63.2% had contributed one book, 22.8% had contributed two books, and 13.9% contributed more than two books during the past three years. Some countries had more multiple contributors than others, and in Italy, of university engineering academics that contributed books, 53.0% contributed one book, and for their colleagues from Croatia, the rate was 56.7%.

In the United Kingdom, among university engineering academics contributing books, there were no multiple contributors. There was considerable variation between countries, with 21.7% of Italian university engineering academics contributing more than two books. In Austria, 19.4% of respondents contributed more than two books, and in Croatia, 16.7%.

Looking at the number of written papers produced by university engineering academics, the Netherlands proves to be an outlier, with over three-quarters having reported producing more than four papers. About 57% of academics from Italy and the United Kingdom reported that they had produced more than four papers over the past three years.

There was considerable variation across countries in the production of *research reports/monographs written for a funded project*. Nearly half of Polish university engineering academics reported that they had produced one report in the past three years, compared with a Europe-wide average of 28.0%. Austrian and Dutch engineering academics reported high production of reports, with 47.4% and 61.5% respectively reporting that they had produce more than four reports.

Based on responses to the CAP survey, the more prolific conference presenters come from Italy, the Netherlands, Austria, Portugal and the United Kingdom, from which countries at least 60% of university engineering academics reported having more than four presentations.

CONCLUSIONS

Although one might have a homogeneous impression of academics' involvement in publishing and presenting scholarly work, it is clear from the data disclosed in this article that the situation is far from homogeneous. The figures above revealed considerable variations when comparing university engineering academics and academics in all disciplines. Similarly, there are strong national variations between the nations of Europe.

The results from the CAP survey are clear enough, but further research would be necessary to establish the reasons for the patterns divulged by that survey. In seeking a workable methodological basis for this article, an assumption was made that patterns would be different between universities, presumed to have a strong focus on research and the research outputs analysed above, and other higher education institutions such as polytechnics, institutions presumed to have a strong focus on teaching, but a much lower focus on research and research outputs. It is possible that some countries have structures that treat universities as primarily teaching institutions, and that the high-level research presumed to be the work of university academics is undertaken in separate research institutes.

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BIOGRAPHIES



Timo Aarrevaara is Professor and Head of the University of Helsinki's Higher Education, Organisation and Governance unit. He also holds a Docent's position in administrative science at the University of Tampere. Professor Aarrevaara has professional experience in public administration, as well as in research and teaching. He is a member of the boards of the Finnish Graduate School in Higher Education Administration, Management and Economics, and the Consortium of Higher Education Researchers in Finland. He has been active in higher education quality assurance auditing in Finland and is the principal investigator in the Finnish Changing Academic Profession (CAP) and the EUROAC - Academic Profession in Europe projects.



Dr Ian R. Dobson was a career administrator, predominantly in strategic planning and statistical analysis from 1971 to 2005, working with RMIT, the University of Melbourne and Monash University. Since then, he has been a freelance researcher, editor and consultant, and was a research director at the University of Helsinki between 2010 and 2012. He has had about 70 publications of journal articles and book chapters on topics, such as student progress, university funding, access and equity, academic and professional staffing, and in recent years on the changing academic profession. Recent projects have been on university science enrolments in Australia, uptake of the STEM disciplines in Europe and an analysis of humanities enrolments in Australia. He also edits the *Journal of Higher Education Policy and Management*, and the *Australian Universities' Review*. He is a co-resident of Australia and Finland.

Table 3: Number of publications and conference presentations by university engineering academics.

	Austria	Croatia	Finland	Germany	Ireland	Italy	Netherlands	Norway	Poland	Portugal	Switzerland	UK	Overall
No. Books													
1	63.9%	56.7%	73.7%	65.2%	70.0%	53.0%	71.4%	85.7%	66.0%	64.7%	75.0%	100%	63.2%
2	16.7%	26.7%	21.1%	30.4%	20.0%	25.2%	28.6%	9.5%	26.0%	23.5%	12.5%	0.0%	22.8%
> 2	19.4%	16.7%	5.3%	4.3%	10.0%	21.7%	0.0%	4.8%	8.0%	11.8%	12.5%	0.0%	13.9%
No. Articles													
1	2.5%	11.2%	16.7%	11.4%	9.8%	5.6%	3.3%	17.2%	5.9%	13.1%	11.6%	5.3%	7.7%
2-4	4.3%	31.5%	25.0%	34.3%	33.3%	28.5%	16.7%	37.9%	18.4%	32.0%	30.2%	24.6%	22.9%
>4	25.3%	38.2%	28.6%	31.4%	39.2%	57.0%	76.7%	27.6%	29.3%	39.3%	41.9%	57.9%	36.3%
No. Reports													
1	13.8%	25.0%	27.5%	28.2%	33.3%	22.2%	7.7%	39.1%	48.2%	15.5%	16.7%	30.3%	28.0%
2-4	38.5%	45.0%	43.1%	46.2%	48.1%	48.4%	30.8%	39.1%	41.8%	54.9%	41.7%	36.4%	44.2%
>4	47.7%	30.0%	29.4%	25.6%	18.5%	29.4%	61.5%	21.7%	10.0%	29.6%	41.7%	33.3%	27.8%
No. Conference presentations													
1	13.7%	11.3%	15.7%	9.8%	15.6%	4.2%	0.0%	13.0%	13.6%	10.7%	5.6%	7.5%	10.7%
2-4	21.9%	41.3%	35.7%	40.2%	37.8%	19.4%	28.6%	42.6%	40.3%	26.8%	41.7%	32.1%	32.8%
>4	64.4%	47.5%	48.6%	50.0%	46.7%	76.4%	71.4%	44.4%	46.2%	62.5%	52.8%	60.4%	56.5%

Source: CAP Survey Question D4_n: How many of the following scholarly contributions have you completed in the past three years: D4_1, scholarly books you authored or co-authored; D4_3, articles published in an academic book or journal; D4_4, research report/monograph written for a funded project; and D4_5, paper presented at a scholarly conference