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▶ **To cite this version:**

Gareth Thomson, Klara Kövesi. Do Academic Recruitment Policies Under Represent Teaching and Learning Competences?. CDIO 2022, Reykjavík University, Jun 2022, Reykjavik, Iceland. hal-03765701

HAL Id: hal-03765701

https://ensta-bretagne.hal.science/hal-03765701

Submitted on 31 Aug 2022

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DO ACADEMIC RECRUITMENT POLICIES UNDER REPRESENT TEACHING AND LEARNING COMPETENCES?

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ABSTRACT

CDIO standards 9 and 10 focus on the technical and teaching competences of staff delivering engineering education programmes. For most Universities, whether CDIO or otherwise teaching and learning are the key financial and reputational activities which ensure the institution can thrive. To ensure academic degrees can be delivered in a progressive, student centered and active manner such as that championed by CDIO it is essential that staff with the capabilities to deliver and develop strong teaching and learning approaches are recruited and trained. This paper looks at recruitment practices for Engineering academics in the UK and France. It examines how research and teaching criteria are framed in the hiring process examining recruitment advertisements and job details to examine both the numbers and types of terms used to describe these two types of core academic activities. This tends to show that, while anecdotally it has always been reported, for many of the more established Universities there is a significantly greater emphasis on research over teaching competences though the picture is not uniform and while the picture in France and the UK overall is similar the degree of emphasis of research over teaching in France appears lower.

KEYWORDS

academic recruitment, faculty development, teaching and learning competencies, CDIO Standards 9 & 10

INTRODUCTION

CDIO standards 9 and 10 focus on the technical and teaching competences of staff delivering engineering education programmes but these standards can be amongst the most tricky to systematically address and appraise. Staff training and mentoring can obviously be delivered to existing staff to develop and grow these skills however this takes time and resource.

Previous work has indicated the provision of this training is often patchy with expectations and opportunities very limited beyond basic thresholds (Thomson & Clark, 2018). Staff are also mobile in academia and will move to posts in other institutions for career progression or family reasons. Having a marketable resume is therefore important and for those seeking a move, a match to expected hiring metrics is a key aspect of career building. These metrics not only

influence the teaching / research balance of those recruited but also the ideal profile of those seeking to be hired.

While most institutions in the UK, France and elsewhere will offer research only or teaching only posts, most staff are appointed on contracts where academics are expected to take part in teaching, research and general administration. The balance between these roles can be contentious however in terms of workload and career progression (Pilcher et al., 2017; Richardson and Zikic, 2007; Fahnert, 2015).

As an indicator of the relative funding importance of research and teaching to institutions, in England, the income from teaching fees and grants in the sector in 2017/18 was approaching £18 billion with research income approaching £7 billion. Much of the teaching income comes from student fees which has seen a shift in students becoming much more consumer minded with expectations of quality learning opportunities for their investment (Bates, E and Kaye, L., 2014-1). Given the relative financial and reputational importance to Universities of teaching, a question asked is "Do academic recruitment policies under represent teaching and learning competencies?"

UNIVERSITY LEVEL ENGINEERING EDUCATION EMPLOYMENT LANDSCAPE IN FRANCE AND THE UK

Academic hiring policies in EE institutions in France

For historical reasons, the majority of engineering education institutions (EEI) in France, called "Grandes Écoles", are in the public sector (85% in 2018). These institutions depend on the French Ministry of Education (or in certain case on others, Ministries like Industry, Defense of Agriculture). To give the "title of engineers" to their graduated students, they have to certify their engineering training via the CTI (Commission des Titres d'Ingénieurs - Commission of Engineering Title) requiring a high level of quality teaching.

In France, the academic profession include three different positions:

1. Tenured academic staff with two positions:
    a. teaching-researching position with a worktime division: 50% for teaching activities and 50% for research activities,
    b. teaching position: 100% of worktime for teaching.
2. Non-tenured academic staff position: generally young academic people waiting for a tenured position and employed on fixed-term contract.
3. Academic staff employed on hourly bases (external peoples employed for giving courses and payed for their teaching hours, have no administrative tasks to do).

Academic hiring policies are very different at Universities (always in the public sector) and at Grande Ecoles (could be in the public and private sector).

(1) The hiring process at Universities is based on a "recruitment agenda" published each year in advance at the beginning of the academic year.

In this process, the first step is to obtain the qualification of the CNU (Conseil National des Universités – National Council of Universities)[1]. For applying to the qualification that is called "qualification concours" in French, candidates are required to hold a PhD degree. The objective of this qualification process is to select the better-qualified candidates for tenured academic position at the national level. The second step of the hiring process is at the institutional level: concerning public HE institutions who have vacant positions for tenured academic staff. To apply to a tenured position, candidates have to be qualified by the CNU (this qualification is valid for four years). Each intuitions set up "recruitment committees" by disciplines for hiring tenured academic staff for their vacant positions. These committees choose a limited number of candidates for interview. Based on the results of interview, they rank candidates (on an ordinal scale) and propose the positions for the better ranked.

(2) The hiring process at Grand Écoles (in the public or private sector) is less regulated and gives more flexibility for these institutions. They are not obliged to adapt their hiring process to the official recruitment agenda and do not require candidates to be qualified by the CNU (or in certain cases not event hold a PhD degree). They apply a one-step hiring process and the decision at the institutional level is by a recruitment committee set up in the institution after the selection and interview of candidates. This hiring process gives much more liberty and adaptability (the possibility to make immediate adjustment of human resources for these institutions). As well as, it does not oblige the limitation of candidates for only qualified persons (could accept candidates from foreign countries who are not qualified by the French CNU).

In EE most of the engineering school are of the "Grande École" type applying the second hiring process with the possibility to employ a more diversified body of tenured lecturers (e.g.: people from research institutes, lecturer from foreign countries or practical teacher with a strong industrial experience).

Academic hiring policies in Engineering Education institutions in the UK

In the UK, Higher Education is not formally divided into different classes of provider as is the case in France and some other parts of Europe. Despite this there are a number of different informal categories. Until the 1950s there were around 25 Universities in the UK, a blend of ancient and civic Universities generally based in major cities. Many of these now form the self-selected 'Russell Group' of research intensive Universities. The numbers of Universities in the country were approximately doubled through to the late 1960s following government impetus. Colleges of existing Universities gained independent status while several former trade and technical schools and new entrants to the field gained University status. University numbers then underwent a further major expansion in 1992 when a large number of former polytechnics converted, again following the paving of the way by government policy. Since that time a number of further Universities have also emerged. While all Universities have equal status in the formal sense, the Ancient and Civic Universities ('Historics' for the purpose of this paper) and 1960s Universities have tended to have a strong research component which the post-92 Universities as a whole do not match (Bates and Kaye 2014-2, Hunt 2016).

[1] The French National Council of University is divided into 72 specific sections by academic disciplines and many of them subdivided into subsections.

Universities in the UK are essentially independent bodies and have a recruitment process similar to that of the French Grand Écoles with the institutions largely having a free hand in the recruitment process. In general a staffing need will be identified and the recruitment process triggered. A "*person specification"* will be drawn up itemising the skills, competence, experience and knowledge required for the role. The criteria in this specification will commonly be defined as either 'essential' or 'desirable' with these being used to formally draw up the shortlist of those applicants invited to interview state. A candidate not demonstrating all the essential criteria via their written application is unlikely to be called for interview. These criteria therefore play a crucial role in framing the type of candidates shortlisted for roles.

Within the UK, academic posts may be purely teaching or purely research but classically most permanent posts are as lecturer, senior lecturer, reader or professorial chair and expect post-holders to have a commitment to both research and teaching alongside administrative duties.

METHODOLOGY

Data Collection

To review the situation in the UK, details of academic posts in engineering education advertised via a major specialist recruitment website (jobs.ac.uk) were gathered over a number of months to see how recruitment documentation described the teaching and research requirements of prospective staff. This website is the standard recruitment site for academic posts in the UK. Excluded from the study were posts such as teaching fellow or research fellow which were clearly focused to specific activities. Also excluded were posts based overseas or at international campuses of UK institutions as were colleges without degree awarding capabilities. 101 engineering academic posts were surveyed in total spread between historic (n=26), 1960s (n=27) and post-92 (n=48) institutions.

In France, academic posts in engineering education are advertised in two ways. For public positions at the University, requiring the CNU qualification as a prerequisite for applying to a position, all advertisements are in an official website called "Galaxy" of the French Ministry of Higher Education, Research and Innovation. On this website, academic positions advertisements are classified according to their specific sections of academic disciplines. Their hiring process follows the "Recruitment Agenda" of the year published in the website. Every year, there is only one national hiring process with an application period between mid-February and March, and ends with the publication of the results in June. For private positions, there are several online websites from where advertisements for academic position in engineering education were gathered. For the private academic position, there is no hiring agenda, they are available as functions of the need of engineering schools making data collection easier. 41 engineering academic posts were surveyed in France.

Collected Data

For each case in the UK, details of the post were gathered; post title, discipline, university and seniority of post. The "person specification" for each post was also gathered.

For France data gathering was limited to private Universities recruitment due to the annual public University recruitment round falling inconveniently with regard to the conference time frame.

Data Analysis

With an aim to see how universities framed and prioritized teaching and research competences, the person specification criteria which had a specific teaching or research focus were isolated for each post advertised.

The numbers of criteria which focused on teaching or on research were then used as an initial approximate measure for the emphasis placed by the Universities on each area.

A word count analysis was then applied to the text used to describe the criteria to determine the type of language used predominantly in describing the teaching and research roles.

RESULTS

Quantitative Data

For each post, a number of essential and desirable criteria were listed in the person specification by the hiring institution. Typically there may be around 6 essential and 6 desirable criteria listed. The numbers of criteria in the person specification which could be attributed specifically to teaching or research activity were recorded. These were also collated depending on University types and whether the criteria were essential or desirable.

Summaries of this data for UK posts can be seen in Table 1.

In all cases, for essential criteria there appears to be a statistically significant (T-test <0.05) difference in the average numbers of research versus teaching criteria listed for each job, though for post-92 Universities this is notably biased in favour of teaching with the 1960s institutions and historic biased toward research.

This can also be seen graphically in figure 1.

Table 1 : Mean criteria count for teaching and research competencies as specified in person specifications for engineering academic posts at three UK University types.

	Historics (n=26 posts reviewed)				1960s (n=27 posts reviewed)				Post-92s (n=48 posts reviewed)			
	Essential Criteria		Desirable Criteria		Essential Criteria		Desirable Criteria		Essential Criteria		Desirable Criteria	
	Teach.	Res.	Teach.	Res.	Teach.	Res.	Teach.	Res.	Teach.	Res.	Teach.	Res.
Mean	1.73	3.27	0.54	0.35	1.70	3.26	0.74	0.67	2.46	1.65	0.77	0.65
St. Dev.	0.83	1.48	0.76	0.63	1.23	1.56	1.10	1.04	1.29	1.18	1.06	0.93
% split T/R	34.62	65.38	60.87	39.13	34.33	65.67	52.63	47.37	59.90	40.10	54.41	45.59
T-test Research v Teaching	7.30E-05		0.169961		2.90E-05		0.663224		0.00152		0.55799	

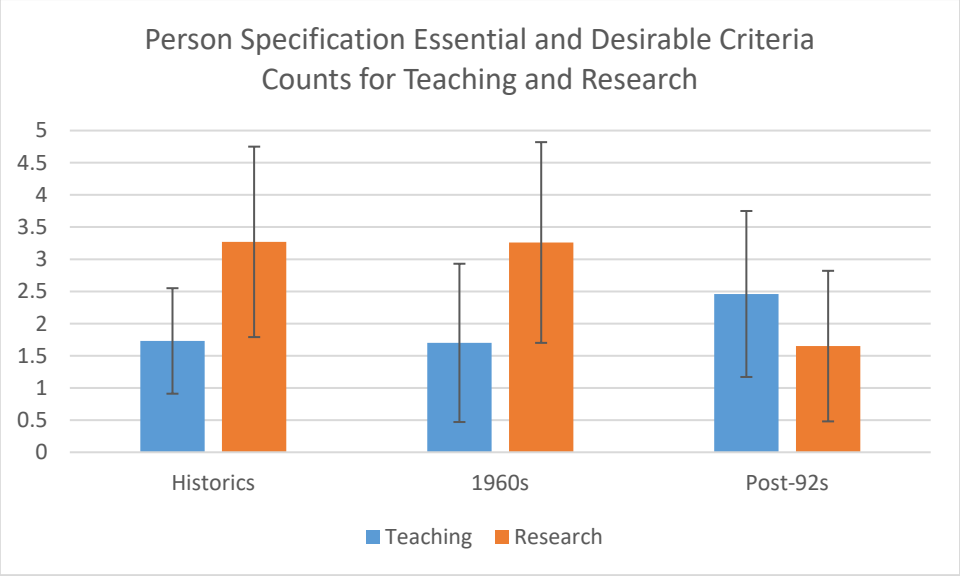

Figure 1 : Mean Person Specification Criteria Counts by Teaching and Research and UK University type

An alternative approach to this same data can also be seen in the table 2 below where a T-test comparing the mean numbers of criteria specified for teaching and those specified for research by each of the University types. This shows no significant difference in person specification criteria counts between the historic and 1960s Universities but both differ notably to the newer post-92 Universities in how they define job candidate specifications.

Table 2 : Criteria comparisons between different University Types

	Teaching Essential	**Research Essential**
T.test Post-92-Historics	0.004335	1.9E-05
T.test 1960s-Historics	0.925467	0.981065
T.test 1960s-Post-92	0.015311	2.87E-05

Qualitative Data

The tables shown below (Table 3) summarise the wording used in the 'essential criteria' for criteria deemed as addressing teaching and research activities respectively in the UK posts surveyed. The count is the number of times a word was used with the %age indicating this as a fraction of the accumulated number of criteria for each activity – a proxy for the likelihood a given word would appear in a given criteria. In each case the top 20 words found have been presented.

While many of the words are simple functional terms related to each activity, others relate to qualifiers which either demonstrate a basic level of evidence of engagement or competency in a specific aspect of the activity (highlighted in orange) and others where a certain higher level of recognition or mastery might be implied (highlighted in green).

It can be seen that the teaching expectations for academic staff hirings appear to be set at a much lower level than those for research with fewer base evidence terms being used and no evidence of higher level terms being used on a consistent basis.

Table 3 : Word frequency analysis of popular terms in teaching and research person specification criteria for UK posts

Words used to describe Teaching Criteria (All University Types)

Count	%age	Word
151	72	Teaching
87	41	Experience
70	33	Student
58	28	Ability
53	25	Learning
46	22	Levels
41	20	Postgraduate
37	18	Undergraduate
31	15	Evidence
30	14	Education
29	14	Higher
24	11	Qualification
23	11	Assessment
23	11	Programme
21	10	Development
20	10	Engineering
19	9	Support
18	9	Delivery
17	8	Contribute
16	8	Commitment

Words used to describe Research Criteria (All University Types)

Count	%age	Word
243	97	Research
73	29	Record
56	22	Evidence
55	22	Publications
53	21	Experience
48	19	Ability
47	19	Funding
42	17	International
41	16	Track
39	16	Quality
36	14	Journals
31	12	Successfully
28	11	High
25	10	Area
25	10	Outputs
21	8	Projects
20	8	Developing
20	8	External
20	8	Relevant
19	8	Activities

Table 4 : Word frequency analysis of popular terms in teaching and research advertisement criteria for French posts

Teaching Criteria (All University Types)

Count	%age	Word
38	12.06%	Teaching
37	11.75%	Pedagogical
32	10.16%	Training
26	8.25%	Experience
25	7.94%	Project
22	6.98%	Domain
16	5.08%	English
13	4.13%	Course
13	4.13%	Participate
11	3.49%	Competences
12	3.81%	Team
10	3.17%	Student
9	2.86%	Capacity
9	2.86%	Responsibility

Research Criteria (All University Types)

Count	%age	Word
59	20.07%	Research
27	9.18%	Project
17	5.78%	Level
16	5.44%	Experience
14	4.76%	Publication
14	4.76%	Activities
13	4.42%	International
12	4.08%	National
12	4.08%	Scientist
12	4.08%	Development
12	4.08%	Participation
11	3.74%	Team
11	3.74%	Partnership
10	3.40%	Collaboration

7	2.22%	Multi-tasking
7	2.22%	Communicate
7	2.22%	Design
7	2.22%	Learning
7	2.22%	Aptitude
7	2.22%	Team

10	3.40%	Competences
10	3.40%	Academic
9	3.06%	Domain
9	3.06%	Develop
8	2.72%	English
8	2.72%	Contract

Table 4 shows a similar analysis carried out for French posts which shows a similar but less clearly defined degree of emphasis between teaching and research.

DISCUSSION & CONCLUSION

This work has shown that that the language and emphasis used in the advertisement of jobs in the engineering education field shows statistically significant emphasis toward research in both the UK and perhaps to a lesser extent in France. In many cases, despite the nominal joint teaching and research role to which the academics would be appointed, for established universities there were typically twice as many references to research achievements and competencies as there were to those associated with teaching and learning. In many cases the threshold criteria for teaching, at least as expressed in the recruitment literature, was often very perfunctory – 'experience' and 'ability' being among the most common terms used with little in terms of qualifiers to suggest the standard which might be expected or the potential to develop in this area. By contrast the criteria descriptors associated with research were often augmented with aspirational or advanced expectations – 'internationally', 'leading', 'external'. In other words, an outstanding researcher with basic competence in teaching would meet the hiring criteria but an outstanding teaching academic with competence in research would not.

Effective engineering education requires well motivated and skilled staff to ensure that the students being developed through the programmes emerge with an education which provides not only the core skills needed to embark on a career in engineering but also and increasingly the qualities needed to grow and develop over a lifetime in the profession.

CDIO aims to address this and alongside the standards associated directly with the active learning of the students are key standards – 9 & 10 - related to the development of faculty. This task however is likely to be significantly harder if progression criteria via internal promotion and external opportunities do not require more advanced levels of engagement in the learning process and where research achievements and targets are set at a higher level.

While the institutions and posts reviewed here were not necessarily those associated with CDIO institutions, they are representative of the labour market from which we recruit and hope to retain the brightest and best of our educators.

The relative paucity of emphasis on learning and teaching in recruitment advertisements and supporting information allows CDIO based institutions to be more targeted and differentiated in the hiring process, using appropriate language to emphasise the teaching and learning opportunities available which may not be present elsewhere. It does however also pose challenges in helping staff develop as per standards 9 and 10 if the drivers which brought them into the role and the expectations of their next role do not necessarily require or reward high achievement in learning and teaching.

This paper does however hold up a mirror and fact check on hiring policies and should act as a stimulus to open up debate on progressive approaches to staff recruitment.

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BIOGRAPHICAL INFORMATION

Gareth Thomson is a Reader in the Mechanical Engineering and Design group at Aston University in the UK. A National Teaching Fellow and Principal Fellow of the Higher Education Academy he is a co-chair of the UK and Ireland Region of CDIO. With a focus on active learning and its benefits to graduates in preparing them for work, he is also developing ideas around how best to support academic and technical staff to work effectively using this approach.

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