

User Education Programmes for Engineering Students and the Importance of Serials

The Leeds Experience

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Introduction

Despite the great and pioneering engineering history of the UK, it is a strange phenomenon that engineers themselves have not been highly regarded in UK society, neither in their status nor in their salaries. The story of recent engineering innovation in the UK can only be described as pitiful, many new inventions being developed in the USA due to lack of funding and interest here.

UK governments of all political parties have been extremely concerned about this situation and its long term effect on the UK economy, particularly with the sharp decline in recent years of the traditional 'heavy manufacturing industries' such as shipbuilding, construction and car manufacturing. Partly as a result of these developments and partly as a result of pressure from the various engineering institutions, the government commissioned a Committee of Enquiry under the chairmanship of Sir Montague Finniston, former chairman of 'British Steel'. The committee's terms of reference were to review (i) the requirements of British industry for trained engineers, (ii) the role of engineering institutions in relation to the education and training of graduate engineers at professional and technical levels, (iii) the advantages and disadvantages of statutory registration and licensing of engineers in the UK and (iv) the arrangements in other countries, particularly those of the EEC for handling these problems; and to make recommendations.

The report of the committee entitled 'Engineering our Future' (1) was published in 1979 and made some 80 recommendations, many for immediate action by both government and industry. The most important training

recommendations, however, centre around the formation of a new 'Engineering Council', constituted by members nominated by the parent engineering institutions. Finniston recommended that the 'Engineering Council' be charged with the responsibility for ensuring the supply of highly trained engineers by (i) the accreditation of 3 and 4 year B.Eng and M.Eng degree courses in all UK universities and Polytechnics (ii) ensuring that young graduate engineers undergo a period of substantial training before they are allowed to register as fully qualified engineers.

These two main recommendations have already been acted upon and every university and polytechnic in the country has had its course scrutinised by the Engineering Council and accredited (or not). Most engineering departments are now running the new 3 and 4 year B.Eng and M.Eng courses instead of the old 3 year B.Sc courses. Overseeing the postgraduate 'on the job' training has, for obvious practical reasons, been delegated to the constituent engineering institutions.

The hope of these enhanced courses and enhanced postgraduate training leading to full registration is to raise the status of the engineering profession by producing engineers more equipped to meet the needs of British industry earlier in their careers. In the case of M.Eng graduates who successfully register, it is hoped that they will rise to senior management positions fairly quickly and begin fundamentally to influence policies in the firms they work for.

The major restructuring of academic courses from the old 3 years B.Sc to 3 and 4 year B.Eng and M.Eng courses is now complete at Leeds and the first 4 year M.Eng graduates are now entering the profession. The Engineering Council has been encouraging parent institutions to require detailed assessments of graduate engineers who have been working in industry, before they are allowed to register as fully qualified engineers. In the case of civil engineers, the Institution of Civil

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Engineers now requires young graduate engineers to submit a written report as part of their 'on the job' training and also to take an oral examination. Candidates must succeed in both parts of this assessment to be registered as fully qualified civil engineers. In order to help graduate engineers in this task and to raise the level of professional written work within the profession, the Engineering Council has encouraged university and polytechnic engineering departments to provide courses in communication and writing skills to their final year students; these presuppose a high level of familiarity with the major sources of information in the relevant engineering discipline. It was partly in response to these needs and partly in response to the increased use of library materials (necessitated by the high component of project work in the new degree courses) that I decided to develop lecture programmes for the 4 engineering departments, concentrating in particular on the as yet unfamiliar serials literature. These programmes are discussed below in the context of the whole user education programme.

User Education Programmes for Engineering Students

(i) 1st Year Undergraduates

Leeds is one of the few UK universities that has a separate library just for undergraduate, M.A. and M.Sc students. Known as the Student Library, it is situated in the Edward Boyle Library Building and has multiple copies of coursework textbooks recommended by academic staff for examined courses. There are approximately 80,000 books in this collection, representing some 35,000 titles. Most titles are represented by at least one reference and one loan copy, but copies of individual titles are added on the basis of the number of students on each course and according to demand; regular computer analyses of the loan statistics identify heavily used titles in order to consider the purchase of extra copies. In addition, the Student Library is augmented by a short loan collection of very heavily used books and photocopies of articles from journals, where these are recommended for coursework reading and where we have been able to obtain permission from the publishers to take such copies. User education programmes for first year students are fairly simple. A short video of all the libraries and library collections is shown and students are given a brief introduction to the structure of the literature and where patents, journals, abstracting journals, theses, books and encyclopaedias fit into this structure. Students

are taken on tours of the Edward Boyle Library in groups and the use of the student library explained in detail. Most students usually find they have few problems in using this collection since both the microfilm catalogues or 'GEAC' terminals are easy to use for checking reading lists. Fortunately, the Science and Engineering Research Library is also located in the Edward Boyle Library Building, and engineering students are also briefly shown this, but no attempt is made at this stage to explain the use of abstracting journals and searching the literature in detail; this is left until the third year. Students are told to refer to the enquiry desk in the Science and Engineering Library if any problems arise earlier, such as writing a long essay, and help is given by a subject consultant, who is a member of the professional library staff.

(ii) 3rd Year Undergraduates

By the third year, undergraduates are starting to use the research literature for long essays and are starting to prepare for their project work. They are, though, still not confident in the use of the periodical literature and in the use of abstracting journals in particular. Fortunately, most third year engineering students are now required to attend courses on communication skills and part of this course is a lecture given by myself in each of the four engineering departments on the structure of the literature, how to search and record it effectively and which sources to refer to for guidance on writing up reports, theses, etc.. The structure of the literature is first discussed by reference to Jackson's diagram on the structure of the literature and channels of communication in Mildren's excellent book 'Use of Engineering Literature' (2). This diagram is reproduced overleaf by kind permission of the publishers.

Searching the literature is illustrated by taking a specific example, eg for chemical engineers, I have chosen the topic 'The Design of a Cost Effective and Minimum Pollution Plant for the Production of Sulphuric Acid' and illustrated how to trace references in all the major sources, working backwards from Encyclopaedias to book sources, and then, most importantly, abstracting journals, primary journals, reports, theses, patents and conference proceedings. Examples of references obtained from each of these sources are displayed in the course notes and how to search each source and where to find it in the library are also discussed in detail. It has also been beneficial to hand round individual volumes of each source as it is discussed, so that students can familiarise themselves with what they are

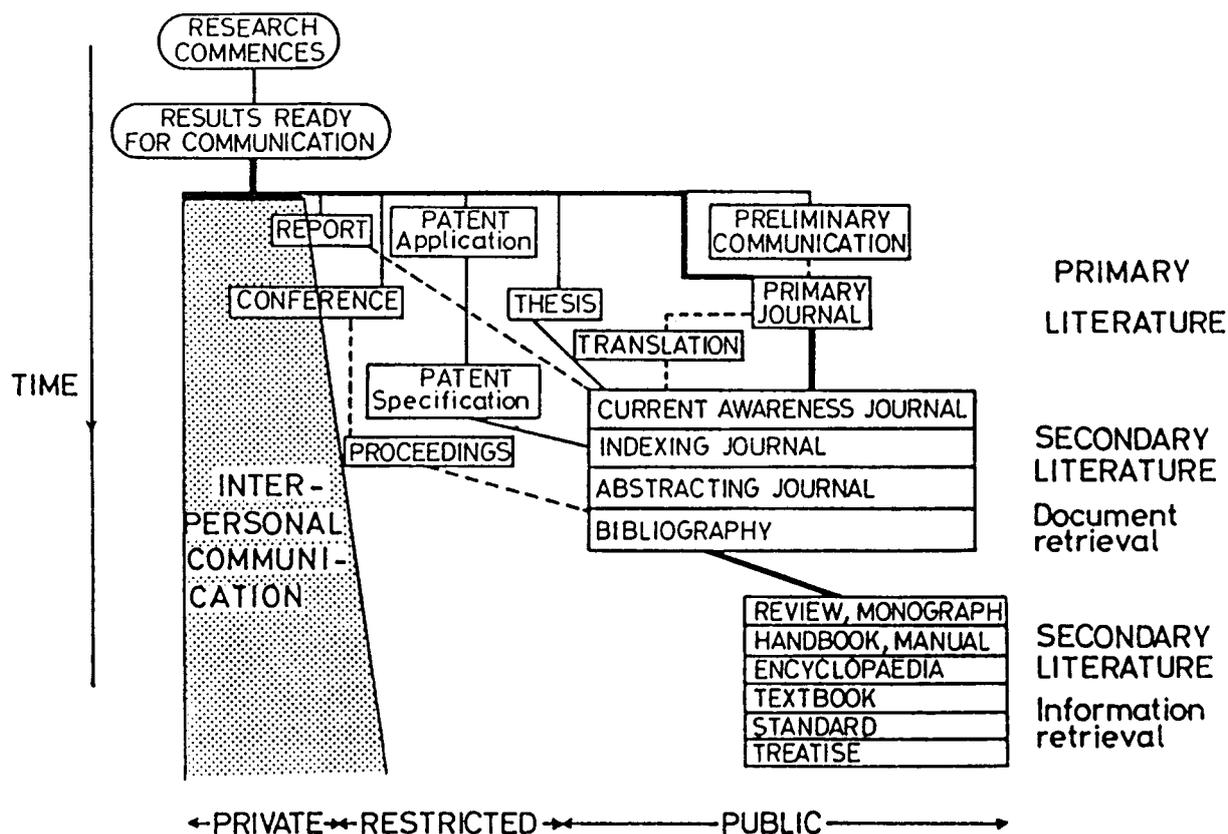


Figure. 1. Structure of the literature and channels of communication

looking for when they come into the library. The 'search strategy' is also summarised in the course notes and advice given on recording references and writing up, with further recommended reading such as Barra's book 'Scientists Must Write' (3) and Foskett's 'Guide to Personal Indexes' (4).

The library provides a comprehensive online literature search service on a wide range of databases, but since this is operated on a full cost basis and most departments are unwilling to pay for searches by undergraduates, few undergraduate engineering students as yet request online searches. The value of online searches is, however, explained to them in detail so that they can follow this up later on in their careers, either as postgraduate students or as graduate engineers working in industry.

(iii) Postgraduate Students

M.A. and M.Sc courses are usually one year in duration and have both examined courses which are catered for by coursework books in the Student Library and also a research project with a dissertation. Most of the students who attend these courses are overseas students with little understanding of 'open access' libraries and often a poor command of spoken English, particularly of the regional Yorkshire accent! The task of educating them in the use of library materials is thus a formidable one, but an early start is made with many of them who attend 'pre-term' induction courses for overseas students organised in liaison with the British Council. Part of this induction course is given in the library and simple 'quizzes' in the use of library catalogues and tracking down references are set so that library staff can, as far as possible, ensure that what has been taught has been fully understood. Later on in the term, these students do attend subject

based library instruction courses along the lines of those given to final year students; these are backed up by tours of the library and individual tuition as and when necessary.

M.Phil and Ph.D. research students are probably the group least well catered for, partly because they start their courses at various times throughout the year and partly because they are expected to take the initiative to contact library staff themselves. Pre-registration packs sent out to all prospective research students ask them to make such contact with the library on an individual basis. The only engineering department which has a formal induction day for new research students is the Department of Civil Engineering. In the morning, all new research students are given a talk from the computing service on computing facilities and from the department's own staff on the use of laboratory equipment and other facilities. I then join the group for lunch together with the head of department and supervisors of the students, and bring the whole group down to the library for a detailed induction course along the lines of that given to final year students, but with greater emphasis on the detail of recording the literature and a discussion of some of the problems encountered when writing up. More detail is also given about the online search service, since most research students are allowed to charge at least one online search to the department. This is

followed by a detailed tour of all the major library collections in the university; the whole programme takes most of the afternoon.

(3) Future Developments

It seems likely that the Engineering Council will soon require all engineering departments to run courses on communication skills. University and Polytechnic librarians in the UK thus have a unique opportunity of contributing to these courses and producing young graduate engineers who are fully cognisant of all the major information sources in their own field (most of which are serials) and how to use them effectively, for tracing, recording and utilising all the relevant information.

References

- (1) Montague Finniston, "Engineering Our Future - Report of the Inquiry into the Engineering Profession". Command Paper no 7794 (London: HMSO, 1980).
 - (2) Jackson, D. "Structure of the Literature and Channels of Communication", in Mildren, K.W. "Use of Engineering Literature" (London: Butterworths, 1976).
 - (3) Barras, Robert "Scientists Must Write" (London, Chapman & Hall, 1978).
 - (4) Foskett, A.C. "A Guide to Personal Indexes" (London, Bingley, 1970).
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