by Hilary Steedman, Karin Wagner and Jim Foreman

Meeting the ICT challenge

Like the UK, Germany is facing educational challenges over information technology. Hilary Steedman, Karin Wagner and Jim Foreman look at the two countries' contrasting responses.

Credit is usually given to "Leo", the business computer device constructed by J. Lyons & Co, the catering and food company, in the early 1950s, for being the first practical application of information and communication technology (ICT) in Britain. But the new communication and faster information retrieval and manipulation possibilities for business did not really open up until the early 1990s, with the advent of in-house networking and faster and more powerful electronic communication, including direct communication between data capture and data manipulation devices.

The extent to which the potential of these technologies was exploited for the automation of business and manufacturing processes in advanced industrialised countries was undoubtedly driven by the heightened competitive environment of the last quarter of the 20th century. Entirely new types of economic activity, for example software development and, more recently, web page design and web server support, assumed much greater relative weight. More established sectors of economic activity – for example, retailing, financial services and manufacturing – increased investment in ICT and consequently expanded ICT-related employment. The OECD estimates that employment in computer and related activities in the UK was 115% higher in 1999 than ten years earlier.

Using an occupational measure developed for the Council of European Professional Informatics Societies (CEPIS) in 2002, Britain now has some 850,000 ICT practitioners, considerably more than the 550,000 in Germany. In Germany, ICT practitioners are 1.45% of total employment and 2.1% of service employment. In Britain the corresponding figures are 2.33% and 3.1% respectively.

The research report on which this article is based analysed the contrasting British and German national strategies for

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the supply of ICT skills and examined their impact on the companies engaged in the industry. Some 90 firms in Britain and Germany were interviewed, selected at random from four sectors – financial services, retailing, motor manufacture and software development.

The requirements of the ICT industries in each country seem to be similar, but the British and the German higher education (HE) systems are organised in diverse ways and, therefore, the supply by the educational system differs considerably. For example, in 2001 the output of computer science graduates from German universities and applied universities (Fachhochschulen) was in the region of 6,000. In Britain that year some 20,000 computer science graduates left university with two-year diplomas, first degrees or postgraduate qualifications.

The low annual output of ICT graduates in Germany reflects the long lead times and high drop out rates typical of the German higher education system. Numbers in the system have now expanded, but the increase in supply will not come through for some years. In Britain, by contrast, shorter courses and low drop out rates have helped the steady increase in the supply of ICT graduates.

These low numbers of computer science graduates have had an important impact on the skill supply strategies of German companies. They pay higher starting salaries to graduates than their British counterparts, yet still have concerns about supply. The pool of ICT contractors available to German companies is smaller than in Britain, probably reflecting the relative scarcity of qualified graduates.

The German language is, of course, a barrier to the employment of non-German speakers in ICT occupations, even though English is the working language of ICT. Employees still need to communicate with colleagues and customers and to fit into the working environment. As a result, German companies consider that they are losing out to competitors in Anglo-Saxon countries, who can attract good ICT practioners from abroad.

An important advantage of the British system is the flexibility to move from a first degree to a postgraduate course. At this point it is possible to change subjects. It is also open to those with a first degree and some years of work experience to return to university for one- or two-year courses leading to a Masters degree or other postgraduate qualification.

This flexibility is not available in Germany, where courses at the traditional and applied universities (FHS) are parallel and take at least four years. Changeover between subjects is cumbersome and rarely occurs. The newly designed German Bachelor and Master courses will eventually make changing subjects easier and lead to a higher graduate output. But their impact so far has been negligible.

A clear advantage of the German system, however, is the requirement for internships as part of the FHS courses. It leads to early contact of students with companies and provides relevant experience of the world of work, which helps the subsequent recruitment process greatly. This also reduces the training costs for the company.

Within higher education, in Germany the traditional apprenticeship system has long held a position of higher esteem than in Britain. However, there has been recent questioning of its continuing relevance to ICT companies, working as they are with intense global competitive pressures and a high premium on flexibility and adaptability. The argument is whether the traditional concepts underlying an apprenticeship linked to a particular trade or profession (*Beruf*), defined in terms of the individual's status in relation to other employees and his or her "ownership" of defined areas of skill and action, were compatible with the less hierarchical cooperation across traditional boundaries required in the new industries. Thus, when the decision was taken in 1997 to establish four new apprenticeship occupations in the ICT field, this was widely perceived as a test of the "innovative potential" of the German "dual" system.

The new qualifications were developed in about a year, in contrast to the accepted wisdom that the development of apprentice qualifications was an inevitably lengthy and cumbersome procedure. Four occupations were identified and the programmes sought to ensure that apprentices acquire relevant and cutting-edge skills and competences. The training programme is composed of core competences and optional elements, which allow for specialised training relevant to the apprentice's training firm.

German employers were clear from the outset that one aim of promoting apprenticeships was to produce the skills that companies required at a lower cost. The apprenticeship system was intended to replace more expensive graduates from the higher education system.

While in training, German apprentices are paid about one third of the full rate for the occupation involved. Our data on salary levels confirmed that qualified apprentices in ITC companies are earning about two thirds of the pay of graduates. Many of the German companies we interviewed with apprentices in training expected that they would undertake tasks similar to those carried out by graduate recruits. Some hoped to develop a core of personnel that did not aim for fast promotion and would provide stability at the base of the firm. They seemed confident that, provided apprentices continued training and study, they would play a significant part in combating future skill shortages.

In this respect there is a huge contrast between employers' enthusiasm for apprenticeship is Germany and the almost total disdain shown by ICT employers for the Modern Apprenticeship scheme in Britain. In 2001, fewer than 1,000 young people started a technical ICT apprenticeship in Britain, compared with some 20,000 in Germany. This is despite the fact that the ICT Modern Apprenticeship was established in Britain in 1995, two years before the four German ICT apprenticeships began.

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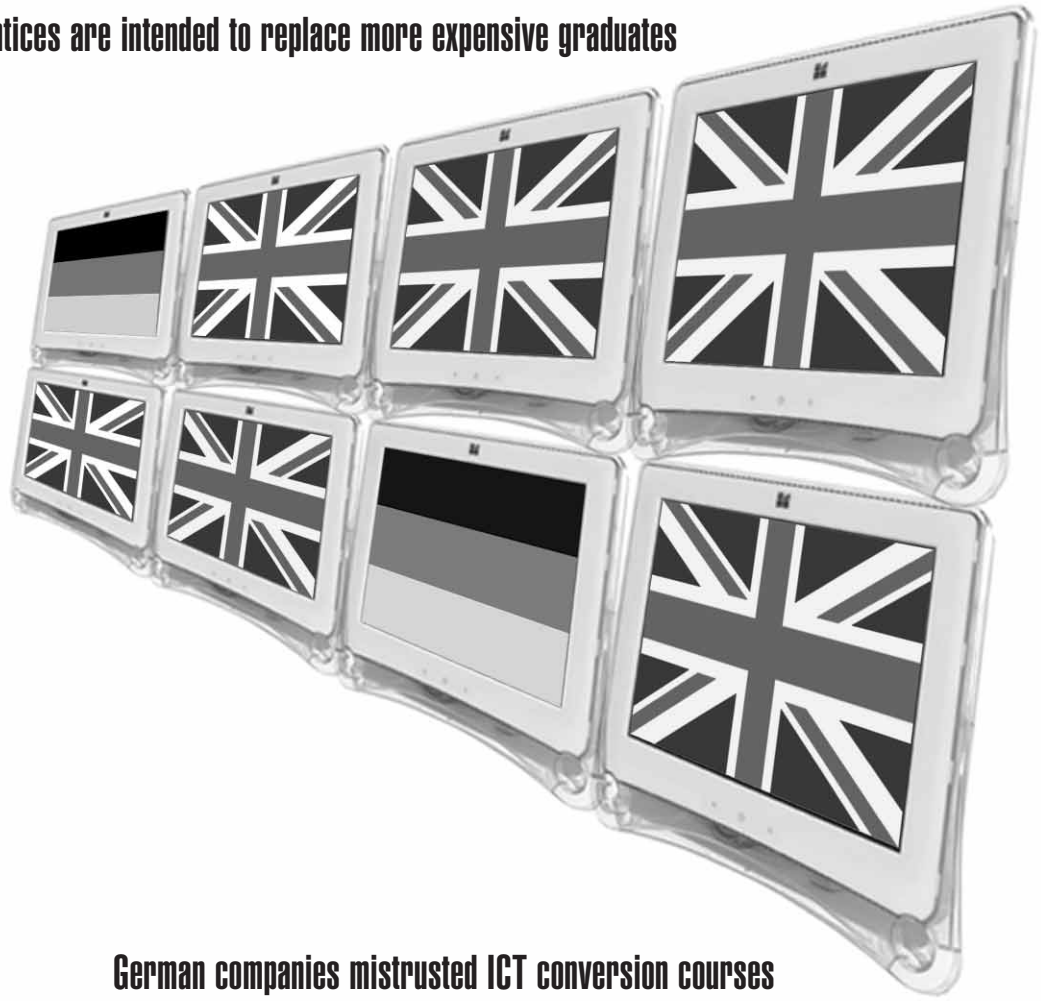

German companies mistrusted ICT conversion courses

The explanation does not seem to lie in differing standards. Our evidence is that a good Modern Apprentice in Britain, capable of attaining NVQ Level 3, could cope with most of the demands of the equivalent German apprenticeship.

British ITC companies' neglect of apprenticeships cannot be explained by arguing that they do not need or use intermediate skills. Only some two thirds of those employed in ICT in Britain are educated to degree level. Many of the companies we visited in Britain, in particular those in the "user" sectors, recruited young people with A level qualifications and then devoted a considerable proportion of their own resources to training them in ICT occupations.

British companies undoubtedly suffer from "information failure" in relation to apprenticeships. Hardly any of those we spoke to had heard of the Modern Apprenticeship scheme and we, therefore, could not explore with them their reasons for not making use of it. By contrast, the German managers we spoke to were familiar with the new German ICT apprenticeship schemes, no doubt because of extensive campaigns about them by the German government and their Chambers of Commerce.

One important difference between the two countries is that far fewer Germans aspire to go to university and, therefore, the available pool of able candidates for apprenticeships is greater. In Germany, two thirds of young people expect to enter apprenticeships, though around 20% of these will in fact go to universities or FHS. In Britain, 50% of the same age cohort is now aiming for university via the A level route. The potential apprenticeship pool in Britain is further reduced by companies that recruit young people with A level qualifications directly to their own training schemes. There is also anecdotal evidence that British companies that have taken on ICT apprentices have found the assessment and certification procedures to be burdensome and costly.

Far fewer Germans aspire to go to university

British and German ICT companies have responded differently to the recruitment market facing them. We found British companies paid little attention to the degree qualifications of those they recruited, provided that they had sufficient previous experience. We were told that "the last three jobs" were all that really counted when it came to the recruitment decision. Graduates taken on as their first job could have a wide range of first degree, not just in ICT or cognate disciplines.

This approach obviously widened the pool of potential recruits, but led at the same time to problems in narrowing down applications and identifying good applicants. British companies used recruitment agencies to help them here and incurred significant costs as a result. However, this approach probably means that they are less affected by skills shortages than their German counterparts.

German companies were less flexible in their recruitment policies. They mostly mistrusted applicants that has been through ICT "conversion courses", even when they had a first degree. As in Britain, companies went for a mixture of graduate and non-graduate recruits. But their graduates came almost exclusively from ICT or closely cognate disciplines. This inevitably restricted the pool of potential recruits. German companies spend longer themselves identifying requisite skills in candidates and rarely used employment agencies.

We had the strong impression that German companies expected university and FHS graduates to become fully effective at a relative high level within a short time. Certainly, German companies supplied less off-the-job training to new graduate recruits than did the British. Most learning was on-the-job through projects, backed by short seminars. It was rare for German companies to invest in graduate recruitment programmes of the sort found in Britain to recruit potential top managers. Having come through the German university education system, however, German graduate recruits were likely to be considerably older at 28 or more.

German companies' views on how university education could be improved from their point of view were more consistent than the views of British companies. Almost unanimously they thought that university students did not have enough experience of the real world, particular of the realities of the business environment. FHS students were recognised as having followed more practical courses, but graduates from the traditional universities, in particular those with PhDs, were described as suffering from "work shock".

Some British companies were "very satisfied" with the graduates they were recruiting. Arts graduates were appreciated for having better communication and "soft" skills. Lack of communication skills was often identified as a weakness in ICT graduates. Around half the comments recorded echoed the German complaints about lack of awareness of the business environment.

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A fuller account of the research is contained in the CEP's Discussion Paper No. 575, which can also be downloaded at http://cep.lse.ac.uk/pubs/dp.asp?prog=CEPDP&pubyear=2003 .

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