What are the perceptions of stakeholders in both the UK and Germany in relation to the teaching and learning of ICT and its relevance in the work place?

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Abstract

When the Heads of States met at the Lisbon summit in March 2000, European Union leaders set out a new strategy to make Europe more dynamic and competitive. “The Strategy became known as the “Lisbon Strategy” and came to cover a very wide range of policies.” (I2010, 2008). At this summit members noted that “Information and communication technologies (ICT) represent both a major challenge and a significant opportunity for job creation.” (The Lisbon Special European Council, March 2000)

Developing a technologically skilled workforce is a high priority in Europe but the ability of governments to achieve this goal has been uneven. There are, for example, considerable differences in e-maturity between countries and within countries (The Global Information Technology Report (2007); West, Stokes, Bäcklund, Freundal, Meusy, Poux and Schöpper-Grabe (2004)). Further, there are wide variations in the way that curricula in ICT are developed in relation to the needs of the local economy (Robertson and Shortis, 2004)

The purpose of this study was, therefore, to compare teaching and learning of ICT in selected locations in Germany and Britain and to evaluate its relationship to the local workplace. Such research will provide key indicators with regard to core work place competencies and may impact upon the context and methods of delivery used to promote effective teaching and learning of Applied Information Technology within the UK.

Introduction

The socio-economic changes currently taking place in Britain suggest that labour mobility is likely to reduce unless significant changes are made to the transport infrastructure which allows the necessary flexibility to support this. (East of England Development Agency, 2007)
These changes, which are accelerating in the global economy, means that the needs of British industry, must now be matched much more closely with the skills matrix of ‘local’ people leaving the compulsory education system, and/or entering the post-compulsory system. (Leitch, 2006)

As such it seems opportune to learn from our European neighbours as, for example, a key feature of the German domestic economic system is its ‘local’ focus. Unlike Britain, Germany still maintains, to a significant degree, an ‘island’ economy structure, which means many services are not nationally delivered, but are locally provided and consumed. As a result of this ‘locally driven’ environment, the education provision is again largely centred on local needs. The following extract illustrates the de-centralised, but regionalised, nature of the German system.

‘At the regional (Land) level, curricula are usually developed in special curriculum planning commissions (committees) by teachers (including headteachers) who are assisted by other specialists such as representatives of the school (administrative) authorities and school research institutes in the appropriate Land and, to a lesser extent, by subject specialists from institutions of higher education.” (INCA 5.3.1 para 7, 2006)

However, with some of the changes currently taking place in Germany, the provision is now becoming, by need, a hybrid, trying to address the traditional, but at the same time taking account of the ‘new’ in terms of ‘global’ businesses.

This means that, to be effective, the schools in Germany need not only to work closely with local commerce but also provide skills, which are relevant in the wider work environment. As identified by some recent research, that has examined IT skills from school to work, this particular requirement is also true for the UK:

“the results indicate that there is a gap between what people are learning during education and what IT applications are being used in the office. For example, 85% of respondents learnt to use PowerPoint software at school but only 39% reported using it at work. Similarly, 88% learnt to use spreadsheet software but only 65% reported using it as part of their job.” (Filemaker International, 2008)

The German education system has, according to reports, overcome this mismatch by developing education business partnerships at all levels. (Eurydice, 2005: p.151)

Such a practical relationship is one that would be of great value in Britain particularly for Small and Medium Enterprises (SMEs), who comprise in excess of 99% of all businesses each of
whom employ between 10 – 49 employees. (BERR, 2007) This equates to over 46% of the total workforce. It is, therefore, fundamental for these businesses that employees, new and existing, have skills relevant to core business activities as, in real terms, they only have resources for training in those skills specific to that business. These businesses by their very size have to be ‘lean’ if they are to survive, and large business practices are usually neither affordable nor relevant to them. This means that if they are to employ new people, those people must bring a set of relevant skills with them. (OECD, 2008)

**Methodology**

In order to investigate the level of connectedness between school curricula and local businesses in the UK and Germany a case study approach was undertaken. The initial data capture was focused on KS4 and the German equivalent, being the 14–16 compulsory element of full-time education. To be able to undertake comparative research, it is important that the context and data collection enables comparison. The German education system has significant differences to the British system, and therefore using purely comparison of subjects taught would not enable "clean data" to be collected.

To address the comparison issue, the teaching of Information Communications Technology (ICT) and its link to employers was chosen as the focus for the research. The reason for this was that there are ‘core’ competencies in ICT that are universally applied, and hence these would provide a basis for comparative assessment.

To collect this data a capacity study and questionnaire series was developed. The data collection instrument was designed to capture data that would allow the different stakeholder’s (Year 10/11 students, Year 12/13 students, employers and teachers) perceptions to be analysed against standard criteria. As such there were 3 questions which asked each group of stakeholders; ‘How important is it for school leavers to show ability in a range of skills?’, ‘What level of ability should school leavers demonstrate?’ and ‘What level do you think is demonstrated?’ Their responses were set against a range of ICT skills and competencies. The geographical areas that were chosen for the purposes of data collection were Bavaria in Germany and Bedfordshire and Norfolk in the UK.

More detail in terms of the economic profile of Bavaria is given in their location section of the Website but this particular region of Germany was chosen because:

“*There are almost 650,000 medium-sized businesses in Bavaria, forming the backbone of the state’s economy. Together they account for more than 41% of the total turnover and more than 50% of the total investments in Bavaria. 75% of the*
employees and 83% of the trainees are employed by small and medium-sized companies.” (Bavaria, 2008)

This suggests a very similar profile to many parts of Britain, and in particular the western part of the East of England represented by Bedfordshire and Norfolk.

The specific town locations selected in both countries were then chosen for their comparable characteristics, being nuclear communities largely servicing their own economic infrastructure, and which were likely to enable sustainable data collection. Each of these are now briefly outlined below:

- Bamberg, university town, located in Bavaria, south-central Germany, some 60km north of Nuremberg, Population 70,00, with main industries being cotton spinning and weaving, silk spinning, the manufacture of tobacco, ropes, metal-ware, furniture. Surrounding region predominantly farming.

- Bedford, university town, County town of Bedfordshire, some 64 miles north of London with a population of 79 000, with main industries service sector, food beverages, hi-tech, automotive supply, aeronautics, traditional production and engineering. Surrounding region predominantly farming

- Norwich, university town, located in Norfolk, East Anglia, some 117 miles north east of London, with a population of 130 000, with main industries insurance and financial services companies mustard and double-glazing. Surrounding region predominantly farming

Having identified comparable regions data capture was then undertaken by PGCE (14-19) trainees and faculty staff who surveyed 3 schools (110 pupils and 8 teachers) within the University of Bedfordshire School of Education partnership. Trainees and faculty also collected data from 84 students and 5 teachers who were based in the Hauptschule, Realschule, Gymnasium and Berufschule in the city of Bamberg. The questions addressed were issues of perceived quality and relevance of the ICT provision in schools to the needs of employers.
**Findings**

a) Institutional focus

Some initial findings in Bamberg were that a 3-tier educational system was in place that consisted of the Gymnasium (Grammar School), Realschule (Technical School) and Haupschule (Secondary Modern School).

- “Gymnasium (grades 5-12, outphasing course 5-13) aims at the General Higher Education Entrance Certificate (Allgemeine Hochschulreife), which provides access to higher education, normally without further entrance exams. The upper secondary level (grades 11-12, outphasing 12-13) allows students to set individual priorities when selecting their courses.

- Realschule (grades 5-10) aims at the Intermediate School Certificate. It has an important distribution function for upper secondary education, especially for the Fachoberschule. Students entering the work force with this certificate often prefer office-related careers.

- Hauptschule (grades 5-9 or 5-10 with option M) is the compulsory stream of secondary education. Pupils with vocational orientation reach the Dual System through grade 9. Those attaining the Intermediate School Certificate through course M (7-10) enjoy the same educational mobility as Realschule graduates.” Bayerisches Kultuministerium (2008)

They also had the Berufsschule (part-time Vocational School and part-time company training) which is equivalent to our Vocational/FE Colleges. Within the Gymnasium the whole ethos of the ICT curriculum was focussed quite clearly on academic knowledge of computing rather than what we in the UK perceive as the practical skill that employers are seeking. For example, it was stated by the head of ICT at the Gymnasium that preparing students for the work place was not the job of the Gymnasium. He felt that a Gymnasium’s role was to develop students for further education and it was the responsibility of the employer to adapt their training program to fill any skills gap. Nevertheless in the Gymnasium, as well as throughout the rest of the German school system, the skill of keyboarding was a compulsory element within the ICT curriculum and all students had to evidence proficiency in this.

There also appeared to be an increasing number of students leaving Gymnasium and entering Berufsschule to pursue a vocational qualification. It was suggested that there might
be two reasons for this. Firstly, the earning opportunities were better as there is currently a skills shortage, and secondly, it is a more sustainable route to business ownership. Overall from the observation of student activity, as well as through discussions with staff in each of the German institutions, it was perceived that the Hauptschule and Realschule, recognised who their ‘clients’ were, whereas it seems that the Gymnasium still had an essentially traditional view of the exit pathways for their students.

b) Software applications and their usage

Questionnaires were distributed in each of the schools visited and responses in terms of the software used by students in both the UK and Germany are illustrated in Fig 1:

![Fig 1 – Software used by Students](image)

It is noticeable from these findings that the German students use a greater variety of software and that much of this, particularly in relation to Word Processing, is not purely based on Microsoft products. Part of this may be due to the individual Länder who set the overall curriculum and individual subject specifications. For example, it was clear from discussions with German teaching staff that the ‘IT’ policy and provision varies from Länder to Länder and that this then impacts on the operating systems and software employed. For example, in 2003, nine cities in Rheinland Pfalz were in the advanced stages of adopting Linux (IDG, 2003) and, in a more recent survey, 59% of all companies in Germany said that they use Open Source Software (OSS) as opposed to others who use either Microsoft or other proprietary brands. (Heise online, 2007) This might suggest why the German students have access to a greater range of software.
Findings from the teacher’s survey (Fig 2) indicated that the German teachers also used a greater variety of software but that they predominantly used either Word 2000 or Word 2003 for word processing. In the UK, however, it was Word XP, Word 2003 or Word 2007 that were the preferred programs. Some of the German teachers also used OSS software although both German and UK teachers all used Excel as their spreadsheet application. Teachers in both countries also used either Access as their database or did not use this particular application at all. It was, however, interesting to note that the necessity for knowing about databases provided some variable results.

For example, Fig 3 shows that the perceptions of both the UK and German students were very similar. 42.9% of UK students felt that it was important for school leavers to have knowledge of databases, and 41.7% of the German students held the same view. Generally 86% of UK students felt that it is either ‘Not very important’ or ‘Quite important’ to have
knowledge of databases when they leave school. Generally, 81% of German students held the same view.

Interestingly this does not quite equate with a recent report, examining IT skills from school to work, that found:

“There is also a desire to build on basic IT skills with 62% of respondents indicating they would like to learn more about specialised IT functions such as database software or graphic design/drawing programs.” (Filemaker International, 2008)

The importance attached to knowledge of databases by UK and German teachers is also not too dissimilar overall. However, the main point of divergence is that half of all UK teachers felt that it was ‘Quite important’ for students to have knowledge of Databases, which was 20% more than the German teachers, whereas 20% of German teachers felt that it was ‘Very important’ for school leavers to have knowledge of Databases, which was nearly twice as many as those in the UK.

![Diagram showing the comparison of teacher and student perceptions of employers' requirements for database knowledge.](image)

**Fig 4 – Teacher and Student Perception - what Employers want in terms of Database knowledge**

Looking at the students perception of ‘Employers requirements’, there is again some divergence in opinion whereby nearly 43% of German students think that employers look for ‘Good knowledge’ in terms of database knowledge, whilst 72% of UK students think that only ‘Some knowledge’ is expected.

There was, however, a significant divergence between the UK students and teachers’ perceptions – e.g. 50% of the UK teachers were of the view that employers would want ‘Good knowledge’ of Databases; whereas nearly 72% of the UK students felt that an employer would want ‘Some knowledge’. Nearly 43% of the German students opted for ‘Good knowledge’; whilst 80% of their teachers felt that this was the attribute that an employer would want.
However, neither UK nor German teachers think that knowledge of Databases would be ‘Very important’ to employers.

![Graph showing level of databases demonstrated by UK and German teachers and students]

**Fig 5 - Teacher and Student perception - actual knowledge of databases demonstrated**

Another divergence between the German and UK students is in the perception of the degree of knowledge that they felt would be being demonstrated in the workplace. Only 25% of the German students as opposed to 75% of the UK student’s perceived that ‘Some knowledge’ would be demonstrated.

However, another of the elements of interest here is the high number of ‘No response’ to this question by both the UK and German teachers. From the German point of view 20% of the teachers did not respond whereas 50% of the UK teachers did not although, looking at the responses we did get, we can see that both the UK and German teachers felt that generally, the students when in employment would demonstrate a good knowledge of databases.

It was also interesting to note that in comparing the ‘Expectations’ and the ‘Demonstrations’ of knowledge, the UK students are consistent in what they perceive the employers want and what they think they get. On the other hand with the German students there is a 40% disparity in what they perceive the employers want and what they think they get. Clearly the reasons for such disparity would, of course, need further exploration but another aspect that produced some interesting results was in terms of the varying perceptions regarding the importance of the different forms of communication.

c) Communication

‘Communication Skills’ was another focus area that showed ‘obvious’ trends. To paraphrase ‘the two factor’ theory, (Hertzberg, 1950) whilst communication in its own right is not an IT
skill, the level of effective communication will impact on those IT skills but, as noted in a recent report:

“Surprisingly, recent school leavers feel more confident in basic IT use than communication and interpersonal skills.

- 82% of respondents between 16 – 18 years felt confident in basic IT, however only 64% felt confident with interpersonal skills, whilst 72% felt confident with communication skills. (Filemaker International, 2008)

Therefore, comparisons were made between perceptions on the use of i) face-to-face communication (speaking), ii) use of Instant Messenger and iii) Email.

i) Speaking

![Graph showing perceived importance of speaking communication among school leavers](image)

The perceptions of 82% of the UK students were fairly evenly split between ‘Quite important’ and ‘Very important’ at 44% and 38% respectively. 89% of German students considered these abilities to be ‘Quite important’ and ‘Very important’ at 21% and 68% respectively. The teachers perception of school leavers communicating effectively by speaking is very similar, with 87% of UK and 80% of German teachers indicating that effective oral communication was either ‘Quite important’ or ‘Very important’.

Comparing the student and teacher perceptions with regard to spoken communication, there was quite close correlation between the students and teachers in both countries in their perception of the importance for school leavers to communicate effectively orally, although a greater proportion (5%) of the German students perceived that oral communication was ‘Very important’.
The perceptions of the students, however, diverged to a greater extent when considering the ‘Employer requirements’. Here 57% of German students thought that employers would find effective communication ‘Very important’, whereas 61% of the UK students perceived effective communication to be ‘Not very important’, with a further 28% perceiving that an employer would find it ‘Quite important’.

There was also some divergence of perception amongst the teachers. For example, 60% of the German teachers were of the view that effective oral communication was ‘Very important’ to employers, compared to 25% of UK teachers who held the same view. There was a closer correlation between the teachers for ‘Quite important’, where 50% of UK and 40% of German teachers identified this attribute.

With regard to teacher and student perception of effective oral communication demonstrated in the workplace, again there is a distinct divergence between the German and UK students’ perceptions. (See Fig. 8). All of the UK students were of the view that communication in the workplace was ‘Quite effective’. The Germans on the other hand appear to be more circumspect in that 62% of them were evenly split between ‘Quite effective’ and ‘Very effective’.
Both sets of teachers felt that oral communication was ‘Very important’ and they were of a similar view in terms of their perception of practice. Neither group felt that there was evidence of very effective oral communication, although a third more German teachers (60%) considered that there was effective spoken communication. This view was almost reversed where the focus area was ‘Quite effective’ spoken communication with 50% of UK teachers perceiving that this was the situation in practice compared with 20% of German teachers.

Again, the UK students were at variance with the rest of the groups in that all of them thought that effective oral communication would actually be demonstrated in the workplace.

The German students and both sets of teachers held the same view that a spread of oral communication would be demonstrated, which for the most part would be ‘Quite effective’ or ‘Effective’. The variance here was 20% of the German students believing that oral communication would be demonstrated to be ‘Very effective’ in the workplace.

**ii) Instant Messenger**

The next aspect of communication that was investigated were perceptions related to the use of Instant Messenger. (See Fig 9)
Fig 9 – Teacher and Students perception - communicating via Instant Messenger

Results from this evidenced that there was a distinct difference in the UK and German students perception of school leavers communicating via Instant Messenger. 38% of UK students thought that it was ‘Quite important’ to be able to communicate via this method, with 15% believing it to be ‘Very important’. The German students were to some extent polarised with respect to this method. Nearly half of the students thought that using Instant Messenger was either ‘Unimportant’ or ‘Not very important’, whilst 15% thought that it was ‘Very important’ to be able to communicate via this method.

The teachers were generally split between ‘Not very important’ and ‘Quite important’. 50% of UK teachers felt that communicating via Instant Messenger was ‘Not very important’ and 20% of German teachers subscribed to this view as well. 40% of German teachers thought that using Instant Messenger was ‘Quite important’. None of the UK teachers thought that using this method was ‘Quite important’ but 12.5% thought that it was ‘Very important’, whereas none of the German teachers thought so.

The UK teachers were, therefore, at variance with the other groups in their perception that Instant Messenger would be ‘Not very important’. Apart from the German teachers, there was, however, general agreement about the degree of ‘Very important’ fairly low.
Fig 10 – Teachers and Students perception - Employers view of Instant messenger at work

In terms of using Instant Messenger at work 56% of UK students believe that employers think that this is ‘Quite important’, in contrast to 18% of German students who take this view. The largest percentage, 31% of German students consider employers would perceive the use of Instant Messenger as ‘Not very important’, and this view is supported by nearly 33% of UK students.

60% of German teachers believe that employers would view the use of Instant Messenger as ‘Quite important’, whereas 50% of the UK teachers take the view that employers would consider the use of Instant Messenger as ‘Unimportant’.

The UK students and the German teachers are, however, in accord with their view that the use of Instant Messenger is ‘Quite important’, being 56% and 60% respectively. The German students are also in reasonable agreement with the UK teachers that the use of Instant Messenger could be viewed as ‘Very important’ with 15.5% and 12.55 respectively. However, a significant percentage of the UK teachers (12.5%) and the German students (14.3%) did not return a response here.
In terms of the effectiveness of using Instant Messenger in the workplace nearly 55% of UK students think that this would be effective, whereas only 13% of German students are of the same view.

Generally all groups perceived that the use of Instant messenger would have some use in the workplace, although the degree of effectiveness varied. The largest percentage of German students (27%) and UK Teachers (50%), think that its use would be ‘Quite effective’, whilst 55% of the UK students and 40% of the German teachers feel that it would be ‘Effective’ in the workplace. A significant percentage of teachers, 25% UK, 20% German, did not offer a response to this particular element of the focus area.

**iii) Email**

Fig 12 – Teachers and Students perception - the importance of school leavers communicating via email
With regards to communicating by email the students generally agree that it is ‘Quite important’ for school leavers to communicate effectively via email, with 38% of the UK students and 43% of the German students taking this view. Nearly 29% of UK students and 20% of German students think that it is ‘Very important’ to communicate effectively via email, while interestingly 19% and 25% respectively take the view that it is ‘Not very important’.

60% of German teachers think that it is ‘Very important’ for school leavers to use email effectively, a view supported by only 12.5% of UK teachers. On the other hand 62.5% of UK teachers think that it is ‘Quite important’, a view which is not supported by the German teachers. There were no responses to this focus element from 20% of German teachers and 12.5% of UK teachers.

The students are in more agreement with the UK teachers view of email being ‘Quite important’ with only 25% of them agreeing that the effective use of email is ‘Very important’.

![Fig 13 – Teachers and Students perception - employers view of communicating via email](image)

In terms of what they think an employers view of email would be 60% of the UK students felt that the use of email would be ‘Not very important’. In contrast the German students were evenly split 33% and 33% in their perception that email usage would be either ‘Quite important’ or ‘Very important’.

The teachers hold the same view as they did for the previous focus element, which was UK teachers 62.5%, ‘Quite important’ and 60% of the German teachers taking the view that the use of email as a means of communication would be ‘Very important’.
From a recent report looking at these issues the findings were, in fact, that:

“word processing (76%), email (78%) and spreadsheets (65%) were reported by a high number of respondents as being used as part of their day to day jobs”.  
(Filemaker International, 2008)

However, with regard to the use of email as an effective means of communicating, generally there is some separation of the student and teachers’ perceptions here.  (See Fig 14)

60% of UK students perceive that using email in the workplace is ‘Quite effective’, whereas 18% of German students are of this view. 32% of German students think that the use of email is ‘Effective’, this being the view of 29% of UK students. 20% of German students believe that the use of email would be ‘Very effective’, but only 6% of UK students agree with this.

The teachers are generally in agreement that the use of email as a means of communication in the workplace is quite effective. 50% of UK teachers and 60% of German teachers think this. 20% of German teachers believe that the effective use of email is ‘Very important’, although none of the UK teachers feel this way.

There was, however, no response to this focus element from 25% of UK teachers and 20% of German teachers.

The largest percentage of German students (32%) agreed with the perceptions of the teachers that the use of email in the workplace was an effective means of communication. However, neither the UK teachers nor the UK students were of the view that email was ‘Very effective’ as a means of communication in the work environment.
Conclusions

Clearly what has been uncovered from this research is that not only was there a significant difference in approaches to curriculum development in each of the countries but that this has then had an impact, not only on the subject content and teaching of ICT, but also in terms of the range of software that is used. It has also demonstrated a completely different approach to the teaching of such fundamental skills as keyboarding – in the Bamberg educational system this is a compulsory element whereas in the UK it is very much dependent on the attitudes of individual teachers. Indeed it was clear from speaking to both the German teachers and students that they all felt that this particular skill (keyboarding) was vital to preparing students for the workplace as well as for further/higher education.

However, it was also interesting to note the incidence of ‘No response’ on a number of questions from both the UK and German teachers with regard to their perceptions of what employers want and what actually happens in the workplace. This particular phenomenon may, of course, be a consequence of the research instrument that was used and this will be looked at in the next phase of data collection.

Another issue that warrants further investigation is with regards to the clear disparity of opinion between teachers and students, particularly those in the UK, in relation to their perceptions of the importance of database knowledge and oral communication in the workplace. Also the difference in opinions with regards to how employers would view the use of Instant Messenger and Email offer further issues that could be investigated in more depth. For example, Richard Lambert, CBI Director-General, said:

“Young people are clearly doing some things very well. These technology-smart whizz kids are making a great impression at businesses with their expertise in IT and computing. Their fluency with iPods, mobiles and MySpace has translated well into the workplace, and often gives them an edge over their bosses. The greater focus on IT in schools and investment in computers is also helping”. (CBI, 2008)

However, the average sample company size commented upon here was over 2,100 employees per company. Clearly these were large companies and therefore not SMEs whose needs are very different. It is also not clear what these 21st century IT skills actually contribute to the operation of the business. Indeed later in the same article the comment is made that:

“The survey also shows that 71% of employers feel school leavers lack business awareness, and 50% are dissatisfied with their generic employability skills”. (CBI, 2008)
Clearly further probing of some of these findings are likely to be significant in light of the 14-19 reforms and requirements for development of the new Diplomas. In the next stage we will, therefore, need to modify the questionnaires to allow respondents to indicate a lack of knowledge or opinion on particular aspects to prevent skewing of the data collected. We will also need to do some follow up, focussed interviews with selected respondents – something that we did not have time for in this particular phase of research.

**Next steps**

There is a formal structure for the education sector in Bamberg and we were able to gather a useful range of data. However, even in Bavaria itself, there are local variations, and we were advised that it would be valuable to visit both Nuremberg and Munchen where their needs are different due to higher migrant levels. Also the State Education Centre is located in Munchen where policy and research is carried out. It has also been reported that Munchen was migrating 14,000 of its PCs to Linux running Open Office on Windows. (Thurston, 2006) Therefore visiting there could have additional benefit. We also intend to carry out further data collection with employers. In terms of the data already collected from schools, the intention is that this will now be analysed in terms of school type and age group in order to identify whether different perception profiles emerge. We also intend collecting additional data from staff and students in 6th form/FE Colleges as we will then be able to compare it with the data we have already collected from the Berufschule (Vocational/FE College) in Bamberg. We will also be undertaking purposive sampling for follow-up interviews to elicit a more detailed understanding of our initial findings.

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