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# Electronic information resource use: implications for teaching and library staff

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*Traditionally, guidance from teaching staff to students on the use of information sources has taken the form of reading lists containing a mix of books and journal articles, and the assumption is that information specialists within the library will provide whatever additional help is needed to access these resources. Given the rapidly increasing availability of electronic sources of information, and changes in the learning and teaching environment, such an approach can no longer be regarded as appropriate. This paper addresses the issue of the best way of helping students make effective use of electronic information resources, thereby developing their information-gathering skills. Reference is made to the lessons learned from undertaking a small action research project in this field. Consideration is also given to a number of broader, more contextual issues, such as the ongoing shift towards more independent learning by students and changing relationships between teaching staff and information specialists. We conclude that more research is urgently needed if ways are to be found of ensuring that students maximize the potential of electronic information resources, and argue that there should be greater collaboration between teaching staff and information specialists, and that their roles and responsibilities in providing appropriate support and in assessing the information-gathering skills of students need to be redefined.*

## **Introduction**

Within institutions of higher education, teaching staff and library-based information specialists have tended to occupy separate worlds. Although there has been some contact, in the main this has been partial and intermittent. For first-year students, one consequence of this state of affairs has been the absence of a systematic and co-ordinated strategy for enabling them to acquire, practise and develop information-gathering skills. Teaching staff have seen their role in this respect mainly in terms of issuing students with reading lists containing a mix of books and journal articles, and underlying this approach is the expectation that information specialists will be on hand to provide whatever additional help is needed to access these resources, for example through the provision of introductory talks and one-to-one support sessions. Relatively few teaching staff have incorporated library exercises into their teaching and assessment, or adopted a more creative approach to information gathering by students, such as helping them use bibliographic and other aids to prepare personalized reading lists. Consequently, when students have been required

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to do this at later stages of their studies, especially in the context of preparing a dissertation, they have not been adequately prepared, and often find it extremely difficult to access and evaluate information resources effectively.

Such deficiencies have been compounded by major changes in the information and learning and teaching environments. Of particular importance in this respect are the rapid expansion of electronic information resources and the moves towards seeing students as independent learners. There is now a perceived need on the part of an increasing number of teaching staff and of information specialists for a more carefully planned approach to the introduction of students to information gathering.

In this paper, we shall:

- outline the key features of the changing environment within which students are expected to develop their information gathering skills;
- report on a small action research project undertaken by a team of teaching staff and information specialists at Sheffield Hallam University (SHU) and designed to examine some of the issues concerning the effective use of electronic information resources by students;
- highlight a number of the lessons learned from the project; and
- set an agenda for further research in this area.

### **The changing environment**

In recent years, a number of technological developments have radically changed the availability of information, and this has had a significant impact on students and teaching staff, and on information specialists struggling to support them.

Information that was previously only accessible on remote, complex and prohibitively expensive online systems has become accessible locally on CD-ROM databases. CD-ROM search interfaces have become relatively easy to exploit. Familiarization time with key functions has been significantly reduced. User documentation has shrunk from multi-volume online manuals to simple user guides consisting of only a few pages. Databases which in their online form required several days of training to access effectively can now be searched by new users after a relatively limited amount of training. The increase in access has presented new skills-related problems concerning the effectiveness of searching, and – ironically – many services are easier to use ineffectively than expertly. In addition, students and teaching staff now face the problem of balancing quality with the quantity of information retrieved.

The costs of electronic information resources have fallen dramatically in the past ten years. Hardware and software costs have declined. The use of local CD-ROM storage as opposed to online access has removed the very expensive and unmanageable online communication costs. The removal of access limits associated with communication charges has allowed information providers to give unlimited access to services which had in the past been prohibitively expensive. For example, a standard US bibliographic database accessed online could cost the provider about £60 per hour to access and obtain references. The CD-ROM version has no such costs attached to the intensity of usage or volume of data

retrieved. Moreover, national agreements between manufacturers and higher-education institutions are making available in an electronic format a considerable quantity of teaching and research material that could not otherwise be afforded.

Developments in CD-ROM networking have allowed multiple and simultaneous access to the same data. In 1990, only two operational networks were installed in the UK university sector (Akeroyd *et al*, 1990). A survey in 1993 identified a substantial increase in the number of operational installations, with approximately 20 institutions running networked CD-ROMs. Of these, 75 per cent had plans to expand substantially in the near future (Ward, 1994). The continuing expansion is confirmed by a recent survey of CD-ROM acquisition by British Universities carried out by the Database Research Resources Group at City University. The initial findings show that there was a 36 per cent increase in expenditure on CD-ROM acquisition between 1993/94 and 1994/95. In short, the mounting of CD-ROMs on networks has become an increasingly attractive option to information specialists facing the spiralling and geographically dispersed student numbers of the 1990s.

These changes have resulted in a fundamental shift in how information is accessed and by whom. The role of the information specialist as a provider of mediated online searching has shifted to that of supporting and training users who access resources directly. Specifically, students now require guidance on effective searching and balancing the potentially unlimited quantity of information with quality and time constraints. Such guidance is of increasing importance with the moves towards greater student centredness in the delivery of courses and other changes in the learning and teaching environment. This is presenting information specialists with new challenges as they seek to help students exploit the potential of electronic information resources.

First, there is the challenge arising from the fact that students are being given greater freedom regarding what they study and where they work. Formal classroom contact hours are decreasing, and students' self-managed study time is increasing. This shift to student-centred, independent learning has resulted in a requirement for a much more diverse pool of relevant information, a greater need for personal support from information specialists, and the need for students to develop new skills to enable them to retrieve and utilize data from a complex and vast selection of database services.

Second, despite the increasing availability of electronic information resources, many teaching staff continue to place a heavy reliance on recommending traditional library support material, particularly text books. Thus, there is a growing mismatch between so-called 'core' material cited on reading lists and the actual information required for students' assessed work. This raises some fundamental questions relating to liaison between information specialists and teaching staff and the relative emphasis in library spending on different types of material. The challenge is heightened by the fact that there is still a very poor awareness among teaching staff of the potential of electronic information resources and of access problems facing their students, and teaching staff are often unaware of the resources available to students for the work they have set. This is particularly worrying in situations where teachers are formally required to assess the ability of students to use these resources. A case could be made for arguing that information specialists should play a large part in raising the awareness of teaching staff as to what is

available and, more radically, should contribute to the design of assignments and their assessment.

Third, many students are unaware of the large number of complex electronic information resources now available via library and information services. Some students discover appropriate resources in an ad hoc manner, not necessarily at the most timely moment for their work. Others remain in complete ignorance of their availability. The provision of appropriate and timely support and guidance is therefore a key challenge.

Fourth, there is an increasing emphasis on information gathering and retrieval as an essential transferable skill which students are expected to acquire as part of their studies. For example, 'use information sources' is one of the 18 common skill outcomes identified by BTEC; the core skills framework developed within SHU includes 'information gathering'; and there is an emphasis on information retrieval skills within NVQ competencies.

Last, there are considerable variations of computer literacy among students. Many are computer literate prior to entering higher education, a result of increasing exposure to technology in the home, school and social environments, and many mature students have computer skills learned in industry. However, some students, both from traditional school-leaver intakes and from mature entry routes, still have no computing skills when they arrive. Thus, there is a need to level the playing field with regard to basic computer literacy prior to exposing students to electronic information resources, especially when their competence in this field is to be assessed.

These related challenges highlight the critical need for improved liaison between the providers and users of electronic information resources. They also emphasize the need to address the skills requirement of students and the increased contribution which information specialists might make to the teaching of related areas, such as information technology and statistics.

For SHU, the need to find an appropriate response is particularly pressing, since at the time of writing (Summer 1996) it is about to open a new Learning Centre, an initiative that has been prompted, in part, by the gathering pace of technological change and the increasing emphasis on skill development and resource-based, independent learning. It was against this background that a group of SHU staff decided to undertake a small action research project designed to explore some of the issues surrounding the impact of electronic information resource developments on the student experience, and the roles and responsibilities of teaching staff and library-based information specialists. Such a project was very much in line with Raddon's call for more joint research in this area that is 'innovative and imaginative' (1995).

### **The research project**

The project team comprised two members of the teaching staff and three information specialists, who shared the view that the increasing availability of electronic information resources had significant implications for students and staff alike. The aims of the project were to determine how best to facilitate the effective use of electronic information resources by students and staff, and to identify those issues concerning relations between teaching staff and information specialists requiring further investigation. In pursuing these

aims, the team worked together on the design and administration of a library exercise involving the use of electronic and paper-based information resources, the training and assessment of the students who undertook the exercise, and the monitoring and subsequent evaluation of the experience of collaborating in this way.

The students who served as the focus of the project were those studying European integration on the first year of the BTEC Public Administration/Business and Finance Programme in the Business School of SHU. They were selected because:

- skill development is given a high priority on BTEC programmes;
- the subject area – the European Union – is a field where the information resources available are both complex and dynamic, with the material being organized according to non-standard referencing systems and often in several languages;

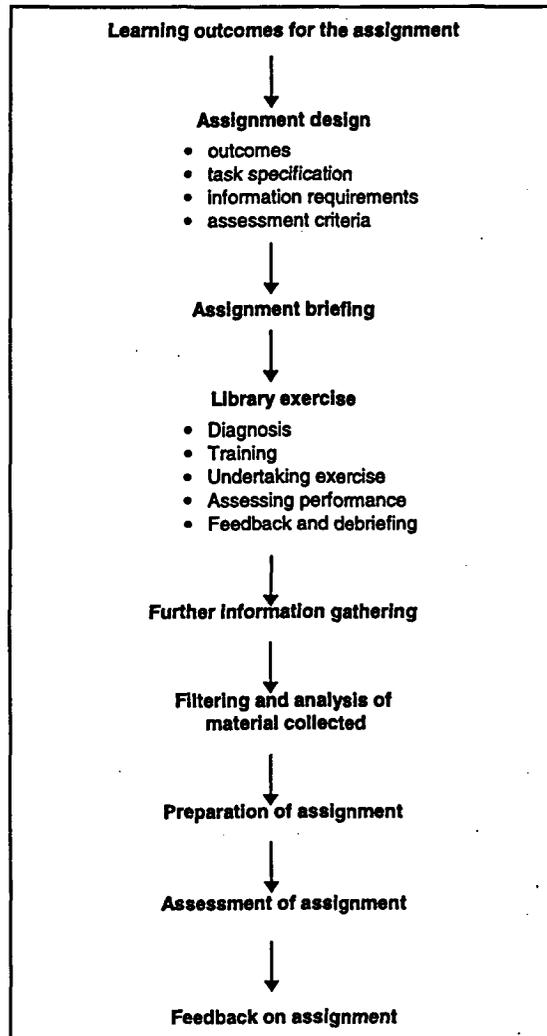


Figure 1: The library exercise in its pedagogic context

- the subject tutor expected them to keep up to date with developments in a rapidly changing and controversial field;
- the total number taking the unit was relatively small (15), which made the project easier to manage;
- a second-semester unit fitted better with the timetable for the project; and
- the subject tutor and her line manager were both members of the project team.

Despite some of the distinctive features of European integration, the team felt that any lessons learned from the project would be equally relevant for other subject areas.

In designing the library exercise, care was taken to ensure that it would contribute to the completion of a formally assessed assignment. The link between the exercise and the assignment is shown in Figure 1. As can be seen, the learning outcomes being tested through the assignment served as the starting point. Of these, the most relevant for the exercise was the ability of students 'to undertake specialist studies of the impact of the Single Market on specific sectors'. In skill-development terms, this implied being able to select and access relevant sources of information. As the figure makes clear, following the exercise the students were expected to gather additional information prior to the preparation and submission of their assignments for assessment and feedback. In other words, the exercise was but one small part of the total assignment experience. Nonetheless, it alerted students to the range and variety of electronic and other information resources and to their means of access.

The exercise consisted of a set of questions with precise answers, and focused on both European Documentation Collection (EDC) and non-EDC resources. Decisions on which resources to use were taken jointly by the subject tutor and appropriate information specialist. The majority were computerized databases containing abstracts, references and, in some cases, articles. However, a few were paper-based and could be found in the OPAC library catalogue. The databases were *EC Infodisk*, *Hansard on CD-ROM*, *The Guardian on CD-ROM*, *The Economist on CD-ROM*, *The Financial Times on CD-ROM*, *ABI Inform* and OPAC. Some resources provided students with the required data on screen, and others provided information which referred them to printed collections. They included a mixture of stand-alone and networked services. Although predominantly CD-ROM based, the library online catalogue was also a key resource. All the resources were regarded as important not only for the library exercise but also for European integration in general. The majority were accessible on a number of networked terminals, with the exception of *EC Infodisk* and *Hansard*. All the databases were relatively simple and user-friendly, with the possible exception of the *EC Infodisk*. The downloading procedures for the *Guardian* CD was also quite complicated for novice users since it had a more difficult search interface than the others. However, all the services were menu-driven and contained on-screen help. And with the exception of the library catalogue, all the resources had printed documentation adjacent to the terminals. More complex online systems were excluded due to limits on access and considerably greater training requirements.

The exercise was intended to be completed in a maximum of two and a half hours. The questions were piloted on members of the project team to ensure that they could be answered in the time available. The students were all given the same questions to complete

to facilitate comparison. This meant that there could be collaboration and even copying. However, students inevitably share information and direct one another to appropriate resources, so this situation was realistic.

Prior to undertaking the exercise, the link between the learning outcomes, the assignment – in terms of both the skills and knowledge requirements – and the library exercise was explained to students. The value of completing such an exercise, and the importance of the assignment in developing their understanding of European integration, were also stressed. Each student was then interviewed to assess his/her previous computing experience (degree of computer literacy) and his/her ability to use electronic media in a library environment. Clearly, the prior knowledge and experience students bring to an exercise of this nature is extremely varied. It is also very difficult to measure. Nonetheless, an attempt was made to quantify their computer literacy and familiarity with electronic information resources on a scale of 1 to 5.

The next step was to divide the students at random into two groups. One, the privileged group, was given training prior to carrying out the exercise; the other, the control group, was given training after the exercise. In this way, it was hoped to compare the relative performance of each group in carrying out the exercise and thereby assess the validity of the assumption that their success or failure in using electronic and other information resources would be affected by the timing of their training. This took the form of a 90-minute classroom session led by one of the information specialists in the team. It incorporated the following elements:

- a detailed handout listing and describing databases of relevance to those studying European integration;
- a 30-minute computer presentation on the databases, their coverage, location, how to access them and how to print and download data; and
- a 60-minute demonstration of the systems required for the library exercise, including worked search examples and data output (the worked examples were similar but not identical to the actual data required in the exercise).

Thus, the training covered both general information-gathering skills and data-specific ones. The former included awareness raising and coverage of relevant resources, the location and role of the help desk, finding and accessing resources, search skills (for example, how to narrow down and select items), printing and downloading to disk, and using printing facilities in the library. The latter included understanding library classification sequences in the EDC and the general book collection, the nature of information in the EDC (specifically the Official Journal), and how to relate references to cited material. The training did not include hands-on exercises and was not as interactive as it might have been. In retrospect, one of the weaknesses of this part of the project was the failure to involve the subject tutor as well as the information specialist in the design and delivery of the training session.

The exercise took place between 10.15 am and 12.45 pm, a time when the library is usually at its busiest. During the exercise the students were observed by the member of the project team who had previously interviewed them and someone they did not know. The former also dealt with many of the questions the students asked, keeping a note of them and the

answers she gave. Very few of the students made use of the services of the help desk: not surprisingly, they felt more comfortable approaching someone they knew.

The situation was not entirely realistic in a number of respects. Some of networked machines had been pre-booked for the students to use. This would not happen in reality; but was done on this occasion to ensure that as many of the students as possible completed the exercise in the two and a half hours allocated. The students had access to the total attention of a minimum of one librarian for the whole of the two-hour session – a desirable situation from the students' point of view, but again not currently realistic from a staffing point of view. However, despite pre-booking machines, there was still limited access to the databases, and given that there are several databases on each stand-alone machine, only one database could be used at any one time. Furthermore, because of the limited amount of time allowed for the exercise, the students had to work in twos and threes at the workstations, which led to a certain amount of sharing of information.

A record was kept of how long it took each student to complete the exercise as well as his/her mark. The students were individually interviewed for a second time, prior to the control-group students receiving retrospective training. The purpose of this second interview was to debrief the students and to act as a feedback session in relation to the exercise and training. The questions in the debriefing interviews were designed to encourage student reflection on their training and the effect it had had on their performance in carrying out the exercise. During the debriefing process, the computer literacy of each student was reassessed.

Although the number of students involved was relatively small and the results were not statistically significant, several interesting observations can be made. These are summarized as follows:

- members of the privileged group achieved, on average, higher marks for the exercise than members of the control group;
- members of the privileged group finished the exercise, on average, earlier than members of the control group;
- students who achieved the highest marks also tended to have the higher computer literacy levels as assessed at the first interview; and
- there was an increase in computer literacy levels for members of both groups, but with a much higher overall increase for those in the privileged group.

Members of both groups agreed that the training had been beneficial with respect to improvements in their search techniques; helping them identify and access the correct resource; saving time in completing the exercise; and increasing their confidence.

From the point of view of the team, the project was felt to be a useful learning experience. It helped to clarify the nature of the differing perspectives of teaching staff and information specialists; to demonstrate the scale of the investment in terms of time, if training and exercises and assignments are to be jointly planned and delivered; and to highlight the practical problems involved in carrying out research in this area. More specifically, it threw up some important lessons for information specialists and teaching staff.

## The lessons

Arguably, the most important lesson was that if the enhancement of students' information-gathering skills, particularly with respect to the effective use of electronic information resources, is to be taken seriously, collaboration between teaching staff and information specialists is essential. What this means in practice is that both must support each other in the monitoring of developments in the sphere of electronic information resources, the training of students, and the setting and assessment of exercises and assignments.

With respect to the monitoring of developments, information specialists need to pay constant attention to finding effective ways of familiarizing and updating teaching staff on what is happening. This means being sensitive to the other pressures on teaching staff but, at the same time, getting over the message that they are in danger of not being able to guide their students as fully as they might if they ignore, or do not keep up with, technological developments in the sphere of information gathering. Teaching staff need to respond to help and support from information specialists by enriching their reading lists through the addition of electronic information resources, especially where it is intended that students should use these for assignment purposes. In other words, careful attention must be given to the shaping of student expectations with respect to the information resources they will be expected to utilize while studying a particular unit.

Another lesson is that training sessions for students need to be planned jointly, to ensure that both the timing and content are right. For training to be successful it has to be provided at a time when it will have maximum impact as far as the meeting of assignment deadlines is concerned. There also need to be direct and explicit links between the training and the information requirements of assignments. Thus, decisions on the resources to be covered in the session have to be made on a collaborative basis and take into account factors such as their relevance, their user-friendliness relative to their value in information terms, and their availability. In addition, training ought to be undertaken during a regular class session in order to symbolize the integrated nature of the assignment/project and to overcome the problems associated with finding an alternative day/time when all the students are available. Ideally, training sessions ought to be team-taught and, wherever possible, they should be based on student-centred, hands-on, interactive delivery methods, and incorporate library exercises. Only in this way are students with a relatively low level of computer literacy likely to build up the confidence they require in order to be able to use the resources with little or no further assistance.

It is also important to recognize the consequences of the raised student expectations arising from their training. These are likely to include:

- increased demands for access to electronic information resources;
- requests for additional help from information specialists, especially those involved in the training; and
- queries about the availability of resources not covered by the training.

Consideration needs to be given, too, to the possibility of guaranteeing access to terminals at particular times for groups of students undertaking a particular project.

Like the training, assignments requiring access to, and the use of, electronic information

resources need to be designed on a collaborative basis. Only in this way can teaching staff be specifically briefed on the availability of resources and the pressures on them from students and other users. A related lesson is that, on occasions, it might be appropriate for information specialists to be proactive by providing teaching staff with ideas for assignments and projects designed to test the ability of students to utilize electronic information resources in a competent manner. At the very least, their involvement in drawing up the specification for assignments of this kind is essential. The participation of information specialists in the assessment of the information/bibliographic skills aspects of assignments is also highly desirable. Clearly, this is likely to affect workloads and would have to be negotiated with teaching staff.

In designing assignments, it needs to be recognized that information is not a 'free' resource. Moreover, the ability range of students with respect to computer literacy in general, and the use of IT skills in a library context in particular, is likely to vary considerably. Thus, it is desirable to determine their prior knowledge and expertise in this area (that is, to carry out a diagnostic exercise) before deciding on the precise terms of reference for a piece of coursework.

Underlying these lessons is a recognition that the boundary between the support students receive from information specialists and teaching staff is becoming increasingly blurred. It is therefore important for both teaching staff and information specialists to see themselves as partners in a joint enterprise, namely to facilitate learning. Clearly, this should be reflected in the continuing professional development not only of teaching staff but also of information specialists (Raddon, 1995).

### **An agenda for further research**

The lessons referred to above also point to areas where further research is required, the first concerning communication between information specialists and teaching staff. It is particularly important to find the most effective mechanisms for ensuring that teaching staff are kept abreast of developments in the sphere of electronic information resources. Linked to this are the expectations teaching staff have of information specialists and vice versa, and the problems which can arise when these are not realized.

A second area involves finding solutions to the logistical problems involved in training very large numbers of students in the use of electronic information resources and in providing them with appropriate access. While the project described in this paper has demonstrated what can be achieved with a relatively small number of students, resource constraints make it extremely difficult (if not impossible) to adopt similar methods on units being taken simultaneously by 200 or more students.

Third, research could usefully be undertaken into the relationship between competence in the use of electronic information resources and overall performance in an assignment. In other words, to what extent is the diligence with which students undertake the bibliographic and information-gathering aspects of an assignment or project, including the use of electronic information resources, reflected in the overall quality of the finished product? From the project, it is clear that both the way students use electronic information resources and their achievement in assignments are affected by a very wide variety of factors. From the grades students received it is not possible to say that those who are

confident on the technology did best in the assignment. Performance depends on a very complex set of factors. For example, some confident users of the electronic information resources were insufficiently analytical of the material they found and did not, therefore, perform well in terms of grades. Others were less confident but approached the work methodically and did all that was required of them, thus achieving higher grades.

A final research area relates to the design of assignments/projects and the question of how to secure an effective balance between, on the one hand, the conceptual and theoretical requirements of an assignment/project and, on the other, the empirical requirements. The information explosion has led to many students suffering from information overload and thinking that a long list of sources and undigested extracts from them constitutes learning.

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