Barriers to student computer usage: staff and student perceptions

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Abstract
Ensuring that all graduates are able to exploit new technologies is a primary goal of all UK universities and a variety of assumptions have underpinned policies designed to promote this goal. This paper explores some of these assumptions through the findings of a longitudinal study involving a cohort of over 800 university students. The study adopted a student perspective to examine the factors affecting their use of computers over a three year period. Unsurprisingly, the results indicated that situational factors (e.g. access, training and time) influence the extent to which students use computers, but a disparity was found in the importance attributed to these factors by the academic staff, who focused on the needs of their department, and by the students, who focused on their individual needs. Results suggest that increased attention to a student perspective may lead to improved strategic planning in students’ use of computers.

Keywords: Access; Computer usage; Staff and student perceptions

Introduction
Since the 1970s a number of initiatives have promoted the use of computers in UK compulsory and higher education (see Gardner et al., 1993; MacFarlane, 1998). Many of these programmes were developed in response to the recommendations of the Barnard report, which had proposed that ‘a scheme to provide introductory courses for all undergraduates should be started as soon as possible’ (Barnard, 1970, p. 1). Various initiatives have been built on this aim and the Committee of Vice-Chancellors and Principals (CVCP 1997, cited in Dearing 1997, p. 135) has reported that universities are continuing to reaffirm IT skills as one of the key outcomes of university education. This paper investigates a number of contextual and situational factors which may act as barriers to developing the computer use. In particular, issues relating to support (training, help and information) and resources (access and computing facilities) were examined from the students’ perspective. These were compared with the views of staff to establish the extent to which students’ concerns and needs are being recognised.

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Research on student computer use

Research in the UK and elsewhere, which examines the factors affecting computer use among students, has mainly focused on the institutional, departmental or staff perspectives (Hammond et al., 1992; Hirscheim et al., 1988). For example, Laurillard et al. (1993) pointed out that surveys conducted in this area 'have tended to focus on developers...computer centre directors...or university registrars...and have mainly concentrated on technical and resource issues' (p. 5). Issroff (1993) highlighted the fact that, by focusing on implementation and institutions, much of this research tends to ignore '...what the learner feels when learning from the computer and the learner's attitudes towards the computer in terms of motivation' (p. 4). Similarly, the majority of policy reports have failed to ascertain the views of students or to investigate how they use computers (see for example MacFarlane report, 1992; Williams & Fry, 1994; JISC, 1995; HEFCE, 1995; CVCP, 1995).

Examples of empirical research taking a staff rather than a student perspective include Hirscheim et al. (1988); Green (1991) and Maier et al., (1997). Hammond et al. (1992) conducted a survey of heads of departments in humanities and social science about the type and extent of computer use and their views on the problems, benefits and barriers involved. The only consideration of students' needs was an inquiry as to whether the head of department felt students had access to computers. In Greene's (1991) investigation of computer integration, faculty members were surveyed and the questions related only to their opinions and use of computers rather than on the student perspective. Hammond et al's (1992) investigation of the factors inhibiting the effective use of information technology in higher education focused entirely on educational and organisational issues from a staff perspective and did not consider the barriers to students' use of computers in their learning. More recently, the examination by Maier et al. (1997) of the barriers to successful information technology integration was from the perspective of departments within a particular institution. One of the limitations of research, which examines the integration of computers into higher education, has therefore been its focus on staff views rather than on the students' perspective (Bork, 1995; Green & Gilbert, 1995).

Attitudes to computers

In contrast to investigating how students use computers, a substantial body of research into students' attitudes to computers does exist. For example, a number of researchers have investigated students' attitudes after a period of training and have concluded that some students do experience a positive shift in attitude as a result of the training (e.g. Gressard & Loyd, 1986; Torkzadeh & Koufteros; 1994). Colley et al. (1994) also found that participation in a computer course significantly reduced anxiety and increased confidence among both males and females. The relationship between the amount of experience on a home computer and attitudes was different, however, for male and female students. Home use was associated with greater liking for computers among female students, greater confidence among male students and lower anxiety for both sexes.
Consistent support for the notion that training can significantly reduce anxiety comes from research that indicates a positive effect of experience on attitudes to computers. From a meta-analysis of nine empirical studies with college students, Rosen and Maguire (1990) concluded that computer experience appears to lessen ‘computerphobia’. Similar findings were reported in a cross-cultural comparison of 23 countries involving over 3,000 first-year undergraduates (Weil & Rosen, 1995). Their evidence indicated that anxiety and positive and negative cognitions were significant factors in the use IT and can, in some instances, inhibit students’ use of computers.

In order to address, at least partly, the limitations of previous research the present study sought to examine barriers to computer use from a student perspective. Themes which emerged from a questionnaire survey and focus group discussions with students were compared with the views of lecturing staff in order to identify common and divergent areas of interest or concern.

**Method**

Three methods of data collection were used with a view to triangulating any inferences drawn. The methods were: a student survey repeated in each of three years (using a postal questionnaire), interviews with students (focus groups) and staff (one-to-one). The postal survey instrument was designed to capture data in relation to the extent, pattern and nature of students’ use of computers, their attitudes to computers and their competence in using them. It is not possible in this paper to report the findings from the inferential analysis of the attitude and competence data but relevant parts of the descriptive dimensions and free response aspects of the surveys are incorporated. The interviews with students \((n = 63)\) and staff \((n = 48)\) were based on semi-structured schedules designed to probe views, attitudes, working contexts and resources etc. Qualitative dimensions of the data included perceptions and opinions, which were used to enrich interpretation of the quantitative data.

**Sampling**

The target population was the first year cohort of students entering seven faculties of a UK university in three successive years beginning in 1994. A stratified random sample of 835 students was drawn from the list of 3015 enrolled students. A minimum of 40 students (max. 20%) was selected from each faculty-by-gender cell, with the one exception being a small group from which all of the 20 students were selected.

**Survey**

The administration of the survey involved posting the questionnaire to the students’ home addresses in the second term of each year. A reminder letter and a second copy of the questionnaire were sent to all students who had not replied to the survey after approximately one month. In the event, a high response rate was achieved for each year of the survey: 70% (585) in the first year, 68% (562) in the second year and 63% (505) in the final year.
Reliability and validity of the design
The validity of the study as a whole was partly assured by conducting it in a real life setting, i.e. in context. The adaptive approach to the design, in response both to changes in the environment e.g. the wider availability of access to the Internet, and the preliminary analysis of earlier data collection, also underpinned the validity of the study. Kirk and Miller (1986) have argued that providing a number of perspectives on the same issue or using differing methods of data collection helps to assure the validity of the study and inferences drawn from it. In this study, reliability and validity were supported by this multi-method multi-source triangulation approach, i.e. a combination of quantitative and qualitative methods involving interview and survey with the related target groups, i.e. students and staff. The extent to which the results are generalisable to other higher education student populations may, however, be limited due to the single institution approach adopted. Nevertheless, by providing details of the context of the research, readers are in a position to draw insights from the research and judge the relevance of the findings for their own contexts and purposes.

Student focus group sample
Eight focus groups were identified as follows: four groups comprising 34 volunteers from ten departments across the faculties and four groups made up of 29 students who agreed at short notice to switch a timetabled commitment to a focus group discussion. The former groups’ self-selection characteristics (i.e. students who volunteered to be interviewed about IT developments) were counterbalanced by the four groups whose members accommodated the interviews in lieu of a compulsory tutorial. Each focus group consisted of between four and eight students from different year groups and where possible included equal numbers of male and female students. Sessions lasted between 45 minutes and one hour.

Staff interview sample
Individual interviews were conducted with 24 members of staff nominated by their heads of department on the basis that they had responsibility for, or interest in, student computer usage. The participants were drawn from the seven faculties used in the student survey. To ensure that this (technically) self-selected group did not introduce unnecessary bias, a further group of 40 academic staff was randomly selected from the university staff list and a sub-sample of 24, covering the relevant faculties, was also interviewed. Each interview session lasted between 30-90 minutes.

Data analysis
The situational and contextual factors which affected students’ use of computers were examined in terms of: training, support, information and available resources. Each is described in turn drawing on evidence from:

- Students’ responses in the survey
- Students’ annotated comments to survey questions
- Students’ views from the focus group discussions
- Staff views expressed in one-to-one interviews
Results and discussion

Training

Research evidence would suggest that training significantly reduces anxiety and increases confidence in computer use (e.g. Colley et al., 1994; Gressard & Loyd, 1986; Torkzadeh & Koufteros; 1994). The results from the survey indicated that training, which might address this goal, did increase for the student sample over time; with 36%, 45% and 51% respectively having received some form of training in the three years. Differences were noted between faculties with the students in Agriculture, Engineering and Economics & Social Sciences receiving more training than their counterparts in Medicine, Law and Arts. In these latter faculties less than a quarter of all students claimed to have received any form of computer training by their final year. More surprising, perhaps, was the fact that only half the students had had some computer training at school, a figure which is low given the common expectation in higher education that students will have at least a basic knowledge of computers by the time they reach higher education.

The findings from the focus group discussions indicated that students generally viewed their lack of training in computers as the strongest inhibitor of usage. Most valued learning about computers but believed that computer training in the university was generally inadequate. In contrast, Engineering students believed that they had learned a great deal about computers throughout their degree course, although several pointed out that they had learned as much from friends and ‘going in and messing about’ as they had from the course. Some students also criticized the type of training provided which, they argued, did not encourage understanding:

“All students should be taught basic computer and word processing skills as part of their course. I am expected to use a computer and word processor but have never been shown how to do so”. (First year student)

Consistent with these findings, the results from the questionnaire survey in the third year indicated that a substantial number of students (44%) attributed their failure to acquire and develop computer skills to lack of support in terms of training, information and help from staff.

In contrast to the students’ views, staff in 75% of the departments reported providing their students with at least some form of training or general introduction to computers. Several argued that students had sufficient information for them at least to ‘get on with it’ or to make a good attempt at ‘teaching themselves’. While there was some agreement between staff and students as to the depth of training provided, they clearly differed in the perceived adequacy of training. Students identified training as the single most important barrier to computer use while staff defended the adequacy of training by arguing that students should take a more hands-on approach. It appeared that staff views centred more on overall provision while students understandably took an individual perspective.

Support

Lack of help with computing was also considered a barrier to computer use. Students in all departments reported in the interviews that support and
assistance was rarely provided by members of staff. Staff interview evidence to support this view came from comments that they were “... not really here to teach computing” and that it was “out of the question for someone like me to teach them”. Similarly, representatives from departments with high computer usage felt that students should be able to teach themselves; with comparisons drawn between successfully learning to write programs (e.g. in Engineering) and learning to wordprocess. However, it was clear from the student interviews that this view was not necessarily shared. Help was often sought from knowledgeable friends or from other students sharing the same computer facilities. A number of students reported that when attempts to get help failed they often gave up and left. Consistent with these views are the results from the questionnaire survey which indicated that 61% of first year, 57% of second year and 50% of third year students found lack of help with computers an inhibiting factor to computer use. The written comments made in response to survey questions also served to illustrate this point, for example:

“No one ever tells you how to use the computers which makes it very difficult unless you know someone who can operate them.” (Second year student)

Information
The issue of whether students have sufficient information ‘to get on with it’ was also explored. The evidence presented in Table 1 indicates that a substantial number of students, in their first year, perceived lack of information about the computing facilities and their location in the university to be a problem. However, with the exception of information on available facilities, the problem had receded considerably by year 3.

Similar views were expressed during the focus group discussions and, in the main, students felt that information about computing facilities was largely inadequate. In six out of the ten departments represented in the focus groups, students were clearly frustrated with the situation, describing it variously as ‘non-existent’, ‘abysmal’, and ‘pathetic’. The written responses to the survey corroborated this to some extent:

“My first year is almost over and I have no idea how to even find out about using or even finding a computer in the university.” (First year student)

<table>
<thead>
<tr>
<th>Survey question</th>
<th>Year 1 %</th>
<th>Year 2 %</th>
<th>Year 3 %</th>
</tr>
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<tbody>
<tr>
<td>The information on computing facilities in the university is inadequate</td>
<td>44</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>I don’t know much about the computing facilities at the university</td>
<td>41</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>I don’t know much about where I can use computers at the university</td>
<td>88</td>
<td>49</td>
<td>27</td>
</tr>
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By contrast, staff believed that even where training was not available, students received sufficient information to teach themselves basic computing skills. With
the exception of part-time students, lack of information was not perceived by staff as a barrier to computer usage; a notion not shared by students.

**Computer access**

Findings from the survey and focus group discussions indicated that access to computers represented a problem for most students. Problems associated with access were generally considered to be more annoying and frustrating than actually inhibiting. For example, access was a particular problem at peak times of the day and approaching course work deadlines. The following comment illustrates some of these difficulties:

“I definitely feel that students require more computers — there is always a rush to get a computer. Whenever projects have to be completed and classes are using computers and other people are trying to get computers to finish different projects - this results in chaos and high tension!” (First year student)

Consistent with these views, a recent internal review of the university’s computer facilities indicated that while there are more than 1,000 computers available to support teaching and learning in the university, there is a need to extend this provision. It also recommended that more computers be made available to students through open access centres.

Allied to problems of access to computers were the feelings of lack of confidence expressed by some students; a problem which might deter some students from seeking access, e.g.

“I would feel intimidated about using computers in university where there are ten or more computers in one room and the other users are competent.”

(First year student)

“I was totally inexperienced in computing and was anxious about displaying my ignorance in a busy open access centre.”

(Third year student)

Comments such as these offer some corroboration to earlier research, which has identified that embarrassment at making mistakes in front of others acts as a barrier to computer use (Jones & O’Shea, 1982). The added anxiety of other users being present, and the feeling of being less ‘entitled’ to use the computers, when others they perceived as more competent were around, was found to be more of a problem for the less confident students. This finding is also consistent with Pitt’s (1993) assertion that, while hardware and software are important issues, other factors may contribute significantly to computer learning. He added the caveat: “It seems to be assumed that filling a room with computers creates a teaching cluster. This is like saying that filling a room with jars of chemicals makes a chemistry laboratory” (p. 170).

Support for the view that access to computers is among the most important factors in predicting computer use is provided by Malaney and Thurman’s 1988 study of the views of just over 300 undergraduate students in a US university. These authors concluded that, along with expectations of computer usage in future careers and computer usage prior to university, access issues contributed to explaining 50% of the variance in identifying computer users in their sample (Malaney & Thurman 1989/90). The focus group discussions revealed, however,
that access generally affected the quality or convenience of students’ use of computers. For example, in the questionnaire survey, a substantial minority of students in each year, particularly in the first year (47%), indicated that they would use computers more if they knew there would always be a computer free.

In contrast, staff generally considered computer access to be the most important factor in inhibiting computer use. Focusing on the issues of resources, most believed that there was a pressing need for more computers in the university. The importance that staff attributed to the access issue is exemplified by one member of staff who felt so strongly about the need for more machines that he proposed, tongue in cheek, that the quadrangle in the middle of the university should be covered over and completely filled with machines!

In the main, however, staff were more concerned with the lack of facilities within their own departments, considering this to be a major barrier to their students’ use of computers. This view was not consistent with those expressed by students, who were more concerned with gaining access to facilities than with their location.

**Time**
The availability of time to use computers was also found to affect use. Almost 60% of students in all three years reported that they would use the computers more if they had more time. The following example from the student survey highlights students’ concerns about time:

“Quite simply the time is not there — unfortunately for me. But the interest is! I’d love to be computer literate, but it’ll have to take a back seat until after my degree.” (Second year student)

This and similar comments from other students would suggest that it is generally left to the individual to make time, outside of their degree course, to attend computer skills courses. The recent Dearing Report (1997) has called for a greater emphasis on graduates being computer literate before entering the job market, but if these kind of impressions continue to linger in the student community, this goal is unlikely to be realized.

**Conclusions**
This single site study leads to several conclusions that certainly relate to the participating cohort but which may also provide insights for other institutions. These conclusions focus on:

- adequacy of computer training;
- support and information for computer users;
- access and time to use computer resources

Students identified lack of training as the most important factor in inhibiting computer use. Although most valued learning about computers, they claimed that the training offered to them was largely inadequate. In contrast, staff believed that they provided sufficient initial training for students to continue to develop their own computer skills. However in some instances, anxiety and
lack of confidence interacted to prevent students from adopting this self-help approach.

Students in the study also felt that support when actually using the computers was inadequate, particularly from members of academic staff. Assistance was therefore often sought from student colleagues. As students become more familiar with their environment, they become more knowledgeable about the resources available to them but the findings remind us that first year students can often experience frustration when it seems to them that information on these matters is inadequate or in some aspects not available.

Access to computers was clearly an important matter for all of the students. The study findings would support the view, however, that problems associated with access amount to a more complex issue than simply the number of available machines or indeed access times. For example, the latter may be too restricted or not sensitive to peak periods such as coursework deadlines and free time periods such as weekends. Staff members recognized the need for greater provision but differed importantly on seeing the issues at a departmental rather than individual student level. Resource problems were clearly an irritation for students, but time and training (above) were considered more important.

In conclusion, the study has highlighted the need to embrace a student perspective in planning to increase students’ use of computers. A staff perspective will remain an important element but giving students what planners think they need will not be sufficient. They must provide instead a more negotiated mix of training, access and free time in the undergraduate timetable to enable students to progress themselves.

References


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