
Evaluating the Use of Computer Mediated Communication Resources by Trainee Educational Psychologists

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Background

The MSc in Educational Psychology at the University of Strathclyde is a two year course providing British Psychological Society accredited professional training for (currently) 12 people. The trainees are honours graduates in psychology, and in the main have three to four years experience of work with children, young people or families, in most cases via teaching or research. The course is delivered via a combination of lectures, seminars, tutorials, group and individual project work, and practice placements. Lectures, seminars and tutorials take place during the two days per week when trainees attend the university. A further two days per week are spent on individual placement in schools and Psychological Service offices across central Scotland, where trainees begin professional work under the supervision of "practice tutors".

In the past, preparation for seminars and for group project work has been to some extent constrained by this division of time. Since for much of the week the trainees were physically remote from each other, if they needed to collaborate or to seek guidance from course tutors they had to rely on meeting whilst in the university (despite the tight scheduling of this time), or else make do with telephone calls. Thus it was clear that enhanced support for trainee learning could be achieved by developing the use of e-mail and online conferencing for remote communication with tutors and peers, and by providing remote links to library facilities and WWW resources. Introduction of this element to the course would serve in addition to promote the acquisition of generic, transferable IT skills which would later be valuable to trainees and to the profession when they became practitioners. For instance, educational psychologists in Scotland have for some while had a dedicated electronic conferencing system, although this has been little used other than for specific development projects. If trainees were already experienced in this mode of communication when they qualified, they would be able to make better use of such systems, and would also carry the culture of online contact into Service offices.

Implementation

A new intake onto the course for the 1997-98 session provided the opportunity to attempt to achieve these objectives, and from early 1998 trainees were given access to a dedicated *FirstClass* e-mail and conferencing system. This operates via networked machines within the Psychology Department at Strathclyde and modem links in Service offices, and allows users to post messages to either a shared discussion space or an individual's personal mailbox. Whilst the conferencing system formed the cornerstone of the new facilities, access was also provided to internet resources, including Netscape and a course web site. *FirstClass* 3.5 was selected for the e-mail system after a survey revealed that this version of the software, together with connections to a coordinating server (run by the Scottish Council for Educational Technology), was readily available out in the field to eleven of the twelve trainees on the course. *FirstClass* also had the advantage of providing the trainees with a relatively transparent graphical user interface and a range of menu-driven facilities. These were important considerations given that, despite their likely strengths as effective face-to-face communicators, this cohort of trainees was not experienced with *computer-based* communication systems. In fact only three of the group of twelve had used e-mail previously at all.

The introduction and embedding of the *FirstClass* system into the course took place gradually. Shortly after commencing in October 1997, trainees were shown examples of e-mail and conferencing facilities, and were introduced to the idea of using these for course-related communications. Some of the advantages of doing so, both for aiding current activity and for learning generic IT skills, were pointed out to them, and the introduction of such a system into the course was discussed. It was suggested that if it was introduced, it would be desirable to monitor the usage and impact of that system, in order to establish whether it was being effective, and if it might be improved upon. This monitoring was something to which they were asked to give explicit consent.

After the trainees' agreement had been obtained, and a variety of software options had been considered, a "closed" discussion group (i.e. accessible only by the trainees, course tutors and project consultants) was finally set up on the SCET *FirstClass* server. Specific training in the use of *FirstClass* was then provided within the university, backed up by copies of paper-based guidance notes. Trainees were encouraged to check their connections to the conference from their respective Psychological Service offices, and were offered assistance, if necessary, in installing software and setting up modem links correctly.

Due to networking and software problems, the cementing of field connections did not in fact proceed smoothly. Five weeks after the system had been set up, only eight of the twelve trainees were fully online. For two of them, problems persisted for a further five weeks after that.

Whilst attempts were made to resolve these various problems, those who could access the *FirstClass* facilities were left to make informal use of them for contacting course tutors and each other. In the meantime, the course tutors, with the assistance of an LTDI Project Consultant, identified and mapped out in detail activities which lent themselves to computer mediated conferencing and which could be integrated into the course. The intention here was to provide the trainees with clear incentives to engage with the resources now becoming available to them. Thus approximately one month after the conferencing system had been set up, trainees were divided into two groups of six, and set the task of working collaboratively within these groups to produce a seminar paper on an assigned theme, making use of e-mail where appropriate. For each theme, details of key readings (three papers) and four to five 'starter' web sites were made available by tutors. Each group was to review the materials relevant to their theme and produce a briefing paper of four to five pages containing an overview and critique of previous work, together with guidelines for professional practice. This paper was then to be discussed at a face-to-face seminar.

Initially, the intention was that the first group (Group One) would be allowed three to four weeks to prepare their paper, and that following the face-to-face seminar that paper would be subjected to a critical peer review by the second group (Group Two). The roles would then be reversed, and Group Two would move on to prepare their paper. However, the time required by the Group One to complete their draft was almost twice as long as

had been anticipated by tutors, and it became plain that it would not be possible to undertake the peer reviews within the time frame originally envisaged. The sequence of work remained as planned in other respects though, with deadlines for Group Two being about one month after those for Group One. In addition to the seminar tasks, trainees were encouraged to use the conferencing system to collaborate on their small group (foursome) research projects on school-based reading intervention.

They are expected to use it further to prepare a poster for a professional conference later in the year.

Evaluation

As McAteer et al. (1997) and Warren & Rada (1998) point out, there are a variety of potential foci for evaluation studies of resources like the trainee conference. Implicitly or explicitly, the objective of such studies is not simply to determine whether a resource "works" or not, but to isolate as far as possible the factors that contribute to success or failure. Which factors are chosen for attention in any particular instance can be argued to reflect, broadly speaking, one or more of three main areas of concern: the C&IT systems approach focuses on the effects of the resource or system itself; the individual differences approach is concerned with the influence of individuals' attitudes, experience and capabilities; and the human relations approach focuses on relationships between users and how they work together.

In the present case, the size and nature of the trainee cohort and the use of a well-established "off-the-peg" system militated against the individual differences and C&IT systems approaches. Whilst care was taken to establish what prior experience the trainees had had with e-mail and other online resources, the group was too small and highly selected to display much readily measurable heterogeneity. In fact, outside of their lack of past experience with e-mail, previous literature indicated that the trainees had all the characteristics of task-related expertise, motivation and awareness of goals that would predict a successful implementation (see Tolmie & Barbieri, 1997; Tolmie & Anderson, 1998). Similarly, whilst much thought went into the choice of system, the selection of *FirstClass* was guided not only by its availability, but also by a range of literature indicating a high degree of suitability to the circumstances in hand (see e.g. Wilson & Whitelock, 1998).

In a sense then, the issues of interest here were inevitably those most closely identifiable with the human relations approach, but this was not the case simply by default. From the outset, the intention was to set up a resource that was likely to be well-used, as far as could be judged, with evaluation work primarily focused on how well the system fitted into the *context* of usage, as gauged by its capacity to support task-related interaction amongst a group of skilled communicators. The methods employed to conduct the evaluation were selected specifically to address particular questions deriving from this concern. A description of these methods, together with preliminary results, is laid out below question by question.

1) How receptive were the trainees to the introduction of the conferencing system?

Despite the range of indicators pointing to the likely success of introducing the selected system into this particular course, if the trainees were resistant at the outset, or felt that these developments had been imposed upon them, they would be unlikely to use it. For this reason it was considered important that introduction of the system be accompanied by a process of negotiation, as noted previously, and that the effects of this process be carefully monitored, as far as was possible. To this end, **written records** were kept of the early meetings where the introduction of the conferencing system was discussed, and of the trainees' reactions during these.

Some outline of the introductory meetings has already been given, but to enlarge on this, the idea of using e-mail and conferencing facilities as part of the course was first mooted by the course director at the initial e-mail demonstration, prior to trainees commencing their placements. The potential advantages highlighted at the time were benefits for course administration and group project work in terms of ease of communication; the capacity to generate jointly written material, including that needed for presentation at the annual professional development conference; the possibility of contact with trainees on the parallel course at Dundee University, and with other professionals; and the chance to gain experience of the use of resources of this kind. As far as monitoring of use of the system was concerned, it was stressed that the main objective would be to identify any improvements to the system needed for Year 2 of the course. Trainees were told that this monitoring might involve the completion of questionnaires and logs of activity, and also inspection of online messages, but only with their agreement.

Reaction to these suggestions was somewhat cautious, especially as regarded the issue of monitoring use of the system, and the trainees requested further information on this point. Thus a second meeting of the group with one of the project consultants was arranged. Here it was explained that past research indicated that many factors affected whether educational conferencing systems worked, but also that when they did they provided an important avenue for productive discussion and exchange of information. For these reasons it was helpful to check the operation of such systems when they were up and running, however much thought had gone into their set up. It was stressed that any intrusion and extra work involved in making monitoring possible would be kept to a minimum, and that as already indicated, online messages would not be inspected without consent.

Concerns were still expressed at this meeting about the possibility of use of the conferencing system involving extra work on top of an already heavy load; and conversely, whether the group would actually find things to use the system for, and if they did, whether the benefits would be available to everyone. However, after an interval of a couple of days the trainees expressed an overall favourable opinion towards proceeding with the idea along the lines suggested. On this basis it was decided to set the system up, and provide time for the trainees to explore it before setting specific tasks that might require its use. The fact that the trainees did take time to consider actively what might be involved and whether it would be of benefit to them, rather than simply acquiescing straight away, was felt to be an indication of the likely emergence later on of at least some sense of ownership of the system, and thus a further sign that a successful outcome was probable.

2) What was the pattern and content of the online interaction, how dependent was it on task characteristics, and how far did it differ from off-line interaction?

Having decided to set up the conferencing system, the next concern was how it bedded down in the course, what functions it served, and whether these were novel or if it simply supplanted other means of achieving the same ends. In short, was the system acquiring a distinctive role, and was it effective in serving that role?

A variety of methods were used to address this issue. The first involved **observation of a face-to-face seminar** prior to the setting up of the system, in order to gain a picture of the trainees'

communicative styles and capabilities when dealing with course-relevant material under more standard circumstances. The seminar chosen was the last prepared without potential e-mail support, or allocation to task groups, and focused on secondary schools' policy and organisation with regard to Psychological Services. The observation tended to confirm the anticipated sophistication of the trainees' face-to-face communications. There were some differences in expectation about how formal the session was supposed to be, some having come armed with overhead slides and prepared talks, others just with notes. However, over a two hour period there were lengthy contributions made by almost all present, although since each had been working in a different school they had different information available, which was probably helpful. What was striking, though, was the incidence of spontaneously organised floor-shifting, without direction from the tutor present: those who had not yet contributed would typically pick up on a point from the previous speaker, develop it and carry it on into their own mini-presentation.

The second major source of information with regard to the issue of interaction was the **online messages** themselves. Three methods were used to inspect these: a) a simple count of the **frequency** of the messages, in relation to the tasks which had been set; b) an examination of the **relative contribution** of different course members; and c) coding of the **function and length** of messages. Taken together, these provide a picture of online communication patterns during the first months of operation of the conferencing system.

Looking at **message frequency**, a count of messages per week after start-up showed a small flurry of activity for the first four weeks (on average about five messages per week were sent to the shared conference space), as those who were able to gain access tried out their connections. This subsided to an average of one message per week for the next four weeks, despite the Group One's seminar task having been set, although this was explicable in part by the period coinciding with the Easter vacation. Over the next four weeks message frequency climbed sharply to a peak of 20 per week, as the remainder of the trainees established connection, Group Two's seminar task was set, and Group One finalised their paper for the face-to-face seminar. The subsequent four week period, leading up to Group Two's face-to-face seminar saw a drop in frequency to around three messages per week. The period after that, leading into the summer vacation, saw a further decline to, on average, one message per week.

All in all, then, there was a clear coincidence between online activity and the group seminar tasks, especially in the periods immediately prior to the face-to-face sessions, although this trend was more marked for Group One than for Group Two. As hoped, whilst it was not necessary to use e-mail for the seminar tasks, the indications were that it had to some extent proved helpful to do so. It is perhaps worth noting that this is consistent with previous literature suggesting the importance of clear tasks for the use of CMC in educational settings (see Tolmie & Barbieri, 1997).

Turning to the examination of the **relative contribution** of different members of the course, the data both confirm and qualify the apparent impact of the seminar tasks. In the first place, use of the shared conference space varied widely across the trainees, from no contributions at all in two instances, to a maximum of 24. Overall, taking initial connection problems into account, only five of the twelve trainees could be classed as regular users (i.e. those who made a reasonable number of contributions, spread over a period of time). Having said this, however, the number of contributors did tend to increase in response to work on the seminar tasks, although there were further distinct differences in this respect between Group One and Group Two: for the former, four out of the six group members became regular contributors for at least the period preceding their face-to-face seminar; for the latter it was three at most, and then only very briefly.

This was, on the whole, unexpected. Whilst variable participation rates and 'lurking' are often regarded as the norm in the CMC literature, in fact participation rates amongst small groups at this level of expertise are usually much less patchy, especially when they have a clear task to work on (see Tolmie & Anderson, 1998). The pattern here also stands in some contrast to the observed participation in the face-to-face seminar reported on above. There would seem, on the face of it, to be two possible explanations. The first is that the trainees, for the purpose of the seminar tasks at least and for whatever reason, genuinely divided into "movers and shakers" on the one hand, and "lurkers" on the other, and these were not evenly distributed across the two groups. Consistent with this, one member of Group One did explicitly acknowledge lurking tendencies in a message to the conference! However, it seems unlikely that this lack of engagement extended to all aspects of the task, not least because it would have been markedly out of line with the trainees' other work, but also because

there were no signs of the claims about "passengers" which would typically accompany this pattern.

The alternative, then, is that all group members were contributing to the seminar tasks (and other activities) but that some were doing so outside of the online conference. If so, it would be valuable to identify why. It should be noted, however, that there is one straightforward possibility to be taken into account. For the purposes of examining online interaction, only the trainees' messages to the *shared* conference space were available. Messages relevant to the seminar tasks may therefore have been sent via the *private* mailboxes in some instances (there were no instructions to use the shared conference), but these would not register in the contribution count. Indeed there were indications that in general much mail was sent this way: around 10% of the shared space messages appeared to be direct responses to private box mailings.

Coding of the **function and length** of the messages to the shared conference space helped to fill out further the gradually emerging picture of the character of the online interactions. First of all, there was confirmation of the impact of the seminar tasks: during the eight week period covering the lead up to the face-to-face seminars for Group One and then Group Two, there were only two weeks when communications relevant to the seminars were not amongst the most frequent categories of message, and average message length jumped during this period from 1K to 8K. Two further points are relevant here. This first is that when this pattern is taken alongside that of actual message frequency, it becomes apparent that whilst Group Two apparently tended to make fewer online contributions during the weeks preceding their face-to-face seminar, the characteristics of the messages they did send were similar to those sent by members of Group One during the corresponding period. In other words, e-mail was serving the same *type* of function for both groups, if not to the same extent. The second point is that closer examination of the seminar-relevant messages shows them to be a two kinds: brief exchanges of information, or lengthy attachments of drafts of sections for the seminar paper with requests for feedback (hence the jump in message length). The conferencing system did indeed seem to be serving a distinctive function then, at least in respect to the seminar task, but this in no respect paralleled face-to-face style discussion - making any departure from face-to-face patterns of contribution less remarkable perhaps. It is worth

noting that use of the conferencing system to support joint writing was one of the possible functions highlighted during the introductory sessions (see above).

Seminar-related messages were of course only prevalent during the period noted above. The conferencing system was used at other times for other purposes, including, earlier on, group project work, and latterly the first steps towards preparation of the conference poster. Social messages, the seeking of advice from tutors and peers, and course administration messages tended to occur with moderate frequency throughout. In all these instances, information exchange appeared once again to be the primary objective. Overlaying all other messages, however, was one category which had a consistently strong presence throughout: exchanges about network connections or software problems, either pointing up problems and seeking advice; or announcing the solution of problems and the establishing of connections. During 11 out of the 17 weeks from the start-up of the system until the summer vacation this was the most frequent or joint most frequent category of message. In other words, then, all other activity took place against a background of perceived connection problems.

The third source of information about interaction was provided by **logs of contact and activity** which the trainees were asked to keep in relation to the group projects, both before and after the introduction of the conferencing system, and also for the secondary school seminar (i.e. before *FirstClass*) and the two group seminar tasks. These logs simply consisted of proformas for noting down relevant activity, who else (if anyone) was involved, the medium used, and the time taken. The reasoning here was that whilst examining online messages gave some idea about what e-mail was being used for, in itself this provided no information about how e-mail communication fitted into other activity and contact, and whether the latter had changed with the introduction of the conferencing system. The logs were intended to provide this information.

In the event, the logs were less than entirely successful due, amongst other things, to relatively low completion rates. For instance, only three of the twelve trainees completed the log for the secondary school seminar, although this may have been in part because this log was not given out until shortly before the seminar and there were too many other activities competing for the trainees' available time. Moreover, since it had been stressed at the outset that assistance with monitoring of the system was voluntary, trainees were under no real obligation to

return the logs. A further problem with the secondary school seminar log, though, was that this activity was not the best choice as a baseline for interaction patterns prior to the conferencing system coming online. The nature of the exercise meant that work was necessarily more independent than was the case later, and the bulk of the reported discussion was with teachers rather than tutors or peers: only one of the three returned logs reported any contact with other trainees, and this was limited to discussion of the format of the seminar. Similarly, preparation of material for the seminar was in all cases reported to have taken place without any outside contact.

Logs for the two group seminars had a better return rate, and did show a different pattern of activity, but in view of the points above it is not possible to judge how far this should be attributed to the existence of the conferencing system, and how far to the nature of the task. However, comparison between the logs for Group One and Group Two is revealing vis-a-vis the apparent differences between their online activity, and thus indirectly about the impact of the system.

For Group One, four out of six logs were returned, and although there was a degree of variation across these in the time spent on different activities, it is possible to calculate rough means for each, as follows: on average 119 minutes were spent in face-to-face communication, 97 Minutes on e-mail communication (including failed attempts at connection), 12 minutes on telephone communication, and 281 minutes on independent activity (including word-processing and internet access). Consonant with previous literature (see e.g. Lewis, 1997) and with some of the details reported above, face-to-face communication took place more typically at the outset, and at points of negotiation (a pattern associated with successful use of conferencing), whilst e-mail was used more for the exchange of drafts, updating others on progress, and deciding on the format of the seminar presentation. This confirms other indications that although a reasonable proportion of time was spent conferencing (or attempting to), e-mail was used primarily for information exchange, whilst discussion was reserved for face-to-face contact. It is possible that a lack of confidence in the reliability of the online connections meant that it was not trusted for serious discussion; or it may be that because the group had the opportunity for some face-to-face contact throughout, it seemed natural to use the more familiar medium for discussion.

For Group Two, only two out of the six logs were returned, so the available data is more limited. However, if these are taken as representative, they are revealing. On average 200 minutes were spent in face-to-face communication, 21 minutes on e-mail communication, 29 minutes on telephone communication (including the sending of faxes), and 242 minutes on independent activity. What is interesting is that the overall time spent on the seminar task was very similar to Group One, but proportionately much less time was spent on e-mail, and more on face-to-face (and fax) communication, consonant with the e-mail frequency data noted previously. Face-to-face communication for Group Two included more working together, on top of the strategic uses made by Group One. As conjectured earlier, then, lack of e-mail contact via the shared conference did not apparently signify lack of engagement with the task (or substantial use of the private mailboxes, for that matter), but rather a use of other methods of working and other channels of communication.

The reason for these differences still remains somewhat unclear at this point. Group Two contained the person who had the greatest difficulty getting online, but these problems were solved by the time the Group Two task was set, and in any case this person was amongst the more frequent Group Two users of e-mail. One factor which might have been significant, given the functions of e-mail for Group One, was that Group Two did report more difficulty sending and receiving attachments, in part because of mismatches between the resident word processing software (Word and ClarisWorks) on the group members' machines.

Finally, the group project logs were again not as informative as might have been hoped. Only two out of the twelve trainees returned these, one before the conferencing system was set up, and one after. Given these numbers, it is hard to tell how representative the data are. However, the responses are in fact consistent with the picture presented above of face-to-face communication being to some extent pared down to strategic discussion after the introduction of *FirstClass*, with e-mail taking on the function of information exchange.

3) Was the experience of using the system perceived to be positive, and what further support would be helpful?

The pattern of interaction, certainly for Group One, was consistent with the conferencing system having been relatively successful. This was no guarantee that the experience of using it was *perceived* to be

positive, however, and in order to sustain future use, it was important to be sure that at least some positive perceptions were present, so that these could be built on later. To ascertain whether this was in fact the case, after each group's face-to-face seminar those who had drafted the seminar paper were asked to complete a brief **questionnaire**. This dealt with respondents' experience of e-mail prior to the course and their initial confidence about carrying out the seminar task; the perceived usability of the conferencing system and software; which aspects of the task had been seen as positive, and which as negative; and which features of the system, if any, had been perceived as facilitating completion of the task.

Looking at Group One and Group Two responses separately in view of other identified differences between them, for Group One five out of six questionnaires were returned. Only one of the five respondents reported having had previous experience with e-mail, suggesting that whatever else was the case, the differences between Group One and Group Two were not attributable to Group One containing more of those who had used e-mail before. Despite their lack of past experience, on balance the group members were moderately confident about the exercise at the outset, although most also said they had had doubts about the software and its reliability, and all respondents stated that more initial instruction in *FirstClass* (especially sending attachments) would have been helpful. All respondents reported having subsequently experienced access problems due to network difficulties or lack of availability of machines, and noted that they considered dealing with these problems as key requirements for the success of such systems. However, there were positive aspects. All the respondents liked the speed of exchange which e-mail allowed, and most also mentioned the convenience of asynchronous exchange (a common finding), which meant not having to wait till someone was in, and having time to think about replies. All felt that learning about conferencing was the most useful aspect of the exercise, and that keeping in touch or discussing were the least useful (cf. the relative lack of use of the conference for this, and the availability of face-to-face contact). At the same time, the most frequently mentioned positive outcome was the successful joint production of the seminar paper, so that the exercise as a whole can be claimed to have been seen as facilitating productive exchange.

For Group Two, again five out of six questionnaires were returned. Two out of the five respondents reported having had previous experience with e-

mail (confirming the lack of difference between the groups in background experience), and again on balance the group members had been moderately confident about the exercise at the outset. In general, the pattern of other responses was similar to those given by Group One, except that there was greater emphasis on technical problems, no mention of the benefits of asynchronicity (perhaps reflecting paucity of use of the system), and a less positive reaction to the exercise as a whole. It is not clear from the questionnaires whether it was due to actual technical problems, but the group reportedly decided to split into pairs for the exercise, hence the greater incidence of working together noted in the logs, and the lower use of e-mail.

The implication, then, is that technical difficulties led Group Two to adopt a structure for the seminar task which minimised the need for exchange, and that *this* was the primary reason for the differences in interaction patterns between Group One and Group Two. It is not clear whether these technical difficulties were more perceived or actual. One possibility is that the group had greater lack of confidence in the system because they had fewer early frequent users: three in Group One, against one, or at most two in Group Two. As a result, Group One may have had a "critical mass" of users which was sufficient to persevere and overcome any lack of confidence in the system, whereas Group Two did not. Whatever the cause, though, it seems likely that because of the structure they adopted, there was not the same opportunity for Group Two as there was for Group One to experience a positive outcome in terms of joint writing. There are strong echoes here of previous arguments that the character of the procedures negotiated by groups for tackling a task are critical to the success of online conferencing systems (see e.g. Lewis, 1997).

4) Did the provision of the system have positive outcomes for work?

Given the presence of some negative perceptions of the seminar task, and especially its online components, it is pertinent to ask whether these were justified by the quality of the actual *products* of the task. More generally, in addition to developing practical IT skills, it had originally been hoped that the project would develop the trainees' skills in synthesising and evaluating data through increased discussion either directly using, or facilitated by CMC. In order to address these points, the intention had been to **assess written work** against key criteria, especially the presence of critical reflection (i.e. the exploration and critiquing of issues, rather than simple awareness of their

existence). To date, however, the seminar briefing papers have not been formally assessed, although they were judged by the course tutors to be of a high standard, and will go up on the course web site for wider access by other professionals. Further analysis is needed here. A related issue here is that of the longer-term impact of the conferencing system on the trainees' professional work, and that of those they work with subsequently. It is too early to establish this at present, but the intention is to **monitor usage of the professional conferencing system** after the trainees' graduation in 1999. In particular, the format of the post-graduation induction year laid down by the BPS will provide trainees with the opportunity to organise and extend their own professional development via online resources, including the conferencing system, and activity at this point will be examined with interest.

Conclusions

The project can be argued to have gone some way towards achieving its principal aims, and will be further developed next session. The conferencing system appears to be well on its way to attaining a distinctive function, although this is not in itself discursive in character at this point, and its value may therefore be to some extent task-specific. It has, however, fitted reasonably well into other activities, and the net effect overall has probably been to increase the amount and structure of productive exchange between trainees. Given the more negative experience of Group Two, though, it is likely that further explicit support and tying of conferencing to set tasks will be necessary before use of the system becomes self-sustaining, and the impressions caused by the false start are overcome.

It will also be necessary to ensure greater reliability of connections in future. In this respect, the experience has flagged up a number of practical problems which should be borne in mind by others interested in implementing CMC under similar conditions. There are three key points here. First of all, it is crucial to secure the reliability of the system across all points of use *at the outset*. This may have resource implications, since, for example, the ability to provide a modem or a lap-top computer may be an important means of contributing substantially to reliability. Secondly, there is a need to establish early on the optimum operating parameters of the system, including what format to use for attachments, especially where there are different hardware and software platforms being used within the same network (RTF files were eventually found to be the most portable in the present case). Thirdly, there is a need to provide

training and hands-on experience, including training in the more advanced functions, at all locations which will be used (e.g. in the present case, in the practice bases, not just in the university), since what works one way in one location may work differently in another.

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