

## Chapter 5

### Computer-mediated communication

***“Societies have always been shaped more by the nature of the media by which men communicate than by the content of the communication.”***

Marshall McLuhan and Quentin Fiore,  
The Medium is the Message, Random House (1967)

## 5.1

## Introduction

Chapter 5 and Chapter 6 are grouped together in the road map of this thesis (Figure 1.1 in Chapter 1) as they focus on organisations and technology. The technology is computer-mediated communication (CMC) and, in particular e-mail. The organisational unit is the dispersed collaborative team or virtual team. The aim of the two chapters is to explore how e-mail is used in these teams and whether this can be improved.

In this chapter an investigation into the way in which computer-mediated communication (CMC) is used is undertaken and some suggestions are made regarding general ways in which we can improve its usefulness. The discussion begins by looking at various theories concerning the effectiveness of e-mail as a medium for discourse, that is, whether e-mail can be used in cases where people with different frames of reference and different opinions need to reach a common understanding. These theories suggest that the effectiveness with which e-mail messages convey equivocal information is not solely dependent on the medium but can be improved as the users of e-mail learn ways of compensating for the intrinsic leanness of the medium. Thereafter, some basic guidelines, collected from a variety of sources, are presented. This is followed by a study of various research findings concerning the use of computer-mediated communication in collaborative work in tertiary education.

## 5.2

## Information richness

### 5.2.1 The Medium

Information Richness Theory (IRT) was devised by Daft and Lengel [1986] and proposed that the medium used to communicate a message solely determines the level of communication. Hence, despite its name, it refers to the medium and not the richness of the information. According to IRT, media can be ranked according to their ability to carry information and hence change understanding within a time interval. Face-to-face meetings are considered richest, that is, they will be able to change the understanding of a participant in the conversation most quickly, most particularly when the topic of conversation is equivocal or the participants do not have the same frame of reference. Telephone, personal documents (such as memos or letters which are

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addressed to a specific person or small group), impersonal written documents (whose target audience is unspecified), and numeric documents are considered to be increasingly less rich media. This has the interesting implication that academic writings, which presumably carry complex messages, are published in the second leanest medium. The justification could be that the arguments included are stated explicitly and unambiguously and the readers share a frame of reference. However, the theory was intended to advise business organisations as to the medium that should be used to communicate information and further research has concentrated largely on the choice of communications media by managers, so possibly academic publications fall outside the scope of the theory.

The four characteristics which influence a medium's richness are: how quickly feedback is provided; the number of additional cues it holds, such as tone and body language; the type of language it allows (basically this falls into two categories, spoken or written); and how personal the medium is (this tends to depend on how many people the medium addresses and the symbolic use of language, although this is not actually recognised by the original IRT).

This theory was initially considered to be prescriptive [Markus, 1994] in that it was intended to advise communicators as to which medium they should use for a given purpose. The theory stated that the more closely the medium matches the information processing requirement, the more efficient the organisation will be. This is consistent with contingency theory which says that the degree of fit between any form of technology and the task for which it is used will determine how effective and how efficient the technology will prove to be [Martinsons & Chong, 1999; Lewis, 1998]. Thus, the communicator should analyse how ambiguous the message is and then use the appropriate medium for communicating it. Subsequently, the theory was considered to be more descriptive than prescriptive and was used to explain why individuals and categories of workers choose to use a particular medium.

IRT quite specifically assumes that the individual alone, uninfluenced by social pressures, decides on the appropriate medium and does so using purely rational arguments. Hence IRT is an individual-level, rational choice theory [Markus, 1994]. In addition, the characteristics of the medium were supposed to be the only factors determining the richness of the message that could be communicated. The theory has been extended with time as researchers recognised that situational factors also play a role, such as, whether the recipient of the message was nearby, the number of people to whom the message should be sent, the current form of the message (is it already in print or electronic form) and time factors (urgency and whether the group can feasibly be assembled at the same time). These situational factors are, however, still rational.

The original theory of information richness has lost credibility, as a number of researchers have reported that the medium does not appear to be the sole factor determining how well a message

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is communicated. The work done by several of these researchers and their contributions to communications richness theory is described in the sections which follow. Webster and Travino, [1995] believe that there is no reason why IRT cannot be extended to include social influences and that the original factors concerning the medium itself remain valid. Markus [1994], on the other hand, differentiates clearly between individual-level theories, such as IRT, and social theories.

## 5.2.2 The correspondents

In contrast with the previous section, this section considers the role that the recipient of the message plays in determining what kind of information a message carries, rather than how appropriate the medium is for communicating messages. This point of view is, therefore, significantly different from the original IRT.

### 5.2.2.1 The hermeneutic, interpretive approach

The hermeneutic, interpretive approach to information (or communication) richness stresses the fact that the researcher must be aware that he is interpreting human subjects in the study and that the subjects themselves are interpreting themselves and the world around them. Hence, there is a double hermeneutic. Lee [1994] cites Ricoeur [1981] and Boland [1991] in his discussion of hermeneutics. He associates the concepts of *distanciation*, *autonomization*, *appropriation*, and *enactment* with the use of e-mail. He says that a message is separated in time and distance from its author (distanciation). This is certainly true of e-mail once it is sent. The message then becomes an independent object (Autonomization). In Chapter 3 we refer to this as Information<sup>2</sup>. This is also easy to relate to the e-mail message as an electronic file being transmitted over a network. During this phase changes resulting only from the technology can occur, such as loss of body language cues and the signal being distorted by noise. Appropriation is very similar to Inrona's [1992] use of the word. Enactment is the next phase where the actor acts either alone or with others in response to the appropriated meaning of the message.

The argument put forward by Lee [1994] stresses several things. Firstly, the recipient of the message is an active participant in the process, as he gives a meaning to the message that is not identical to that of the originator or of anyone else who receives it. A message which is stated in an ambiguous way and communicated via a lean medium can nevertheless result in a rich interpretation, as the person interpreting it will contribute richness to it by associating other information and knowledge with it. Secondly, the interpretation of the message is not purely subjective. It is also shaped by the shared meanings of the organisation or society. Thirdly, the message emerges as part of a process and over time.

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Relating this school of hermeneutic thought to the definitions of information provided in Chapter 3: during distancing Information<sup>1</sup> or Information<sup>2</sup> is produced either by a computerised information system or by a person. During autonomization the message could be considered to be data as it is unrelated to a person and is meaningless. During appropriation the information becomes Information<sup>3</sup>.

### 5.2.2.2 The Critical Social Theory perspective

Ngwenyama and Lee [1997] add to the concept of communication richness by applying a Critical Social Theory perspective. The communication process is analysed in terms of Habermas' communicative actions. The very relevant point is made that communication richness depends not only on achieving mutual understanding (that is, the recipient of the message reconstructing the meaning intended by the sender), but that the recipient also critically judges the message to extract meaning. Hence, in the case of a message which is *instrumental*, the recipient will instinctively consider whether the order is valid by deciding whether the person giving the order is entitled, in the given social context, to do so. The message would also only be valid if the recipient thought that the originator could effectively and efficiently enforce the order. In the case of a *communicative message*, where the intention is that the participants mutually agree on future action, the message is valid if it is clear, complete and truthful and it may be necessary for it to be appropriate in the context. Where the two people communicating do not agree but are debating an issue (*discursive action*), the recipient of a message would evaluate it in terms of how clear and appropriate (relevant) the argument is. The recipient would also in many cases consider whether the argument is logical (truthful) and whether the opponent really believed (was sincere) what he was saying. Finally, a message sent as part of a *strategic action* would be judged by the recipient according to appropriateness and possibly sincerity, efficiency and effectiveness.

Hence, this further aspect of communication richness is concerned with the additional processing that the recipient of the message carries out beyond simply understanding what the sender of the message intended. This process does not depend very much on the channel of communication. By creating a personal opinion about what has been communicated and rejecting, if necessary, messages that are judged to be invalid, the recipient is an intelligent actor who is empowered to direct his own interpretation of the world. This is, therefore, an emancipatory view.

The fact that there is more assumed equality in status between correspondents on e-mail, since social context cues are not generally provided, means that there is greater inclination to question viewpoints [Tolmie & Boyle, 2000; Warf et al, 1999]. E-mail, therefore, encourages critical thinking. The process of critical thinking is recognised to be an essential part of learning and hence, e-mail can be seen to be particularly suited to learning and collaboration. Disagreements that occur will promote growth in understanding but these disagreements must be limited

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(moderate) and occur within a shared broad framework of socially constructed reality [Tolmie & Boyle, 2000].

### **5.2.3 Social influences**

The original IRT was entirely positivist and hence is associated with an objective view of the world, as it ascribed the intelligibility of a message entirely to the communication medium. The interpretivist approach used by Lee [1994] in part emphasises the role of the individual recipient and tends towards a subjective world view. Critical theory as it was used by Ngwenyama and Lee [1997] focusses on the emerging understanding of the individual and might also be seen as subjective. There is, however, a considerable body of work which is intersubjective in approach and looks at how the organisation influences the choice and effectiveness of use of a medium.

Lee [1994], despite the fact that he uses a hermeneutic interpretation in his analysis, also pays considerable attention to the concepts of the social construction of reality. These refer to the context within which a text is interpreted but the social structure, existing terminology and shared meanings that exist in the organisation are seen as having an existence or presence that is independent of the individuals who have contributed to their creation. There is a strong resonance between the idea of the social construction of reality and that of a social structure as defined in Giddens' Structuration Theory, as an instance of social reality is created by and altered by the actors and in turn shapes their understanding [Orlikowski & Robey, 1991]. The reality which is socially constructed is abstract but is nevertheless independent of any one person and is therefore, not subjective. It is persistent and hence real in a significant way. As a result of the ongoing process of interaction between actors and structures, a particular socially constructed reality can change. Any organisation is an example of a socially constructed reality. The organisation is not made up simply of buildings, employees, procedures or a bank account but of all of these. It will continue to exist even if quite drastic changes are made. Examples of other socially constructed reality are constitutions and bodies of knowledge such as Euclidean Geometry.

Different studies look at different aspects of the influence of society on the choice of communications medium. These will be considered separately in the subsections that follow.

#### **5.2.3.1 Organisation's policy**

The environments and organisations in which people work and socialise have an immense influence on the way in which they use technology [DeSanctis & Poole, 1994; Orlikowski, 1992; Orlikowski & Gash, 1994; Sole & Applegate, 2000]. The research of Markus [1994] investigates how a policy adopted by an organisation can ensure that a supposedly lean medium can be used

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effectively to communicate rich information. Socialisation is the deliberate introduction and enforcement of policies by means of formal procedures and the social control of deviants. Such a policy would be introduced because one or more key members of the organisation has made this choice [Okamura et al, 1995]. “*One might also expect social definitions and technology usage practices to converge with the technology’s material characteristics over time, ...*” [Markus, 1994] as these choices are based on the experience of the key member and this will tend to become more rational as that experience increases and other people influence it. The policies will differ between organisations as they are not necessarily simply rational choices. The externally imposed use of a medium means that there has been a conscious choice of a tool and there will be a conscious process during which the individuals will discover effective methods for using it and will deliberately teach others how to use it effectively. This results in socially defined behaviour, rather than objective choice or individuals being allowed to make a subjective choice.

In the case where an organisation’s policy stipulates that e-mail is to be used to the maximum extent there is evidence of learned behaviour, which compensates for the inherent limitations of the medium. The loss of conversational coherence as a result of time delays can be compensated for by allowing incoming e-mail to take priority over face-to-face meetings. Hence, participants may interrupt meetings to read and reply to e-mail and a response time that approaches that of real time conversations will be achieved. The use of mosaic messages, where previous e-mails are included with the most recent reply, will also compensate for a loss of conversational coherence.

The justification for such a policy is that the reasons for using the medium are not as obvious as is assumed by IRT. The finding that “... *managers’ high levels of email use did not match their low perceptions of email’s richness*” [Markus, 1994] indicates that advantages are not always recognised consciously.

Advantages tend to be formally acknowledged only after users have learned to use the medium effectively. Examples of rational advantages which IRT does not acknowledge are:

- Flexibility regarding time. In the case of urgent problems e-mail can be used after hours, from home;
- More efficient uses of time as telephone calls tend to be longer and less structured than e-mail and not to be self documenting;
- E-mail can allow tasks to be completed and hence closure can be reached even when the co-worker cannot be reached by telephone; Similarly, in a teaching environment, being able to ask a question when it arises is useful [Leidner & Jarvenpaa, 1995].
- If necessary, e-mail can precede a telephone conversation and be used to provide all the basic information. Final agreements are confirmed and ratified during a brief telephone

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call. Presumably this indicates a trust issue where the more personalised medium is used to confirm commitment.

The need for more personalised media to build trust is reflected in the perception that telephones should be used for relationship building or bonding rather than for debating. Thus, the type of information used in a work environment that e-mail can handle effectively, is seen to be different from the type of rich information which needs personal communication. This second form of information more often needs to be communicated in real time and as audio. This highlights the difference between different types of rich information along the lines differentiating between Information<sup>1</sup>, Information<sup>2</sup>, Information<sup>3</sup> and Information<sup>4</sup>.

### 5.2.3.2 Emergent information richness

Although the hermeneutic interpretation by Lee [1994] was included as a discussion of the role of the individual in determining how rich a message is, Lee really sees richness as an emergent property of the interaction between the recipient, the communication medium and its organisational context.

*“Instead, the best medium or an appropriate medium for a particular communication transaction would also depend on, if not the manager’s familiarity and existing skills with the different media, then the manager’s willingness, opportunities, resources, and support for learning the capabilities of the medium, exploring the possibilities that it opens up, innovating uses for it, and otherwise interacting with it.” [Lee, 1994]*

The medium will become more and more useful and suitable over time as the users find ways of adapting it or altering their own way of using it [Lee, 1994].

Hence, the choice of medium and the perceptions as to whether a particular medium is rich or lean, is not a static, rational choice but tends to evolve over time depending on the context. It does not depend solely on the individual but is situated in an organisation.

If managers encourage the use of a particular medium, or if early adopters are considered to be leaders worth following, or if those who do not use the medium get the impression that they will be missing out on important information and may become marginalised, that medium is likely to be adopted. In fact, social factors are relevant to the adoption of any technology. Social influences may be more important in new media than for more entrenched media. The study by Webster and Travino [1995] found evidence of this for all media. These two authors believe that theories concerning choice of media should not generalise about a whole group, such as managers, but

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determine where it is most productively used, that is, investigate use for specific tasks. When new media are used, choices are made more consciously. In time, habit plays a greater role.

### 5.2.3.3 Channel expansion theory

Channel expansion theory [Zmud & Carlson, 1999] suggests that the way in which a particular communications medium is used will be determined by experiential factors such as the extent to which this person has used the medium effectively in the past, his knowledge of the topic or task that he will be discussing, the strength of the relationship between the people who will be involved and the knowledge of the working environment. A simple measure of the number of messages sent, or time during which the medium was used in an organisation, is not sufficient to determine the extent of experience using the medium. The quality of the knowledge is important. Hence, the theory states that people can learn to use e-mail to communicate rich information but it is essential that experience is gained that extends rather than repeats previous experience.

The two factors, which have the most influence on how rich a channel is perceived to be, are channel experience (experience using the technology) and communications partner experience (how well the correspondents know each other). Over time, channel experience ceases to be relevant as the other factors become more important. In contrast, the importance of the relationship with co-workers increases with time. The effect of insight into the topic being discussed is difficult to determine as a more knowledgeable person will discuss the topic in more depth and hence require more complex information to be exchanged and place greater demands on the medium, than a novice whose discussion is quite superficial. It can also be argued that less knowledge causes greater vagueness and uncertainty and hence makes successful use of the medium less likely. These issues remain unresolved but cannot be isolated from the skill of the communicator in making his knowledge explicit and the community of practice in which the communication is taking place. In the case where a frame of reference is shared the argument can be more complex than in one where the participants use different terminology and have different terms of reference.

Social influence is likely to be greatest where the organisation's staff have most and closest contact with one another and the least other outside or competing social influence. Social influence may increase as relationships become established and trust grows. Therefore, the duration of the relationship is important.

*“Effectively communicating through computer-mediated channels may be a unique skill that takes more than simply time to develop. Inexperienced e-mail users will generally not be able to immediately engage in rich communication over the channel;” [Zmud & Carlson, 1999]*

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Tolmie and Boyle [2000] concur with channel expansion theory. They include in their factors contributing to successful CMC the knowledge of other participants, experience communicating under the task conditions involved (this corresponds largely with experience of the organisation), and prior experience of CMC. These two authors explain the experience with the task in terms of ownership of the task (influence in determining what the task will involve) and clarity about the task.

#### **5.2.4 Symbolic factors**

Up to this point, we have discussed the more explicit content of the message and the way in which it is understood. The motive of the person wanting to communicate also plays a role in the choice of medium and how the message is interpreted. The choice of e-mail as a communication channel is often linked to the psychological advantages it is perceived to allow, or to the symbolic message implied by its use. Use of e-mail may be perceived to indicate informality rather than formality, convey authority and legitimacy, urgency or personal concern. It may be intended to encourage team building. These subliminal messages add significantly to the richness of the message in much the same way as body language does and in a sense compensate for the loss of these nonverbal cues. Thus, there are social effects of e-mail, where e-mail affects the society in which it is used (in contrast to the social effects of society influencing the use of e-mail, as discussed in Section 5.2.3).

#### **5.2.5 Discussion**

Communication richness has been extended to include not only its ability “...to change understanding within a time interval...” [Daft & Lengel, 1986] but also to be the way the message is interpreted and possibly enhanced by the inclusion of the lifeworld of and critical evaluation by the recipient. There is evidence that this communication richness can be retained even when a message is transmitted via a supposedly lean medium such as e-mail [Ngwenyama & Lee, 1997; Lee, 1994; Markus, 1994] and that people do not choose a medium solely for rational reasons [Webster & Travino, 1995].

Information Richness Theory has been extended further to recognise the following factors:

- The physical characteristics of the medium determine what kinds of information it can carry. People recognise this fact and rationally decide which medium to use.
- People interpret information using their own existing knowledge in the process. Hence, lean information can become much more meaningful despite the medium.
- People judge the information or critically evaluate it. They do not take it at face value. Once again this increases its meaningfulness.

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- Reality is socially constructed. It has some meaning independent of the individual and hence meaning can be shared.
  - Social influences, in particular company policies, can require the use of e-mail and as a result employees will learn ways of compensating for the leanness of the medium.
  - Combinations of media may be used (multiple channels).
  - A combination of the depth of experience a user has with the medium, the topic being discussed, the co-workers and the organisation will also affect the way in which he uses the medium.

There is a fair amount of consensus in more recent studies that a number of factors influence people in deciding what medium to use in order to communicate equivocal information. Issues that affect the adoption of a computer-mediated communication medium in any organisation are now generally considered to include the material characteristics of the medium, situational issues, symbolic meaning that the participants believe the medium portrays and social factors. Other situational issues are concerned with convenience rather than meaning and some symbolic issues are more strategic, in that they are more interested in having information accepted than allowing genuine discourse. The social factors can be an imposed policy or more subtle factors where the norms of key figures in the organisation are imitated by new employees [Romm & Pliskin, 1999: 285]. These are not entirely independent of one another, as an organisation's policy, resulting in social pressure to use the medium, might be founded on rational or symbolic arguments. The depersonalisation of e-mail affects social behaviour. Issues of social behaviour are not so much concerned with trying to make the best use of the medium but studying involuntary responses to the nature of the medium. The way that we can compensate for these changes in social norms, in order to make better use of the medium, makes this relevant to the discussion on communication richness.

Recent research generally indicates that the leanness of the medium can be overcome by learning appropriate compensating behaviours and techniques.

*“The effectiveness of knowledge sharing seems to depend less on the features or characteristics of the particular technology medium chosen, and more substantially on the extent to which sharing practices, exercised through particular technology use, are well-established and represent habitual action within the team.” [Sole & Applegate, 2000]*

Zmud and Carlson [1999] note that it is not sufficient to learn only about the features of the software or even communication techniques. Other factors such as the relationship or bond between correspondents, the knowledge of, and interest in the task and a shared knowledge of the organisation are important determinants of successful communication.

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It would be a mistake to assume that members of new virtual teams expect to do much more than co-ordinate activities and exchange documents via e-mail, or that they would immediately be able to work together successfully in the sense of constructing knowledge by means of CMC. However, the body of literature discussed here does indicate that it is possible to change these perceptions and to actually teach people how to use e-mail, either on its own or in conjunction with other media, to reach a common understanding of complex or sensitive issues. Leidner and Jarvenpaa [1995] report that e-mail is preferred to face-to-face communication once a work group has become familiar with it as a means of communicating. The literature discussed up to this point does not explain exactly how to go about doing this other than to advise that policies, particularly concerning issues, such as privacy, should be published. Swigger et al [1997] specifically have developed special software interfaces designed to teach cooperative problem solving skills to students located in different geographical areas but collaborating synchronously. Beyond this, it seems to be a matter of teaching by example. In the section that follows some quite simple guidelines are provided.

### 5.3

### E-mail

The loss of the social context cues present in face-to-face conversation results in depersonalisation. The speaker does not entirely recognise that a person is being addressed, as the immediate nonverbal reaction is not visible. A result that is reported frequently is uncharacteristic aggression. This may involve “flaming” (deliberate rudeness) or simply insensitivity [Chester & Gwynne, 1998]. The lack of “micro-feedback loop providing social constraints” may make this more likely and intensify it by allowing it to go on longer [Ishaya & Macaulay, 1999].

On the other hand, this depersonalisation can make it easier for people to reveal personal details about themselves, as there is a low cost, both financial and psychological, in self-disclosure via e-mail. This openness could result in a feeling of personal intimacy and quicker bonding. Introverted people might, therefore, participate to a greater extent in e-mail conversation than they would in a face-to-face situation [Tolmie & Boyle, 2000; Lind, 1996]. (Extroverts are still more likely to participate in online discussions than introverts, but introverts participate more than they would, for example, in a classroom [Hara et al, 2000; Chester & Gwynne, 1998].) All participants find it relatively easy to introduce themselves in an e-mail group [Hammond, 2000]. As a result people believe that they can get to know each other through the medium [Hiltz & Wellman, 1997]. This has significant implications regarding building trust and hence the viability of virtual teams. The introduction of e-mail may create an illusion of a smaller and more friendly environment, as it reduces people’s feelings of being isolated or excluded [Romm & Pliskin, 1999]. This point of view is, however, not consistently accepted. Tolmie and Boyle [2000] refer to a number of reports

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recommending that groups meet in person in order to get to know each other before embarking on online interaction.

The research of Pratt and his coworkers [1999] is particularly relevant to virtual teams (which are discussed in Chapter 6) as it looks at how personal relationships can be formed using e-mail. The authors indicate that individuals who use a new communication medium can develop new social strategies and techniques, which will compensate for the limitations that the medium itself may have. An example of such compensatory behaviours is being more explicit and hence reducing the need for additional information. They expected that, in order to build up relationships, there would be a tendency to ask many questions early in the e-mail exchange in order to compensate for the loss of information which would otherwise be obtained via nonverbal cues. However, the research does not provide evidence of this, "... [I]t appears that people ask roughly the same kinds of questions in the same kinds of distributions whether the context is CMC or FtF" [Pratt et al, 1999] but not necessarily the same number, at the same times, or in quite the same way. The lack of nonverbal cues and resulting depersonalisation means that inhibitions, which prevent us from asking new acquaintances personal questions, fall away.

New behaviours can be observed which differ from the social norms of face-to-face communication. These are not necessarily adopted in order to compensate for the medium but may be feasible or attractive because of the nature of the medium. For example, it is normal to immediately answer a question posed during a face-to-face conversation. In an exchange of e-mail some questions might not be answered. This is probably because physical presence demands attention and a response but absence results in a loss of that influence [Piccoli & Ives, 2000]. Hence e-mail respondents tend to focus on their own concerns and neglect those of the other participants. It may be that the delay between reading the question and answering it, and the fact that several questions may be asked together, permits (gives a plausible excuse for, rather than this being cause and effect) it to be forgotten. A new medium allows new norms to be invented and adopted as people are unsure what the norms are and do not have established well-entrenched habits. New norms result from observation and imitation of the way others behave.

The distance in time and space also has advantages. It is useful to be able to complete your argument without interruption. In situations with a high risk of conflict, being able to take care how you phrase or state your point is valuable. Hence, impression management is an important advantage of e-mail. An associated advantage in writing e-mail is having the opportunity to construct an argument or rebut a previous point after careful thought. Having the opportunity to read the other point-of-view carefully and repeatedly, link different points and generally consider the argument, is beneficial when a complex or controversial e-mail message has been received [Hammond, 2000; Hara et al, 2000; Tolmie & Boyle, 2000; Benbunan-Fich & Hiltz, 1999; Lewis, 1998]. This can be done while constructing an argument but the discussion can also be reviewed

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and consciously be analysed providing an opportunity for reflexivity. Thus, having the opportunity to reflect on e-mail is an important feature which enhanced it as a potentially rich medium. Seale and Cann [2000] say that, "*There is a growing acceptance that a reflective dialogue could be supported using computer mediated communication.*" Communicating via e-mail can reduce conflict as the distance in time and space permits "cooling off" and e-mail might be deliberately chosen as the medium for communication specifically in order to address highly inflammatory issues in an impersonalised way [Leidner & Jarvenpaa, 1995].

Hammond [2000] points out that each of these advantages can be linked to a disadvantage. The negative factor corresponding to not being interrupted is receiving no immediate feedback, and as noted earlier, you may never get feedback. The permanent nature of e-mail allows you to reread and reflect on messages (both those received and prior to sending a message) but also makes it impossible to retract or explain away a message that has been sent before harm is done. The ability to edit a message is balanced by the time, discipline and skill required to write rather than speak. Anyone who finds it difficult to express himself in writing would be at a serious disadvantage [Chester & Gwynne, 1998].

The loss of cues indicating status and the fact that the reaction of the person being addressed is not seen results in both boldness ("dis-inhibition") and a democratisation process (perceived equalising of status). In other words, it alters the balance of power in relationships [Warf et al, 1999; Hiltz & Wellman, 1997]. This can be emancipating but can also cause offence to people who expect to be treated with greater respect. In collaborative work it can have the effect that team members are more likely to contribute equally and domination by one member is less likely. The fact that there is proof in the form of a permanent record as to who did contribute can increase accountability and have the resulting improvement in reliability and responsibility.

Pratt et al [1999] refer to an experimental study by Walther and Burgoon [1992] which demonstrated that the relational qualities of an e-mail group can be expected to develop to be much like those of a face-to-face group but it takes longer for these to become established. This holds important connotations for virtual teams as the "depersonalising effects" of e-mail may only really be relevant initially.

### **5.3.1 Power structure**

A number of studies [Romm & Pliskin, 1999; 1997a; 1997b] indicate how e-mail can be used as a political tool in organisations. This is due to the wide reach of the medium, its easy access and the bravado ("dis-inhibition") that results from the depersonalising aspects. In the case of conflict between an individual or a group and management, the ability to state one's case to a wide audience in an organisation, without management being able to control or censor the message, is

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enormously empowering to less senior members of staff. This can mean that wide publicity and potentially wide support can be obtained very quickly in conflicts between individuals, individuals and management or conflicting groups. This can be interpreted as extremely damaging to the organisation or alternatively to the ability of management to control the organisation. Similarly, levels of management can simply be bypassed if members of staff can communicate directly with more senior management.

*“E-mail enables people who are at the periphery of organizations to become more visible and facilitates communication between people at the bottom of the organizational hierarchy and those at the top.” [Romm & Pliskin, 1999]*

On the other hand, management can use the tool equally effectively to respond rapidly to information that is published unexpectedly and to give balancing versions of reports.

Management have, at least in theory, ultimate control over access to the e-mail system. They can set up policies and enforce them [Romm & Pliskin, 1999: 283]. These can include the right to read all e-mail, limit access and refuse to allow social e-mail. They can penalise use of e-mail that they consider inappropriate. Weisband and Reinig [1995] concentrate on practical advice, particularly concerning legal issues associated with e-mail privacy. These authors stress the need to educate employees about these matters by implementing a formal and visibly enforced company policy. This point of view is supported by various other authors [Ruggeri Stevens & McElhill, 2000]. Attention can be drawn to the existence of a policy by using intrusive interface design. A company's privacy policy reflects the culture and the level of trust within that organisation.

E-mail can be used in other ways to manipulate co-workers (by sending copies of e-mails to third parties either openly or as blind copies), or as ways of safeguarding yourself (by using e-mail to get evidence of instructions given) [Ruggeri Stevens & McElhill, 2000].

### **5.3.2 E-mail etiquette**

E-mail has rapidly become the way in which busy people communicate [Berghel, 1997]. It has the advantage of being unintrusive (unlike a telephone) and avoids telephone tag, the problem of not reaching the required person by telephone, leaving a message and then not being in when the required person returns the call. A whole body of conventions, called e-mail etiquette, or netiquet, has evolved regarding the polite and appropriate use of e-mail [O'Blenes, 1999; Journal of Accountancy, 1998; McCune, 1997]. A collection of these is given in Table 5.1. The fact that it is seen to be necessary to develop such a list and deliberately bring it to the attention of new users, says something about the medium. Its advantages of ease of use and immediacy can result in impulsive, ill-considered, messages being fired-off in the heat of the moment. The lack of a

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present recipient removes the normal inhibiting factors usually present in face-to-face conversation. That is, in conversation on the telephone, or face-to-face conversations, a reaction to the message can be detected by interpreting facial expression, other body language, or audio clues. The simple presence of the other person serves as a reminder that this is a real person, with discernable status, to whom the existing social norms apply. Without this presence e-mail messages can be sent that are grossly insensitive [Sipior & Ward, 1999; Romm & Pliskin, 1999; Hiltz & Wellman, 1997]. A bitter exchange of five remarks by each of two protagonists takes only a few minutes if they are in each others presence. The fact that the same words exchanged via e-mail may continue over days entrenches the ill feeling. They can be read, reread and be used as evidence. Hence, although we associate e-mail with face-to-face and telephone conversation because it can be spontaneous, it is in some respects very different and far more problematic [Berghel, 1997]. The idea persists that e-mails are personal and temporary, ephemeral, or volatile, as once they are sent they seem to disappear. In fact they are recorded as electronic data which can be read by unintended people and can remain on record for a period which cannot be controlled by the sender. This perception of privacy needs to be actively countered. An e-mail message should be compared to a postcard rather than a letter. The right of other people to use e-mails as evidence in court cases has become entrenched in law. Even once the e-mail message has been deleted, it may still exist on a server or in an archive or be retrieved in some way.

Other issues, such as information overload and wasting the time of others with unsolicited mail and the even more antisocial phenomenon of viruses spread via e-mail [Schneier, 1999], result from the wide reach of the medium.

Some learned, protective, behaviour can be adopted and may be specifically taught [Skyrme, 1998]. For example, people providing services, such as lecturers and public figures, have learned to respond deliberately in a lean (impersonal and short) way to potentially explosive e-mail in order to avoid arguments. In fact the medium is very useful in this context, as the equivalent personal confrontation or telephone call is difficult to handle and end. This is an example of strategic communicative action. Whether the outcome is satisfactory to all parties is a separate issue. Unfortunately e-mail wars are still too easy to start and too difficult to end and e-mail abuses, including sexual harassment, are very common and can result in costly legal action [Sipior & Ward, 1999; Berghel, 1997]. Activating a spelling checker, which will always ask for confirmation as to whether the message must now be sent, goes some way towards changing the e-mail procedure from ready-at-hand to present-at-hand and giving the sender the opportunity to review and reconsider the message. Sipior and Ward [1999] report that some organisations have reminders that are displayed when staff log on to remind them of company policy regarding e-mail.

News groups and list serves are similar to e-mail, except that the messages are sent to a group whose composition was not controlled by the person sending the e-mail. These Internet-based groups are usually devoted to discussions on clearly defined topics of interest. It is interesting to note that in the wake of the destruction of the twin towers of the World Trade Centre and the Pentagon on 11 September, 2001, many such groups were involved in quite heated discussions concerning this act of terrorism. The “managers” of ITForum, ISWorld, and even the Quest user group, had eventually to intervene. ISWorld closed down for a short, cooling-off period.

Many other examples of the use of e-mail for sending messages that are controversial, have serious repercussions legally, are about interpersonal relationships or that are very personal, exist. This is evidence that the users of a particular medium are not particularly aware of, or possibly not in agreement with, research findings concerning whether a particular medium is suited for the message they want to broadcast. Issues such as the extent of the reach of the medium, how easy it is to use, its immediacy, its low cost, its anonymity and the lack of external control or censorship (authorisation is not required), make it very attractive.

These social factors are potent but a lean medium is a hindrance in sending messages where subtlety and sensitivity are preferable [McCune, 1997]. Therefore, it is necessary to develop new conventions which allow the most convenient medium to be used most effectively. Corporate policies can be drawn up but they need to be widely, and repeatedly, communicated [Sipior & Ward, 1999; Weisband & Reinig, 1995]. An example of a reasonably complete company policy document is provided by Parker [1999].

### 5.3.3 Guidelines for use of e-mail

**Table 5.1: Guidelines for use of e-mail**

1	Symbolic
1	Do not type in capital letters. This is an old convention but is still considered to be “shouting”.
1	Typing errors are acceptable if you are sending an e-mail to a friend but not if it is to a superior or a member of the public.
1	Avoid “in crowd” acronyms and humour unless you are sure that your recipient will understand and appreciate them. This includes smiley faces (“emoticons”) and other emotive symbols.
2	Equivocality
2	Consider carefully whether you have stated your case clearly if the matter is complex or contentious.
2	In the case of sensitive matters consider carefully whether e-mail is an appropriate medium [McCune, 1997]. Often once a dispute has started via e-mail it can be ended more easily by a phone call or personal meeting.

3	Relationships
3	Think twice before pressing send, particularly if replying to a message that has angered you.
3	Be cautious. E-mails you have sent may get into the hands of unintended others [O'Blenes, 1999].
3	Read an e-mail that has angered you again a bit later, carefully. Maybe the insult was unintentional, maybe you have mis-read or mis-interpreted something when quickly reading it. Try to find out if the sender has misunderstood a previous e-mail. A cycle of misunderstanding can easily occur [Sipior & Ward, 1999].
3	Include a brief greeting (salutation) and appropriate end.
4	Do not forward spam no matter how close the cause is to your heart.
4	Access to information
5	Always enter a meaningful subject heading [Hara et al, 2000; Skyrme, 1998].
4	Be aware of privacy issues. You should not publish (forward) private e-mails from others unless you have their specific permission.
4	Attachments, and layers of e-mails included within other e-mails, can be relatively slow to get to. If there is a simple announcement retrieve it directly into the body of the main e-mail. Only long documents or big files, such as graphics, should be attached.
4	Ensure that you are sending the message to the intended person. Do not send messages intended for one person to a group. This wastes other peoples' time and can be extraordinarily embarrassing.
4	Do not send e-mail until you know that the person concerned actually does read their mail, or else check that it has been read. Assuming that an important message has been received is unwise.
5	Include alternative ways of contacting you, as a standard part of the e-mail, such as phone numbers, fax and physical address. This can include an indication as to who you are, which is useful to strangers.
5	Ensure that you are not casually making company confidential information available, be aware of intellectual property rights [O'Blenes, 1999].
5	Ways of compensating for intrinsic features of e-mail
5	Reply immediately (within 24 hours), even if only to say the matter is receiving attention.
5	Messages should be kept short and only one issue should be addressed in an e-mail, so that quick responses are facilitated and important points are not overlooked or ignored [Skyrme, 1998].
5	Have a regular office routine for reading your e-mail. The policy of being alerted by the mail system when incoming mail arrives is useful so that important matters can be handled at once.
5	The history of previous comments in an ongoing discussion can easily be included by selecting the appropriate e-mail option. This is useful in reminding people in a discussion what it is all about.
6	Social
6	Alert employees to e-mail policy concerning privacy.
6	Educate users regarding these guidelines.

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### 5.3.4 Discussion

Contentious issues concerning e-mail are whether it *can* be used effectively for sending equivocal information and hence whether it can be an effective medium of communication for teams of people who need to work together [Introna, 2001; 1998]. The original Information Richness Theory (IRT) differentiated between personal documents, such as letters or memos, impersonal written documents and numeric documents and stated that letters and memos held more rich information than impersonal documents (reports, fliers and bulletins) [Markus, 1994]. It seems strange that the content rather than the medium is used to differentiate between these cases. This implies that text (and hence this includes e-mail), **can** convey a broad spectrum of information types - a point of view which is borne out by general experience, as text can definitely arouse emotion, be used to argue (discursive information) and can be strategic (surely many contracts are examples of this, even though they are presented as being impersonal documents). IRT postulates that the bandwidth of the **medium** determines the richness of the information which is communicated and hence face-to-face conversation is richer than telephone which is in turn richer than text. The ability to communicate effectively, regardless of the medium, is learned. It is my contention that this is true of the effective use of e-mail. What needs to be taught is conventions, the need for careful composition of a message, and awareness of ethical issues such as privacy issues [O'Blenes, 1999; Weisband & Reinig, 1995].

E-mail is a special case of text, as it is more immediate (relayed more quickly) and hence some degree of spontaneity is preserved. It is generally informal and the text is unstructured. The use of e-mail by management and in education has been the focus of some research, most notably that of Markus [1994], Lee [1994], Ngwenyama and Lee [1997] and Jarvenpaa and fellow researchers [Jarvenpaa et al, 1998; Jarvenpaa & Shaw, 1998].

*“Even sophisticated users of groupware maintain that it is email that has totally revolutionized the way they work, is still the daily workhorse, and has stimulated a change of behaviour and culture.”* Skyrme [1998]

## 5.4 Telematic education

The use of the Internet, Intranet and specific software for web-based curriculum management has been adopted in education with quite amazing speed. In fact, the availability of the related technology seems to have brought about significant changes in educational policy, which will have far reaching didactic, financial and infrastructural consequences. Academic e-commerce, where services are advertised, ordered, paid for and delivered via the Internet, such as online student

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registration, is just another example of e-commerce. It follows the pattern of the new economic model in attempting to respond quickly to demand, be flexible, expand reach to new groups of customers and improve efficiency. The implications regarding competitive advantage are, therefore, judged to be important [Hosie & Mazzarol, 1999; Leidner & Jarvenpaa, 1995]. However, there is also the possibility that distance education can make use of the Internet for teaching and learning. The delivery of tutorial material can be achieved relatively cheaply and it is hoped that more students will be attracted as they will be able to study at times which they find convenient. There does seem to be a danger, however, that the real potential of telematics as an educational tool might be overlooked as a result of superficial application. Lessons learned from research in other fields, in particular information systems adoption theory, are not often applied in research into educational technology [Jost & Schneberger, 1994] although the “... *increasing overlap among educational institutions’ and business organizations’ approaches to organizational improvement is widely acknowledged*” [Alstete, 2001]. There are lessons that can be learned from Knowledge Management as well [Rowley, 2000]. In fact web-based curriculum management systems such as WebCT can be considered to be a form of Knowledge Management tool.

Often a new educational policy concerning the inclusion of a telematic or web-based component into the existing teaching model is stated simply as requiring that the number of contact lectures presented by a particular department should be reduced and the Internet should be used in some way or other. The actual strategy and **how** this type of tuition and learning will be used may be left up to the academic department or the individual lecturers. This is in accordance with the culture of education that Jost and Schneberger [1994] classify as professional bureaucracies, where the role of management is small and is confined to providing resources, resolving conflicts and liaising with the external environment. Thus, “... *a successful decision to adopt an innovation will not be made by the administration alone, it will be made and carried out by individual professional educators*” [Jost & Schneberger, 1994: 226]. Hopefully, when making these decisions the lecturers will be guided not only by considerations as to whether it will be more work, less work, or advantageous to their academic reputations, but also whether there is evidence that indicates that there will be useful academic outcomes. There are in fact a number of different ways of using the Internet in teaching. An excellent article discussing every possible use of technology in teaching is the one by Leidner and Jarvenpaa [1995]. Which of these teaching strategies is used, and where, depends on the course content, the learners, as well as on the model of learning embedded in the instructional method favoured by the lecturer who is responsible for the course.

Although it is possible to have virtual courses where all learning is done entirely through distance-learning, such as the Masters in Electrical engineering offered by Stanford University, the courses offered by the coalition of universities making up the Western Governors’ University and the 1600 courses were offered by 95 schools together making up the California Virtual University [Beller & Or, 1998] prior to its demise in 1999 [Downes, 1999], it has been suggested that the ideal is to

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use a mixed mode of teaching and learning, telematic enhanced learning, where students do some studying via telematics and also have some contact sessions. This is an appealing option but one that will also require careful thought. This model would make it necessary to keep all the students synchronised regarding progress in their studies which defeats the purpose of self study to some extent. A crucial element is the format and content of discussions during contact sessions. Lecturers and students need guidance and experience in effective discussion group strategies.

It is difficult to achieve a realistic level of enthusiasm in discussing telematic or technology enhanced learning. The enthusiasts tend to come across as naive optimists and those who are cautious are easily labelled as foot dragging, security hugging conservatives. The stakes are high. Careful planning and analysis are essential at all levels and the maximum amount of technical and administrative support, training, discussion and ongoing monitoring must be provided.

#### **5.4.1 Web-based Management tools**

The decision by the management of a university to use telematic teaching is often accompanied by the adoption of a web-based curriculum management tool. Examples are WebCT, FirstClass, Blackboard, NovaNet and others. This type of tool is intended to make it very easy for the lecturer to present the course material on a web site, link associated material, create attractive layouts and highlight important material. It also makes it easy for the student to access and use the material.

An important additional function of such tools is that they allow the academic activity and progress of individual students to be monitored, as well as the effectiveness of the study material. Thus, it provides a mechanism for Informating up by providing more information to the lecturer concerning the student [Leidner & Jarvenpaa, 1995]. This data can be derived from on-line quizzes which the student is required to do, producing marks that are automatically recorded. These are not only useful for monitoring the performance of the student, but also the effectiveness of both the study material and the testing procedure, as the data can be analysed to identify concepts that are frequently misunderstood and questions that are ambiguous [Partow-Navid & Slusky, 1999]. It can maintain a simple count as to how many times a specific student has visited the site or how many messages the student has submitted to a discussion group. (Unfortunately there is evidence that in those cases where marks are awarded for visiting a site or sending messages, students very quickly discover that no actually meaningful academic participation is required and they log numerous entries which represent minimal activity.) Not only is this type of monitoring intended to provide the lecturer with information concerning the student's progress but it can, if used properly, give the student fast feedback from the quizzes and a convenient and complete, picture of what he has worked on. The software is usually also intended to be used as a communication channel

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between the lecturer and students and between students and, to a lesser extent, between administration and student. Both synchronous chat rooms and asynchronous news groups are generally available. The intention is to increase the amount of active discussion on topics related to the curriculum. Ideally, the lecturer is no longer seen as the primary source of information (the fountain of knowledge) but simply a partner in the educational experience, albeit a particularly wise and knowledgeable one. This facility is one of the features which permits the collaborative work to be done, on-line, by virtual teams. Another is the provision of tools allowing multiple authors of assignments.

A disadvantage can be that the student is compelled to spend a large amount of study time on-line. Students are always short of time and hence are highly resistant to any perceived additional demands on their time [Warf et al, 1999]. Reported cases [Morss, 1999; Papaspyrou et al, 1999] show that more than 80% of students participating in projects requiring them to collaborate on-line, spent less than three hours per week on this activity but a significant percentage of the students considered this to be excessive. This depends of course on the extent to which the use of the web-based system is compulsory and whether it replaces other more traditional study options. In some cases, it is considered ideal for all the required student activities to be very closely integrated with the study material on-line (for example, students and lecturers link comments made during the on-line discussions to specific points in the on-line prescribed text). This means that, in order to use the system optimally, all the study material (including the full prescribed text of books and guides) must be shared, on-line and accessible at all times. This places a considerable burden on those maintaining the system, not only from the point of view of hardware and software but also in creating and maintaining content. It also limits learners' options as they **must** study on-line a lot of the time.

In reality, lecturers are unaccustomed to following the progress of each student, monitoring all comments by students to ensure that misconceptions are not widely propagated and providing the encouragement and remedial help that would make a noticeable difference to results. Lecturers are understandably reluctant to adopt a role that can be seen as regressing to that of "nursemaid" or "policeman". At the opposite extreme, there is the possibility that the lecturers will use the system too superficially, placing very limited summaries on the system. Thereafter, the lecturer might pay less attention to the students and there might be less contact between student and lecturer than before. The immature student may lack the self discipline to pace or schedule academic activities and, having invested little in a course, drop out.

### 5.4.2 Summary of features offered by web-based curriculum management systems

A summary of features commonly found in web-based curriculum management systems or any software system intending to support education administration, teaching and learning processes is provided in Table 5.2.

**Table 5.2: Summary of features**

Web facility	Student view	Lecturer's view
Course administration		
General information concerning the course, lecturer's contact details, et cetera	Useful	Easy, short, needs only limited updating
Information regarding time schedules (about lectures, assignments, and tests)	Useful	Easy, short, needs only limited updating
University administration and student records		
On-line registration	Popular	Once off, university-wide development
Student access to his own academic and administrative records	Popular	Once off, university-wide development
Lecturer access to all student academic records	Popular	Needs to include all marks, not just those on-line activities
Lecture contents		
Lecture summaries - better performance in the short but not long run [Karuppan, 2001], length of summary is important, it should not be too long [Smith et al, 1999]	Students tend to think they need to study nothing else. Assists students who have difficulty taking good lecture notes. Students tend to print these out.	Time consuming unless provided with the prescribed book
Full transcripts of lectures	Too long. Students would rather read a prescribed book [Papasprou et al, 1999].	Time consuming [Partow-Navid & Slusky, 1999].

Simulations - demonstrations of processes - and videos. Popular business simulation games [Doyle & Brown, 2000; Maki et al, 2000] or laboratory simulations	May over-load the network, needs big bandwidth [Rowe & Gregor, 1999]	Needs expert development, not often available
Provision of links to relevant articles and other resources, such as databases and public domain software, on the Web	Students need to be convinced that they will need this information [Karuppan, 2001]. More useful to post-graduate students. Time consuming [Warf et al, 1999]. Can interrupt flow of text [Partow-Navid & Slusky, 1999]	Quite easy
Student activities		
On-line quizzes	Quite popular.	Depends on the quality of the MCQs. These are often provided with text books but need to be checked which can be time consuming. A large bank is needed to ensure that parrot fashion learning will not result. Partow-Navid and Slusky consider these to be very effective [1999].
Collaborative assignments plus on-line facilities such as discussion groups and CSCW tools	Students find it difficult to maintain non-trivial, on-line discourse. Issues of equal participation, trust, reliability. Time consuming [Warf et al, 1999]. Seale and Cann [2000] report time related excuses for not participating in an online discussion as predominating.	Difficult to teach how to discuss on-line. [Lind, 1996]. Coordinating the activities is difficult [Orsak & Etter, 1999]. Training, monitoring, seeding, facilitating are all very time consuming [Kochtanek & Hein, 2000; Ryan et al, 1999; Lind, 1996].
Virtual labs and synchronous broadcast of lectures	Bandwidth	Need to be created by experts and communication costs are high [Tsichritzis, 1999].

Web versions of computer-assisted instruction and interactive tutorials	More suitable for subjects in which drill and practice is required.	Need to be created by experts
Delivery mechanisms		
Submission of assignments via e-mail or other on-line delivery mechanisms	Very popular	Needs good administrative procedures. Standard format required.
Lecturers mark electronic copy and return marked assignments via e-mail et cetera	Popular	Not difficult but needs some practice.
Students publish their work on the Web	Can be time consuming. Do all students need these skills?	
Interpersonal communication		
General on-line discussion (not prescribed and not part of formal group work) in open news groups	Students tend to limit themselves to administrative details, coordination rather than collaboration.	
Private e-mail between students, lecturer and student, or administration and student	Very useful	Easy but can result in information overload [Kochtanek & Hein, 2000; Ryan et al, 1999; Lind, 1996].
On-line chat can be used for interactive tutorial type sessions. The lecturer can participate in various chat sessions at the same time [Partow-Navid & Slusky, 1999].		
Video conferencing		Expensive, requires additional hardware and bandwidth. Usually only available in corporate training of senior staff [Coleman & Schiller, 1999].

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### 5.4.3 Discussion

An overview of web-based curriculum management systems features has been presented in this section. The issues relating to the use of the web-based curriculum management system's tools used for computer supported collaborative work will be discussed further in Chapter 6. In Chapter 9, Section 9.6 some results obtained by researchers undertaking similar research will be discussed in relation to the findings in this research.

## 5.5

## Conclusion

In this chapter two main issues were addressed. Firstly, whether e-mail allows complex, equivocal and rich information to be communicated and the meaning embodied in it to be shared. This determines the feasibility of using e-mail in collaborative work in order to develop new designs or concepts and hence construct new meaning or simply to share meaning. Secondly, this issue can be investigated within the context of computer supported collaborative learning. The use of web-based curriculum management software in education was discussed in order to see how it can be used to assist students in constructing new meaning or reconstructing (understanding) concepts that are being taught.

It seems that many researchers believe that e-mail can be used in order to communicate complex and equivocal messages but that this is not a skill that is immediately available to correspondents and needs to be learned. Social factors have a significant impact on the use of e-mail both from the point of view of the circumstances where it is used and the way in which it is used. This is consistent with a sociocultural model of learning, as people using the technology together as a group will develop methods of using it which are appropriate for their purposes, even though these may not have been foreseen by the original developers. E-mail may be used inappropriately, unskillfully and with disastrous results. On the other hand, it may be used very successfully in circumstances where it would seem to be inappropriate. Thus there are social forces that make it important to find ways of using e-mail more effectively since the reasons for using it are so compelling that its limitations must be overcome.

The suggestions made in this chapter regarding the use of e-mail apply to most circumstances and users. In Chapter 6 we will explore the way that virtual teams (or dispersed collaborative teams) work and their need to develop the skills discussed in this chapter. Virtual teams need to communicate more complex information under circumstances of greater stress than is the case with users in general.