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Optimising Email Communication – The Impact of Seminar and Computer Based Training

Abstract

Many organisations worldwide are benefiting from the use of electronic mail (e-mail) for workplace communication. However employees continue to report multifarious e-mail concerns (“e-mail defects”) including ambiguous unclear messages, e-mail overload, security and privacy issues, and e-mail interruptions. Such e-mail defects affect employee productivity and satisfaction, organisational costs and even organisational performance, and therefore should be managed. This paper explores the importance of identify email defects and the effectiveness of training employees in efficient use of e-mail at four medium-to-large UK organisations, using seminar-based training (SBT) and computer-based training (CBT) delivery modes. The findings suggest that SBT has a diminishing impact over a very short period of time, but a combined approach of SBT and CBT is far more effective in the longer term and provides better results. Key implications for e-mail management scholars and practitioners are discussed.

Keywords

E-mail, seminar-based training, computer-based training, workplace communication, E-mail Cost

INTRODUCTION

Electronic mail (*e-mail*) is a major corporate communication and knowledge sharing channel whose effective use can provide individual and corporate benefits including increased productivity and improved organisational performance (Anon, 2003; DiData, 2007; Hewitt, 2006). Defying longstanding predictions of irrelevance and usage decline, e-mail has surprised its critics by demonstrating instead a meteoric rise in organisational usage in recent years. Between 2005 and 2006 corporate e-mail traffic per user per day increased by 33 percent and the average size of an e-mail message increased by 30 – 34 percent (Radicati, 2007a). In a recent survey of more than 900 IT managers and end-users in thirteen countries, e-mail was found the most popular organisational communication channel with all respondents reporting regular e-mail use (DiData 2007). Due to its considerable versatility, e-mail has been appropriated by workers to fulfil a variety of organisational and social functions (Whittaker et al., 2005) including collaborative task management, personal archiving and contact management (Bellotti et al., 2005; O’Kane et al., 2007; Whittaker et al., 2006). Yet despite its popularity and claimed advantages for organisational use, e-mail also has a recognised dark side that can limit its effectiveness (Sipior & Ward, 1999).

In recent years employees – as recipients of e-mail – have reported experiencing diverse e-mail concerns (hereon termed *e-mail defects*) that include constant interruptions (Anon, 2001; Renaud et al., 2006; Russell et al., 2007), e-mail overload (Balter & Sidner, 2002; Bird, 2007; Dabbish & Kraut, 2006; Dawley & Anthony, 2003; Renaud et al., 2006; Whittaker, 2005) and self-induced pressure to respond to received e-mails (Anon., 2003; Thomas et al., 2006). Multiple unfinished complex collaborative tasks frequently litter employee inboxes (Bellotti et al., 2005; Whittaker, 2005). It is also challenging for employees to process unread messages and decide how to handle them, a process known as “e-mail triage” (Neustaedter et al., 2005). Many of the above concerns have been attributed to employee misuse and mismanagement of e-mail and can exact a heavy toll on employees and their organisations (AMA, 2006; Dabbish & Kraut, 2006; Renaud et al., 2006). E-mail defects can be costly in terms of lost time, misunderstandings, increased stress and reduced productivity.

However e-mail defects and their associated costs can be reduced by the optimisation of e-mail use in the workplace. Technical solutions mainly comprise improved e-mail clients based on new understandings of e-mail use and the most common e-mail defects (e.g. Bellotti et al., 2007; Rohall et al., 2004). Activity management tools can be integrated with e-mail applications (e.g. Bellotti et al., 2007; Tang et al., 2007). As governance measures many companies have implemented e-mail policies. In a recent survey of 308 US companies with

more than 1000 employees, more than 75 percent of respondent companies reported possessing an e-mail acceptable use policy (ZDNet, 2007). Similar results were reported by the AMA (2006). Despite various solutions developed to date, studies of e-mail continue to cite e-mail misuse and abuse (AMA, 2006; Renaud et al., 2006) and associated costs, suggesting that new types of solutions are needed to complement existing approaches.

We argue that a strategy of *e-mail training* is a valuable complementary approach to the management of e-mail defects. Employees are major sources of e-mail defects as they write, send, receive and process e-mail (Hair et al., 2006). It is recognised that human behaviour is amenable to change through educational processes and employees could modify their email usage behaviour after training. Some e-mail management strategies have been found more effective than others in managing e-mail defects. For example, personal e-mail management strategies influence employee perceptions of e-mail overload (Dabbish & Kraut, 2006) and the ability to manage e-mail interruptions (Russell et al., 2007). Further, employees leverage e-mail for personal information management in unique ways (Gwizdka & Chignell, 2007). Superior personal e-mail management strategies could be identified, captured and transferred to other employees by training.

The findings presented in this paper have important implications for e-mail management theory and practice. The paper commends to communication managers an e-mail-training approach that may be effective for reducing e-mail defects in organisations. This research is therefore relevant to contemporary business communication issues and provides a solution that is both feasible and likely to yield good results (Thomas, 2007).

The paper proceeds by reviewing the research design for a study of e-mail training. This section will be followed by several sections that present the study findings. Finally a conclusion section summarises the paper and identifies the main theoretical and practical implications. The paper also proposes several potential future directions designed to explore and extend this nascent e-mail training research strand.

RESEARCH DESIGN

The study reported in this paper seeks to develop more effective e-mail use in the workplace by 1) investigating employee concerns with the way e-mail is used, and 2) exploring the role and effectiveness of employee e-mail

training in managing e-mail concerns and reducing associated costs. A mixed method approach was used with a combination of quantitative and qualitative research as will be explained. Extensive research was conducted between 2004 and 2006 based on case studies at four UK organisations selected opportunistically as they had advisory connections with the first author's place of employment (a UK university). The four organisations are:

- 3M UK plc (3M) is a diversified technology company that has manufacturing, sales and marketing operations. At the time of study (in 2004) it had around 2800 employees based at 14 office locations throughout the United Kingdom and Ireland. The case results are reported in detail in Anon (200x).
- LogicaCMG is an IT company that provides IT solutions and consultancy. At the time of study (in 2005) it employed around 20,000 employees in offices across 34 countries. In the UK region LogicaCMG had more than 30 offices of which 2 participated in the research. The case results are reported in detail in Anon (200y).
- The Danwood Group is a supplier of total office solutions that, at the time of study (in 2005), employed around 600 people. It operated at more than 20 sites in the UK and Ireland. The case results are reported in detail in Anon (200z).
- Loughborough University is a large university in Loughborough, UK. The unit studied was the professional Development (PD) department which is a central support unit offering staff and students a range of services to help develop their professional skills. At the time of study (in 2006) it had 23 staff members. The case results are reported in detail in Anon (200a).

Figure 1 depicts the four phases of each case study - 1, 2, 3a, 3b and 4. The Professional Development (PD) case study was the only study that included phase 3b. Each study aimed to identify e-mail defects and determine the effectiveness of training for reducing e-mail defects and whether certain defects are more receptive to training than others. The long term impact of each training approach was also analysed to determine whether any improvements in e-mail use could be sustained. The details of the case study approach are described next.

Insert Figure 1 – Case Study Phases

Phase One – Development and Deployment of the E-mail Questionnaire

The first phase of the case study was concerned with identifying 1) how e-mail is used within the organisational environment, and 2) e-mail problem areas. In order to identify potential problem areas with e-mail use we conducted a web-hosted internal survey for which a questionnaire was developed. The web-based survey

enabled access by each organisation's employees who were often dispersed geographically within the United Kingdom. Several open-ended questions were employed to capture the number of e-mails received daily by employees and a qualitative assessment of the nature of e-mail received, e.g. information only, irrelevant, etc. For each organisation studied, the questionnaire was offered to potential participants for a period of two weeks. A series of closed attitudinal questions gauged ways in which e-mail was used and employee perceptions of the effectiveness of organisational e-mail use. Such questions probed the frequency with which employees were unnecessarily cc-ed, the number of e-mails sent by employees, and whether employees believed they were receiving clear e-mails that were easy to comprehend. The measures that were used to operationalise the variables were partly newly designed, and partly based on previous research. In the survey, all variables - unless otherwise reported - were measured using 1-5 point Likert-type scales.

Miscommunication was measured using statements derived from Burgess et al. (2005). It was designed using two separate scales for miscommunication in sending emails (judging ones own behavior) and miscommunication in receiving emails (judging others' behavior). A sample item from the sending scale is "I would say the emails I write are straight to the point", and a sample item from the receiving scale is "If I receive an email that requires action, it tells me what is expected of me". All items in these scales were stated such that they were reverse coded to measure miscommunication.

Information overload was measured by five items that were designed for this study, but were based on previous work by De Bruijn (2005) . A sample item from this scale is "I receive more e-mail messages than I can handle".

Customization was measured by a newly developed scale, consisting of five items concerning the extent to which respondents took account of potential recipients in their e-mail behavior. These items were stated such that they were reverse coded to measure customization. A sample item from this scale is "When I write an e-mail message, I consider how the intended recipient(s) will interpret it."

Expertise was measured by a scale derived from Van den Hooff et al. (2005), consisting of five items. A sample item is "I know how my e-mail application works."

Experience was measured by a single item asking respondents to indicate the number of years they had been working with e-mail when filling out the survey.

Task complexity was measured by six items Van den Hooff et al. (2005) used to measure task equivocality, task time pressure and task geographical dispersedness. A sample item is "my work differs strongly from day to day". Although we aimed to construct scales for complexity, time and distance as separate task characteristics, reliability analyses and factor analyses showed that no reliable scales could be designed for

each of these dimensions – but a reliable scale could be constructed for the three together, which we used to measure task complexity.

Social influence was measured by two items inspired from Van den Hooff et al. (2005). A sample item is “My use of e-mail is strongly influenced by my colleagues’ use of e-mail”.

Speed of e-mail and *ability of e-mail to overcome distance* were each measured by three statements derived from Van den Hooff et al. (2005). A sample item for speed is “E-mail enables me to speed up the communication process”, and a sample item for distance is “Thanks to e-mail, a communication partner’s location becomes irrelevant”.

User training was measured in two ways: respondents were asked to indicate how many hours they had received concerning (a) *how* to use e-mail and (b) for *what* to use e-mail. In the analyses, both kinds of training were treated as separate variables.

Policy was measured by four items that were specifically designed for this study, asking about the presence and clarity of an e-mail policy, and about the extent to which such a policy was adhered to. A sample item is “Our organization’s e-mail use policy is clearly communicated to all employees.”

Technological measures was measured by four items specifically designed for this study, asking respondents for the extent to which they had implemented certain measures in order to regulate their e-mail use. A sample item is “I have created message rules to efficiently organize my incoming e-mail messages”.

Phase Two – Analyse Results

The data was collected from questionnaires and analysed for each case organisation as follows (Anon 200a, 200b, 200c, 200d, 200e, 200f). Each questionnaire was offered via the Web to facilitate data capture and responses were stored in a database. For ease of use, radio buttons were used for closed questions. Response rates at the four case companies were as follows. In 2004, 2850 questionnaires were distributed at 3M to all employees who were e-mail users. 875 responses were received providing a response rate of 31%. The questionnaire was next distributed in 2005 to 138 employees at LogicaCMG with 77 responses providing a response rate of 56%. Also in 2005 the questionnaire was distributed to 590 employees at the Danwood Group with 167 responses providing a response rate of 28%. Finally in 2006, 23 questionnaires were distributed to PD with a response rate of 28% (16 replies). Such response rates are considered acceptable for sample sizes.

Responses to attitudinal questions were grouped in categories associated with whether participants agreed, disagreed or held a neutral view about the question's issue. On a Likert scale of 1 – 5, responses of 1 or 2 were grouped into a positive category, 4 or 5 were grouped into a negative category, and 3 was grouped into a neutral category. For each such question, category percentages were calculated by comparing the frequency of occurrence of each category in relation to the total number of valid responses. Similarly percentages for categories were calculated for pairs of questions wherever comparisons were made between questions. Invalid responses were not included in the analysis (null answers were treated as invalid answers).

Phase Three: an Overview

In the third phase e-mail training was developed and deployed. The effectiveness of e-mail training was recorded when using 1) SBT, and 2) an integrated SBT/CBT approach to reducing e-mail defects using the criteria developed in Phase Two (the list of the nine criteria are detailed in Table 3, 4 and 5). A limitation of the findings is that due to unforeseen circumstances unrelated to the time intensive study, only two of the four participating organisations participated in the SBT (3M and PD) and only one organisation of the four participated in the comparison between SBT and SBT/CBT (PD).

Phase Three A - Seminar-Based E-mail Training Programme

The SBT was designed to address common employee concerns with e-mail use in the workplace. SBT was customised for each organisation by focusing the training on problems highlighted by survey results determined from the first phase. It was important to highlight the common problems with e-mail communication in order to enable participants to understand the magnitude of everyday e-mail issues. For example, the research by (Anon 2001) was discussed to show the negative effect that e-mail interruptions can have on employee productivity.

To address the discovered defects, participants were provided with training at a more practical level. For example, to consider communication methods, participants were asked to consider whether e-mail was the best medium to communicate the message or whether another channel might be more appropriate. In another example, employees were also asked to consider the designated recipients of the e-mail message and whether all recipients should be copied in (cc-ed). Participants were advised on effective subject headers and the writing of e-mails with clear concise messages. SBT also addressed other aspects of e-mail best practice, such as effective management of the inbox.

Phase Three B – Computer Based Training

To enable a comparison of the effectiveness of an integrated SBT/CBT approach with SBT alone, a pilot real-time *e-mail training tool* was developed by the first author and colleagues at Loughborough University in the UK in 2004 (Anon, 2005). This software tool facilitates the CBT component of the combined SBT/CBT approach. It is designed to be compatible with Microsoft Outlook 2000, 2002 and 2003 as Outlook is generally recognised as the *de facto* corporate e-mail standard. The tool parses each e-mail message by employing a set of rules that govern whether a particular e-mail defect exists. It is able to determine the following indicators of e-mail defects, which were initially derived from the information gained from the questionnaires deployed as part of this study:

- count of the number of recipients (To, CC, and BCC) to ensure the message is not sent to “excessive” numbers of people;
- determine the length of the subject line to ensure its size is sufficient for a recipient to assess the importance of the e-mail;
- determine the length of the message body to ensure the e-mail is “to the point” (concise and focused);
- identify the size of e-mail attachments to ensure that large attachments are not sent to many recipients.

The sensitivity of the parsing criteria is determined by a set of variables that can be altered by the administrator at the time of software installation to adjust the sensitivity of the software. The variables can be set according to training participant views of acceptable and unacceptable uses of e-mail within their organisations. Details of the parsing algorithm are published elsewhere (Anon, 2005).

In a training session, participants (termed “users” hereon) use the tool for learning. A user sends an e-mail which is analysed by the tool as shown in Figure 2. If the tool does not identify potential defects in the message, the e-mail is sent to the recipient(s). However, if the software detects a defect, the user is informed and has the chance to rectify the problem. The software also has an override facility which enables the user to send the e-mail without making the suggested change(s). The user’s ability to override the software supports user learning by providing greater user control.

Insert Figure 2: Process for detection of e-mail defects during CBT

For the interested technical reader, the technical details of the tool's development are summarised here. The tool was developed using Visual Basic in order to enable faster development than if a more complex programming language such as C++ was employed. Software installation requires a file to be added to the registry to store values for variables associated with parsing criteria. Editing the file and reapplying it to the registry could then alter the values for variables. The software was revised several times during the development process and was continuously tested on a group of six computers by the development team. The software was tested using the three previously mentioned versions of Outlook on computers running Windows 2000 and Windows XP in order to ensure compatibility at the four case organisations. The software tool enabled the researchers to determine the effectiveness of a combined SBT/CBT training approach for improving e-mail use within the workplace as will be discussed later.

Phase Four - Training evaluation

Evaluation of training methods was carried out at two organisations (3M and PD). Various modes of training (see Table 2) were conducted using sender and recipient pairs. In each organisation each user identified ten e-mail recipients with whom they had an established working e-mail communication relationship - that is, they made frequent contact with each other via e-mail. From the ten recipients the researchers contacted three recipients seeking their participation. This step was taken to ensure that the senders did not know precisely who would be evaluating their e-mails as such knowledge could produce biased results.

Insert Table 2 – Case organisations, participation and training modes

The evaluation of SBT and SBT/CBT comprised the following four steps:

Step 1: Designated recipients were trained (phase three) in the evaluation of the effectiveness of e-mails received from their paired sender(s) using the nine criteria.

Step 2: Designated recipients evaluated up to twenty e-mails received from their paired sender(s) over a two week period (phase three);

Step 3a: After the senders' e-mails had been evaluated by their paired recipients, senders participated in SBT on Best Practices in e-mail (phase three);

Step 3b (alternative to 3a): After the senders' e-mails had been evaluated by their paired recipients, senders participated in SBT and received advice concerning how to use the CBT tool. Senders were then trained by using the CBT tool (phase three);

Step 4: After the senders had received training, recipients were asked to evaluate paired sender e-mails for up to 2 weeks at 3M and up to 4 weeks at PD (phase three leading to phase four).

For two organisations (3M and PD), recipients evaluated paired senders' e-mails, before and several weeks after training in order to measure improvement resulting from training. Firm-specific e-mail defects had been identified prior to training by analysis of the questionnaire data in Phase One as described earlier. Similarly the nine criteria for each organisation were identified from the data analysis. Before training, and several weeks after training, recipients were asked to continually score each e-mail against the nine criteria. The differences in scores before and after sender training were used to indicate success or failure of the training. For example, a key indicator of training success might be a reduction in the amount of time taken to read an e-mail after training. The evaluation process enabled the researchers to determine the sustainability (at least for several weeks after training) of any improvement achieved.

Training was limited to only two of the four organisations – 3M and PD – as explained earlier. It varied slightly at each organisation to cater for different participant numbers, time constraints and firm-specific needs (Table 2 shows the number of participants). To determine the effectiveness of the SBT in reducing e-mail defects, the evaluation scores before and after training were averaged for each sender / recipient pair. The average score for all participating pairs was calculated to determine the overall effect of the training for each of the criterion identified for both 3M and PD. The t-test statistic was used to determine the significance of both the SBT and SBT/CBT at reducing each of the defects represented by each criterion at both 3M and PD. The results, based on the two cases, provide an indication of aspects of e-mail use that are most receptive to SBT and/or the combined approach of SBT/CBT.

RESULTS

This section first provides the results of the questionnaires at the four organisations. It then provides results from the training programmes conducted at 3M and PD. Importantly, a comparison between SBT training alone and combined SBT / CBT is made. Finally, cost implications from the findings are discussed.

Survey results at the four organisations

The impact of the identified e-mail defects varied within the four organisations. Respondents from LogicaCMG and PD were generally more critical about how e-mail was used by their colleagues than respondents from the

other organisations. This may be because respondents from LogicaCMG and PD received a greater number of e-mail per day than 3M or Danwood employees, and are therefore more aware of the deficiencies of e-mail communication. On the other hand, Danwood respondents were generally less critical about the problems with e-mail use in their organisation compared with respondents from other organisations. This may be due to the comparatively small number (median = 15) of e-mails received per day, which reduces the impact of some e-mail defects.

We present here the main findings from the 3M survey in order to illustrate the type of defects in received e-mails, and their extent:

- 16 percent of received e-mails were copied in (cc-ed) unnecessarily;
- 13 percent of received e-mails were irrelevant or untargeted;
- Only 41 percent of received e-mails were for information purposes;
 - These e-mails contain information but do not require any action to be carried out by the recipient;
- Only 46 percent of received actionable e-mails stated the expected action;
- 56 percent of employees believed that e-mail is used too often instead of telephone or face-to-face;
- 45 percent of employees believed that their own e-mails are easy to read.

These e-mail defects were then addressed by SBT at 3M and SBT and the combined approach of SBT/CBT at PD. The results from those training programmes are discussed next.

Results from Training Programmes at 3M and PD

In this section the results will be deconstructed into two areas and will show:

- the impact of SBT on both 3M and PD at reducing e-mail defects;
- the difference between SBT and the combined approach of SBT and CBT on PD at reducing e-mails.

We will also look at the results to see the longitudinal affect of both training approaches at reducing e-mail defects. A summary of the results is shown in Tables 3, 4 and 5.

Impact of SBT on 3M and PD

Following SBT the t-test analysis shows that five of the nine criteria showed positive initial differences, four of them at 3M and three of them at PD. The five criteria which showed positive differences were:

- more clearly written e-mails that were easier to read (3M $p \leq 0.05$);
- more clearly written e-mails that were more concise and to the point (3M $p \leq 0.05$);
- improved use of the subject line which made it easier to assess the importance of the message (3M $p \leq 0.01$, and $p \leq 0.1$ for PD);
- improved use of the subject line which made it easier to identify overall message content (3M $p \leq 0.01$, PD $p \leq 0.1$);
- improved understanding of the suitability of e-mail as the communication medium (PD $p \leq 0.1$)

While there was an overall average improvement in the 3M senders' ability to effectively choose the most suitable communication medium, this improvement was not statistically significant. The initial positive effect of the SBT can however diminish over time as shown by Table 3 ("Mean scores after training weeks 1&2" versus "Mean scores after training weeks 3&4" at PD). The results show that seven criterion had higher average overall scores after one month than during the first two weeks after the SBT (comparing columns 3 and 4), indicating a reduction in the impact of the SBT across these criteria. Using a Likert scale of 1 to 5 (1 being excellent) an improvement would have been shown by a decrease in the overall average and not an increase and shown by Table 3. The only criterion where the effect of the SBT did not diminish after four weeks were the senders' ability to specify clear deadlines and the senders' ability to write subject lines that enabled the recipient to gauge the importance of the message.

Insert Table 3 - The effect of SBT on PD (up to four weeks after training)

Insert Table 4 - The overall mean effect of SBT at 3M

Difference between SBT and Combined Approach of SBT and CBT on PD

We now turn to the results of combined SBT and CBT training, which took place at PD. The initial impact of the combined training (SBT and CBT) resulted in improvements across eight of the nine evaluation criterion as shown by Table 5. The only criterion not to show an initial overall improvement was the senders' ability to write e-mails that are easy to read, despite this criterion showing significant initial improvements for the SBT at 3M and PD as shown in Tables 3 and 4.

Six of the initial improvements in CBT had been sustained after week 4 or had shown further improvement. The only criterion where the overall initial impact of the training had diminished (mean scores) was in the senders' ability to choose the most suitable communication medium and their ability to write effective subject lines.

The t-test analysis showed (see Table 5) that four of the nine evaluation criteria showed positive differences four weeks later for the CBT. The four significant improvements were:

- more clearly written actionable e-mails that state what action is required of the recipient ($p \leq 0.05$);
- more clearly written actionable e-mails that clearly state when action is required ($p \leq 0.05$);
- more clearly written e-mails that were easier to read ($p \leq 0.1$);
- improved use of the subject line, which made it easier to know what the message is about ($p \leq 0.1$).

Insert Table 5 - The effect of the combined approach of SBT and CBT on PD (up to four weeks after training)

Summary of SBT and CBT and SBT

Overall the most significant finding from this research may be from the results of the PD study. Such results indicate that the positive impact of the combined approach of SBT and CBT is more sustainable than the SBT alone as shown by the last two columns in Tables 3 and 5 (columns 5 and 6). The results have shown that employees that undergo SBT initially show signs of improvement, but after a few weeks have nearly reverted back to their old emailing habits, rendering the training ineffective. In contrast the combined approach of both SBT and CBT has shown employees have an initial improvement in dealing with email, but after a few weeks show no significant signs of reverting back to their bad emailing habits. Therefore the more effective means of improving email communication is a combined approach of SBT and CBT.

Discussion of Practical Implications

First, we discuss the implications of this research for managing e-mail costs. While the results have shown that e-mail defects can be reduced and effective use of e-mail improved by deploying SBT and CBT, what do the results mean in terms of cost changes? One approach to determine the cost of e-mail use within an organisation can be calculated from the amount of time that employees spend using e-mail. This is determined by the number

of e-mails an individual receives, the time it takes to read each e-mail and the number of e-mail end-users within the organisation. The financial cost of reading e-mails can be calculated by applying monetary values, based on an average salary, to the time spent using e-mail. However, this value only indicates how much time employees spend actually reading e-mail and does not take into account the interruptive nature of e-mail and how much time is spent composing e-mail messages.

Assuming an average salary of £23,244 (24,603) (monetary amounts are in British pounds) per annum, based on the UK average salary according to National Statistics Online (National Statistics, 2007) and an assumed overhead of a further £23,244 per year, the total cost per day of reading e-mail for an organisation can be calculated using the formula Eq. (1). An overhead is required to take into account establishment costs (e.g. rent and rates), administrative costs (e.g. telephone and printing) and employment costs (e.g. national insurance contributions and pensions). The formula Eq. (1) can be used as a basis for calculating the annual cost of e-mail use within an organisation and/or calculating the cost of e-mail per employee according to the numbers employed.

Example: Worst Case Scenario of Current Costs for 3M

The results from the survey phase show that employees from 3M receive on average 23 e-mails per day. According to the results from the first phase of the SBT at 3M, it takes an e-mail receiver at 3M an average of 76 seconds to read and understand each message received from a paired sender before the sender has received training. 3M employees therefore spend an average of 29 minutes per day reading e-mail. This assumes that employees read all e-mails received, including irrelevant e-mails.

Equation 1: Organisational cost of e-mail use per day

If employees have their e-mail applications set to check for new e-mail every five minutes (the default setting in MS Outlook), the possible number of interrupts received in an 8 hour day is 96. In this organisation employees received 23 e-mails per day resulting in a maximum of 23 interrupts if their e-mail application had been set to check for new e-mail every five minutes and each e-mail arrived at some interval from the previous e-mail. Therefore the total time taken by these e-mail interruptions is 24.5 minutes.

Using the formula Eq. (1) the daily cost of e-mail use for 3M was calculated to be £56,974, given that the organisation has 2850 e-mail end-users. The annual cost is almost £14.8 million and the cost per employee was £5,197 per annum.

Using the same calculations the daily cost of e-mail use within LogicaCMG was calculated to be £245,104, given that LogicaCMG has around 6000 employees within the UK and on average they receive 47 e-mails per day. The annual cost is almost £64 million and the cost per employee was £10,621 per annum. The total daily cost of e-mail use within PD using the formula Eq. (1) was calculated to be £940, given that PD has 23 employees. The total annual cost is £244,288 and the cost per employee per annum is £10,621. Finally, using the same calculations the daily cost of e-mail use within Danwood was calculated to be £14,081, given that Danwood has around 600 employees within the UK and on average they receive 27 e-mails a day. The annual cost is almost £3.6 million and the cost per employee was £6,102 per annum. The implications of the costs of e-mail use, albeit in a worst case scenario, will now be considered. In the next section we can explore the cost of training and using the research results show how much an organisation could save by implementing training within their organisation.

Costs and Potential Savings

There are several implications to consider. First, clearly removing all irrelevant and unnecessary e-mails that flow around an organisation can reduce the cost of e-mail use. LogicaCMG had the largest proportion of irrelevant and unnecessary e-mails (37%) of the four organisations, and therefore could potentially make the largest saving in this area. 3M and PD had a similar proportion of irrelevant and unnecessary e-mails (29% and 31% respectively) although PD could make a larger financial saving (per employee) than 3M because of the greater number of e-mails received within PD. However, Danwood fared the best with only 14% of e-mails were classified as unnecessary and only 19% irrelevant or untargeted.

Second, each organisation can also reduce the cost of e-mail use by reconfiguring all employees' e-mail applications. Increasing the interval between when the e-mail application checks for new e-mail can reduce the number of e-mail interruptions thereby reducing the overall interrupt recovery time. The financial impact of increasing the interval from five to forty-five minutes is determined by the number of e-mails received by an employee during the day. LogicaCMG and PD could make larger financial savings (per employee) using this approach than 3M because of the larger number of e-mails received by employees from these organisations.

While this approach can reduce the cost associated with e-mail use, it can sometimes be impractical to have an e-mail application set to check for new mail over such a long period as important tasks and deadlines may be missed.

Third, both 3M and PD could reduce the cost of e-mail use by deploying SBT throughout their organisations. 3M could save an initial 8 percent and PD an initial 4 percent on the cost of e-mail use within their respective organisations. The longer term impact of SBT at 3M is unknown although at PD this was reduced to 2 percent, four weeks after training. The results indicate that a combined SBT/CBT training approach may lead to more sustainable reductions in the cost of e-mail use. However, the cost savings do not take into account the operating costs of the training sessions.

Fourth, the costs and potential savings identified only focus on the time spent reading e-mails and do not include the costs associated with acting upon an e-mail or responding to e-mails. It should also be noted that any savings made through e-mail training may not represent an actual monetary saving to the organisation as the employee's time will be spent on other tasks rather than e-mail and such tasks might not be beneficial to the organisation. However, it is plausible that there is a cost associated with e-mail use, which can be reduced by optimising e-mail use within the workplace.

CONCLUSION

While existing studies identify employee concerns with e-mail use, this long-term project sought to research specific e-mail defects within a number of organisations with the intention of reducing the identified e-mail defects by training in several different modes. While the findings from this research cannot be statistically generalised due to the study being limited to only four organisations in the UK context, including only two organisations where training was carried out, the findings are indicative. The findings indicate that there are many deficiencies with the way e-mail is used in contemporary organisations. Such defects relate to 1) the written quality of e-mail messages, 2) the quantity of e-mail received, and 3) the ineffective configuration of an organisation's e-mail applications. Current e-mail defects can increase the amount of time spent by an employee dealing with e-mail. Organisations similar in size and in function to the ones studied in this longitudinal research are likely to face the same kind of email defects identified within this paper and are likely to respond to SBT and the combined approach of SBT and CBT in a similar fashion. Therefore it is important for organisations to take

poor email communication seriously, as not tackling email defects will impact upon employee effectiveness and efficiency.

The paper has added to current theory on organisational e-mail management by providing insights into the diverse types of e-mail defects found in organisations, and their management by SBT and SBT/CBT. Secondly, the paper indicates that SBT can improve the efficiency of employee use of e-mail. However, the initial impact of the training may diminish over time. The results highlight that the impact of SBT can vary depending on the specific areas of e-mail use that are improved, with some criteria showing greater improvement than others. For example, the ability to write more clearly written e-mails that were easy to read improved significantly after SBT. However interestingly, the combined training approach of SBT and CBT proved superior to SBT alone in the one organisation where it was trialled, as it produced improvements that were sustained a full month after training had ended. Further research is needed to explore results from different e-mail training modes in other organisations.

Second, the findings from this paper may help similar organisations to become more effective in managing their e-mail communication systems. It is recommended that communication managers or others responsible for e-mail policy and management examine their e-mail policies and develop a “snapshot” of how their employees use e-mail. Such information will provide an organisation with a useful foundation from which to build their training in order to increase their employees’ effectiveness. If an organisation decides to deploy an e-mail training programme, it is recommended that it not only focuses on the sender side of how to write more effective e-mails, but also on how recipients should manage the inbox. It is further recommended that any training programme aimed at improving e-mail use should take into account other communication media used within the organisation, so that the effectiveness of communication in general can be improved. The findings in this study indicate that employees may not always believe that received e-mail messages should be sent by the e-mail channel.

A final note is that even when e-mail training is firm-specific, most of the training is likely to be relevant and valuable in other firms, as suggested by a seminal study of training (Loewenstein & Spletzer, 1999). The study suggests that many employers and employees believe that most, if not all the skills learned in firm-specific training would also be useful at other places of employment. With e-mail now a standardised ubiquitous

organisational communication tool, the findings of Loewenstein and Spletzer are likely to apply to e-mail training.

Overall, this research shows how the cost of e-mail use can be optimised by reducing the volume of irrelevant and untargeted e-mail and by reducing the frequency with which an e-mail application checks for new e-mail. While assigning a monetary value to e-mail use costs in this research is clearly an oversimplification of impact, financial cost is commonly used in risk management to estimate risk impact, and can assist organisations to visualise the benefits of e-mail training as discussed in this paper.

REFERENCES

Anon – all removed for review.

AMA (2006) 2006 Workplace E-Mail, Instant Messaging & Blog Survey, Report, American Management Association (AMA) and The ePolicy Institute, US.

Balter, O. & Sidner, C. L. (2002). Bifrost Inbox Organiser: Giving users control over their inbox, in Proceedings of the second Nordic conference on Human-computer interaction, Aarhus, Denmark, ACM Press.

Bellotti, V., Ducheneaut, N., Howard, M. & Smith, I. (2005) Quality Versus Quantity: E-Mail-Centric Task Management and Its Relation With Overload, *Human-Computer Interaction*, 20, 1&2, 89-138.

Bellotti, V., Thornton, J., Chin, A., Schiano, D. & Good, N. (2007) TV-ACTA: Embedding an Activity-Centered Interface for Task Management in Email, in Proceedings of the 4th Conference on Email and Anti-Spam, Ca, <http://www.ceas.cc/2007/papers/paper-29.pdf>

Bird, S. (2007) E-mail stress keeps workers on edge of inbox, The Times, August 13.

Burgess, A., Jackson, T. & Edwards, J. (2005). E-mail training significantly reduces e-mail defects. *International Journal of Information Management* 25, 71-83.

Dabbish, L.A. & Kraut, R.E. (2006) Email overload at work: an analysis of factors associated with email strain, in Proceedings of the 2006 20th anniversary conference on Computer-Supported Cooperative Work (CSCW'06), Banff, Alberta, Canada.

Dawley, D. & Anthony, W.P. (2003) User Perceptions of E-mail at Work, *Journal of Business and Technical Communication*, 17(2), 170-200.

DiData (2007) The End of Communications as we Know it, News Release, Dimension Data, <http://www.dimensiondata.com/NR/rdonlyres/1FF223E4-ADCC-4CC3-A332-7D2983605C44/7616/THEENDOFCOMMUNICATIONSASWEKNOWIT1.pdf/>

Ducheneaut, N. & Bellotti, V. (2001) Email as Habitat: An Exploration of Embedded Personal Information Management, *Interactions*, 8(5), 30 - 38.

Ducheneaut, N. & Watts L. A. (2005) In Search of Coherence: A Review of E-Mail Research, *Human-Computer Interaction*, 20(1&2), Pages 11-48.

Gwizdka, J. & Chignell, M. (2007) Individual Differences in Personal Information Management, in (Jones, William and Teevan, Jamie, Eds) *Personal Information Management*, University of Washington Press..

Hair, M., Renaud, K.V. & Ramsay, J. (2007) The Influence of Self-Esteem and Locus of Control on Perceived E-mail-related Stress, *Computers in Human Behavior*, 23(6), 2791-2803.

Hewitt, P. (2006) Electronic mail and internal communication: a three-factor model, *Corporate Communications: an International Journal*, 11(1), 78-92.

- Loewenstein, M.A. & Spletzer, J.R. (1999) General and Specific Training, *The Journal of Human Resources*, 34(4), 710-733.
- National Statistics (2007) 2006 Annual Survey of Hours and Earnings National Statistics, London, UK, at URL: <http://www.statistics.gov.uk/pdfdir/ashel006.pdf> (viewed 19/08/08)
- Neustaedter, C., Brush, A., Smith, M (2005) Beyond “from” and “received”: exploring the dynamics of email triage, in *Proceedings of CHI 2005*, 1977-1980.
- O’Kane, P., Palmer, M. & Hargie, O. (2007) Workplace interactions and the polymorphic role of e-mail, *Leadership & Organization Development Journal*, 28(4), 308-324.
- ZDNet (2007) *Proofpoint: Outbound Email and Content Security in Today’s Enterprise*, 2007, ZdNet.
- Renaud, K., Ramsay, J. & Hair, M. (2006) You’ve Got E-Mail!” ... Shall I Deal With it Now? Electronic Mail from the Recipient’s Perspective, *International Journal of Human-Computer Interaction*, 21(3), 313-332.
- Rohall, S. L., Gruen, D., Moody, P., Wattenberg, M., Stern, M., Kerr, B., Stachel, B., Kushal, D., Armes, R., Wilcox, E., ReMail: a reinvented email prototype, in Extended abstracts of the 2004 conference on Human Factors and Computing Systems, April 24-29, 2004, Vienna, Austria.
- Russell, E., Millward, L. & Banks, A. (2007) Describing the strategies used for dealing with email interruptions according to different situational parameters, *Computers in Human Behavior*, 23(4), July, 1820-1837.
- Sipior, J.C. & Burke T. W. (1999)The Dark Side of Employee Email, *Communications of the ACM*. 42(7), 88-100.
- Tang, J.C., Lin, J., Pierce, J., Whittaker, S. & Drews, C. (2007) Recent shortcuts: using recent interactions to support shared activities, in *Proceedings of the SIGCHI conference on Human Factors in Computing Systems*, San Jose, Calif., USA, pp. 1263-1272.
- Thomas, G.F., King, C.L., Baroni, B., Cook, L., Keitelman, M., Miller, S. & Wardle, A. (2006) Reconceptualizing E-Mail Overload , *Journal of Business and Technical Communication*, 20(3) 3, 252-287.
- Thomas, G.F. (2007) How can we Make our Research More Relevant? Bridging the Gap Between Workplace Changes and Business Communication Research, *Journal of Business Communication*, 44(3), 283-296.
- Van den Hooff, B., Groot, J. & De Jonge, S. (2005). Situational influences on the use of communication technologies: a meta-analysis and exploratory study. *Journal of Business Communication* 42(1), 4-27.
- Whittaker, S. (2005). Supporting Collaborative Task Management in Email, *Human Computer Interaction*, 20, 49-88.
- Whittaker, S., Bellotti, V. & Gwizdka, J. (2006). Email in Personal Information Management: Why Email is the Critical PIM Problem and What we do about it, *Communications of the ACM*. 49 (1), 68-73. ACM Press.

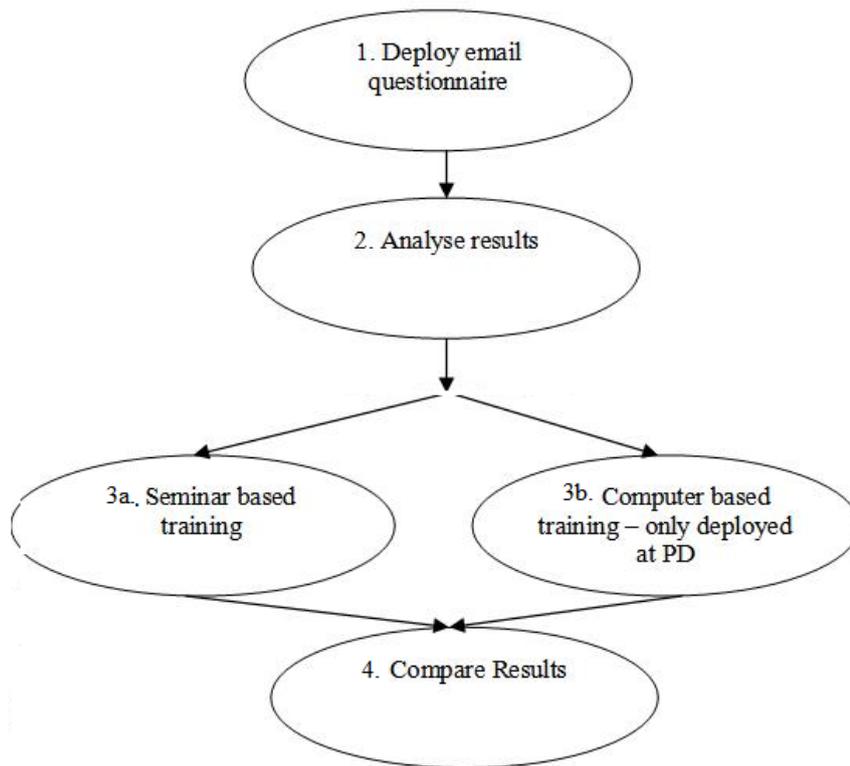


Figure 1 – Case Study Phases

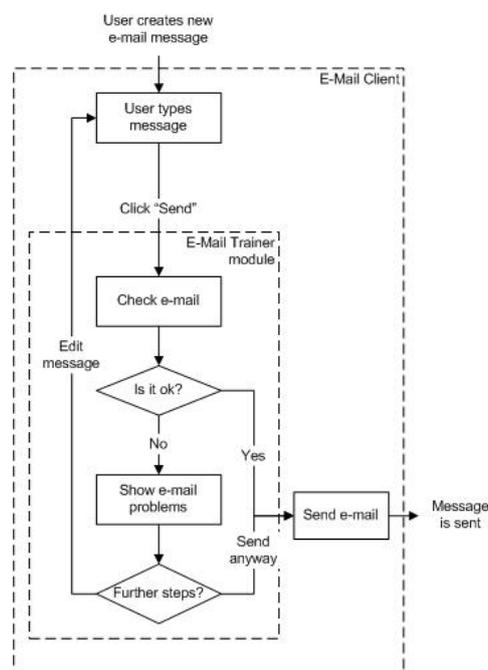


Figure 2: Process for detection of e-mail defects during CBT

Table 2 – Case organisations, participation and training modes

Organisation	Questionnaire <i>Distributed to / replies received</i>	SBT <i>(Senders // Recipients // Pairs)</i>	Combined SBT and CBT <i>(Senders // Recipients // Pairs)</i>

3M	Yes (2850 / 875)	Yes (11 // 1 to 3 // 20)	No
LogicaCMG	Yes (138 / 77)	No	No
Danwood Group	Yes (590 / 167)	No	No
Professional Development (PD)	Yes (23 / 16)	Yes (3 // 2 to 4 // 11)	Yes (2 // 2 to 3 // 5)

Table 3 - The effect of SBT on PD (up to four weeks after training * - $p \leq 0.1$, ^ - $p \leq 0.01$)

Nine Criterion	Mean scores before training	Mean scores after training weeks 1&2	Mean scores after training weeks 3&4	Difference between before training and after training weeks 3 & 4	p-value from 2 tailed t test
- The suitability of e-mail as the communication medium	1.55	1.12	1.18	-0.38	0.057*
- The e-mail is easy to read	1.56	1.21	1.46	-0.10	0.696
- The e-mail is straight to the point	1.59	1.17	1.29	-0.30	0.184
- The relevance of the message to me	1.60	1.44	1.71	+0.11	0.741
- If it is an actionable e-mail:					
o It tells me what is expected of me	1.83	1.43	1.65	-0.19	0.341
o It states when action is required	2.36	2.19	1.87	-0.49	0.221
- The subject line contains sufficient detail for:					
o Me to assess the importance of the message	2.26	1.88	1.70	-0.56	0.006^
o Me to understand what the message is about	2.08	1.63	1.65	-0.43	0.073 *
- Perceived estimated time to read and understand message (in seconds)	49.92	45.88	47.78	-2.14	0.491

Table 4 - The overall mean effect of SBT at 3M (- $p \leq 0.05$, * - $p \leq 0.1$)**

Nine Criterion	Before Training	After Training	Difference	p-value from 2 tailed t test
The suitability of e-mail as the communication medium	1.49	1.40	-0.10	0.438
The e-mail is easy to read	1.63	1.39	-0.24	0.022 **
The e-mail is straight to the point	1.58	1.36	-0.22	0.023 **
The relevance of the message to me	1.69	1.50	-0.19	0.138
If it is an actionable e-mail:				
It tells me what is expected of me	1.80	1.73	-0.13	0.623
It states when action is required	2.61	2.12	-0.48	0.320
The subject line contains sufficient detail for:				
Me to assess the importance of the message	2.89	2.19	-0.70	0.003 *
Me to understand what the message is about	2.17	1.49	-0.65	0.005 *
Perceived estimated time to read and understand message (in seconds)	76.21	65.67	-10.54	0.285

Table 5 - The effect of the combined approach of SBT and CBT on PD (up to four weeks after training * - $p \leq 0.1$, ** - $p \leq 0.05$)

Nine Criterion	Mean scores before training	Mean scores after training weeks 1&2	Mean scores after training weeks 3&4	Difference between before training and after training weeks 3 & 4	p-value from 2 tailed t test
The suitability of e-mail as the communication medium	1.34	1.03	1.05	-0.29	0.157
The e-mail is easy to read	1.48	1.58	1.15	-0.33	0.081 *
The e-mail is straight to the point	1.30	1.21	1.10	-0.20	0.101
The relevance of the message to me	1.48	1.35	1.35	-0.13	0.525
If it is an actionable e-mail:					
It tells me what is expected of me	2.05	1.58	1.00	-1.05	0.034 **
It states when action is required	2.40	2.25	1.30	-1.10	0.028 **

The subject line contains sufficient detail for:

Me to assess the importance of the message	1.79	1.60	1.93	+0.15	0.660
Me to understand what the message is about	1.81	1.17	1.63	-0.18	0.067 *
Perceived estimated time to read and understand message (in seconds)	43.49	36.90	27.00	-16.49	0.102

$$\text{Daily cost of organisational e-mail use} = (t_1 + t_2) * w * n$$

Where t_1 is the time taken for an employee to read all e-mails received (minutes)
 t_2 is the total interrupt recovery time per employee (minutes)
 w is the average cost of an employee per minute
 n is the number of employees within the organisation.

Equation 1: Organisational cost of e-mail use per day