
Interpersonal Computing and Technology:
An Electronic Journal for the 21st Century

ISSN: 1064-4326
January, 1993
Volume 1, Number 1

Published by the Center for Teaching and Technology, Academic Computer Center, Georgetown University, Washington, D.C.

This paper is archived as COTLAR IPCTV1N1 on LISTSERV@GUVM (LISTSERV@GUVM.GEORGETOWN.EDU)

STIMULATING LEARNING WITH ELECTRONIC GUEST LECTURING

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ABSTRACT

The use of electronic guest lectures to stimulate thinking among students and to induce their interaction was explored. This technique, like other applications of Computer Mediated Communication (CMC) in education, shows promise. It can improve quality of instruction while adding convenience attributable to asynchronicity. However, the degree to which students interact in meaningful ways seems related to the style of the lecture. Three different lecturers addressed a graduate course and evoked markedly different degrees of response. The style of each lecture was analyzed to explore the relationship between style and responsiveness. Extraordinary findings showed that the extent of personalization and readability strongly influence responsiveness. Replications of this kind of study are needed to validate the findings.

OVERVIEW

PROBLEM: THE UNIVERSITY UNDER PRESSURE

Colleges and universities are under tremendous pressure to expand. On the one hand is the demand for more classes: students are seeking higher education in record numbers. On the other is the demand for more courses: the growth in knowledge in all fields means that more courses need to be taught. The forecast for number of students and courses is for more, not less; this trend, this demand, is not expected to decline in the near future.

For the most part, institutions of higher education have not been able to keep up with the demand. The traditional instructional delivery systems are simply outdated. The methods that were once adequate are, in today's highly technological environment, no longer cost effective. The results are evident in the graduates: employers frequently complain about the quality of their training. Furthermore, students, in their assessments, often rate the quality of teaching as mediocre.

NEED: REENGINEERING THE ACADEMY

To cope with these pressures, the tendency has been toward larger class size. Considering the negative consequences on learning of disproportionate instructor-student ratios, the move toward larger classes is at best a stop-gap measure; at worst, counter productive. More students in more classes mean more handouts, and more handouts mean more paper to be typed, printed, collated, and stapled. These, as well as other quality and cost issues, need to be addressed in imaginative ways if the academy is to succeed in its mission.

Instead of expanding traditional methods to accommodate increased demand, alternatives need to be considered. As a strategy, extending the walls of the already large halls to sustain face-to-face lecture sessions may have reached the point of diminishing returns. To continue more of the same, given present technology, may not be the answer. Today, there are much newer and more promising tools (Sullivan, 1989).

Changes in the recent past have been largely superficial; switching from white chalk on blackboards to felt markers on vinyl boards is not exactly progress in using technology. Real change calls for going back to basic objectives and rethinking old premises. For example, controls on cost, as a way to cope with greater demand, often reduce effectiveness, even if efficiency improves. Economies of scale cannot be had without reengineering the old processes. While automation can sometimes lead to improvement, reengineering is much more certain to deliver beneficial results in both outcome and efficiency.

Simply mechanizing traditional methods via automation is unlikely to yield as much benefit as a zero-based redesign of processes. Quality and value goals need to be reassessed. The aggregate value of education delivered may be thought of in terms of how much is provided to how many students. With this viewpoint, both quantity and quality of learning could be reduced and still improve value, with large increases in number of students. Such tradeoffs are at least unnecessary if not completely inappropriate. Reengineering can deliver improved value without reducing either quality or quantity of learning. In fact, appropriate reengineering can increase all these variables.

PROPOSAL

GUEST LECTURERS

One obvious way to improve the quality of learning is to place students in contact with the very best instructors available. Unfortunately, using traditional face-to-face lectures, the number of master teachers is not sufficient to meet the need. Fortunately, however, available technology provides a solution, a way to expedite contact between the handful of outstanding teachers and the multitude of students. Multiplying the contact between these masters and large numbers of students would ordinarily lead to teacher burn out. However, available technology can also reduce this risk.

Because the best experts are scarce, instructors across the country rely on their writings, in the form of class readings, to stimulate students. Occasionally, these giants are brought to students physically, as guest lecturers. Large lecture halls fill with students eager to hear the master, and some students get the opportunity to raise a question during the brief encounter. But the contact is brief, leaving the students with a hunger for more. Clearly, access to visiting experts enriches learning, and an expansion of that exposure would enhance learning even more.

COMPUTER MEDIATED COMMUNICATIONS

Telephone or television has been used to deliver simple audio or even "talking heads," but simultaneity and economics impose serious limitations. Videotape lectures, even with on- screen surrogate students asking questions, are not personalized by ultimate viewers. Computer mediated communication (CMC), however, overcomes these obstacles.

In its simplest form, using current CMC technology, an electronic guest lecture is information sent from master to students. But delivery of lecture information is only one dimension of the communication process. In a more complex and perhaps more effective form, it is a sequence of interactions between students and master, in depth and over an extended time frame. But delivery must be convenient and logistical costs must be reasonable.

Compared to past techniques, feedback and interaction via CMC is easier and more complete. Electronic mail, an important mode of CMC, can be used to deliver initial information, facilitate questions and comments from students, and stimulate subsequent transactions among all participants (Kaye, 1990; Kuehn, 1988). CMC eliminates time and distance constraints (Hezel & Dirr, 1990; Anderson, 1988). The master need not travel, nor must the students congregate in any particular place. The interaction need not take place at a particular time, and it can be prolonged indefinitely if students raise successive questions. Additionally, students can discuss issues privately if they wish, as they formulate further questions for the master (Phillips & Santoro, 1989, pp. 159-160).

As more institutions feel increasingly stringent budget constraints, traditional methods of instruction are likely to be replaced with more efficient methods. If the replacement methods are well chosen, they will also be more effective. The aggregate value of higher education will increase because of

increases in all the constituents of value, rather than in just some of them. More knowledge can be delivered economically with better quality to more students. Interactive instruction, delivered with CMC technology, can be very cost-effective (Showalter, 1983). Extending this powerful medium to electronic guest lecturing is merely one of the newly available methods for solving the challenges that face higher education.

RATIONALE

The use of computers to facilitate communication has been one of the great technological developments during the past decade. Of the several types of communication that computers mediate, electronic mail (e-mail) is the most widely used. One advantage for which e-mail is especially useful is its ability to accommodate senders and receivers who are separated by long distances and substantial time zone differences. It is unnecessary for both to be available simultaneously in order to communicate. This asynchronous feature adds considerable convenience.

Asynchronous communication is efficient: Faculty and students can communicate easily with electronic mail (Phillips & Santoro, 1989, pp. 155-156). Electronic office hours can replace physical office hours (Hiltz, 1986), and office facilities need not be extensive. Faculty can deal with electronic visitations much more readily than with physical ones. Such meetings are significantly shorter and more convenient in time and place. E-mail is also effective: Without the need for spontaneity, answers to questions can be more thoughtful (Beals, 1990, p. 2).

Another key e-mail feature is the ability to send a single message to multiple addressees virtually simultaneously. This mail-list feature allows many people to share ideas in parallel. Although the asynchronous feature does not require simultaneous attachment of communicators, it does permit everyone on a mail- list to send messages simultaneously to the list (Lyness, 1992). These features make e-mail very useful for office hours, assignments, guest lectures, seminars, and many other academic processes.

CMC is enabling. Communication among students, especially when working on group assignments, is facilitated (Henri, 1988; Hiltz, 1988). Conflicting schedules and commitments are accommodated easily. Dispersed recipients are easily included and their schedule preferences are respected with e-mail.

Unlike telephone voice-messaging, e-mail need not be brief requests for return calls. Instead, it can quickly and effectively deliver lengthy messages, free of the confusion so commonly associated with oral messages. Deliberate delays, in order to ponder answers, improves the quality of messages. The ability to edit and expand before sending makes e-mail much more effective than voice communication. The facility of forwarding exact copies of messages solves the problem of inaccurately repeated messages and all the ensuing confusion. These and other features make e-mail a very powerful tool in reengineering the academic process.

Effectiveness in mastering course content should be only one of the goals in a course. Other dimensions should also be considered, for example, improving thinking (Phillips & Pease, 1985) and writing skills. Certainly, providing firsthand experience with telecommunications is a useful objective.

Building collaborative skills and improving cooperative attitudes is also important (Smith, 1990, p. 83; Kubota, 1991).

All courses should encourage students to explore uses of new technology. Instructors could serve as examples by bringing an occasional guest lecturer to students electronically. This admits diverse opinions with a variety of experts who could expand the sphere of learning. Exposing students to the best lecturers provokes deeper thinking. It also provides them the opportunity to experiment with various communication styles (Murray, 1988, p. 17). Students who are less aggressive may feel encouraged to interact with a non-threatening visitor.

Finally, innovations often invite and inspire a spectrum of other new ideas, for example, electronic performance reports, computer ombudsman, and downloadable tutorials.

DESCRIPTION OF THE STUDY

METHODS AND PROCEDURES

The study began with a list of possible guest lecturers, who were selected on the basis of their active participation in pertinent electronic forums and the quality of their postings. Those chosen were solicited by e-mail and encouraged to take part in the project. Guidelines and schedules were arranged to accommodate the preferences of the guests. In place of honoraria, implicit gratification and challenge were offered and accepted.

To facilitate mailings to all students, an address list was established as an alias on the host system. Typically, an introduction of each guest was provided in an e-mail message to the list, followed by the lecture.

Prior training in the use of e-mail was provided to all students in a hands-on computer lab session. The lab also provided easy accessibility for those few students who did not have convenient access to the host computer.

The course instructor deliberately stayed disengaged from the guest lecturers so as not to influence or prejudice the results. Students and lecturers were able to interact freely, without interference from the instructor. A wide range of discussions ensued, with only subtle indications that the instructor was present.

DATA ANALYSIS

The electronic records of all lectures and the discussions were gathered and stored (Beals, 1990). The processing began with removal of superfluous header elements from each posting to isolate time, person, and subject reference data. For each message sent, the header identified sender and addressee. It also carried information on the date and time sent, from which frequency, endurance, and intervals between messages could be determined:

"[studentname 6/6 15.07 >

lecturername 6/4 08:03]

Subject: Training

I agree that the training function has not gotten the attention it deserves. Having worked on several project that involved the implementation of automated systems, I have seen the effects of insufficient . . ."

Subtraction of successive dates and times from headers yielded information on intervals between messages. The full text of messages provided data for an objective assessment of language style and usage. Extraneous punctuation and typographic elements were carefully removed to facilitate analysis via computer software designed to assess style, grammar, and readability.

FINDINGS

Overall, 155 messages were exchanged between the 3 lecturers (LectX...LectZ) and the 15 students (Stud1...Stud15), not including the initial lectures. Students sent 86 messages; lecturers, 69:

	Rec'd from Students	Sent to Students	Total
LectX	76	66	142
LectY	5	0	5
LectZ	5	3	8
	86	69	155

Between LectX and the 15 students, 142 messages were exchanged. All 15 students who participated in the e-mail activity had at least one exchange with LectX, except for Stud12, who sent a message but received no reply. Students sent 76 messages; LectX, 66. The most active exchanges occurred between LectX and 4 students:

	Sent to LectX	Rec'd from LectX	Total
Stud8	15	14	29
Stud5	12	10	22
Stud1	08	09	17
Stud9	07	09	16

Eight messages were passed between LectZ and 3 students: students sent 5; LectZ, 3. Five messages were sent by students to LectY; none were answered.

Because of the vast differences in frequency of exchanges, direct comparison of student-lecturer messages among the three lecturers would not be valid. Instead, we analyzed the opening lectures for variables that might help to explain the large differences in number of exchanges between LectX and the other two lecturers.

STYLISTIC MEASURES OF THE OPENING LECTURES

For quantitative measures of style, we analyzed the three opening lectures using the tools in nine different computer programs:

1. _Word for Windows 2.0_ (WW)
2. _Grammatik IV 1.0_ (GMK4)
3. _RightWriter 4.0_ (RW)
4. _PC-Style 1.0_ (PCSTY)
5. _Correct Grammar 2.0_ (CG)
6. _Pro~Scribe 3.0_ (PROSC)
7. _Text Analyzer 1.11b_ (TEXT)
8. _Fog-Finder 1.1_ (FOG)

9. _Parse_ (PARSE)

The programs provided a variety of information. For example, _Word for Windows_ offered the following information:

- Total number of words, characters, paragraphs, sentences
- Average number of sentences per paragraph, words per sentence, and characters per word
- Percentage of passive sentences
- Scores: Flesch Reading Ease, Flesch Grade Level, Flesch-Kincaid Grade Level, and Gunning-Fox Index

Grammatik IV:

- Scores: Flesch-Kincaid Grade Level, Flesch Reading Ease
- Percentage passive voice
- Average lengths of sentences, words, and paragraphs

RightWriter:

- Total word count
- Scores: readability, strength, description, jargon

The smaller programs, such as _Text Analyzer_ and _Fog-Finder_, provided information on only one or two variables, e.g., total number of words and sentences, and Fog index.

Instead of relying on one or two programs, the information from each analytical tool was combined and averaged when possible. Furthermore, to compare scores and averages based on slightly different algorithms, we calculated T-scores.

THE OPENING LECTURES: GROSS MEASURES

Of the three lectures, LectX's was the shortest: 1760 words versus 8075 and 4941 for LectY and LectZ:

Total Number of Words (avg. of CG, WW, PROSC, PARSE, PCSTY,

RW, TEXT)

0 1 2 3 4 5 6 7 8 9

|....|....|....|....|....|....|....|....|....|....|

LectX XXXXXXXXXX 1760

LectY YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY 8075

LectZ ZZZZZZZZZZZZZZZZZZZZZZZZZ 4941

LectX's average sentence length was also shorter than the others': Words per Sentence (avg. of GMK4, CG, WW, PROSC, PARSE, PCSTY)

0 ~ 15 16 17 18 19 20 21 22 23 24 25

|. ~ |....|....|....|....|....|....|....|....|....|....|

LectX XX ~ XXXXX 15.82

LectY YY ~ YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY 23.25

LectZ ZZ ~ ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ 21.82

In length of words, however, all three were quite similar, averaging between 5.07 and 5.20:

Characters per Word (avg. of CG, PARSE, WW)

0 ~ 2 3 4 5 6

|...~ ..|.....|.....|.....|.....|

LectX XXXX~XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 5.07

LectY YYYY~YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY 5.10

LectZ ZZZZ~ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ 5.20

Grade Level, Reading Level

The following bar graphs present grade-level averages, with their T-scores shown in parentheses, for the three lectures, for the various measures:

Flesch-Kincaid Grade Level Index (avg. of GMK4, CG, WW)

```
      0   ~   10       11       13       14       15
      |... ~ ...|.........|.........|.........|.........|
LectX  XXXX ~ XXXXXXXXXXX 10.77 (36.07)
LectY  YYYY ~ YYYYYYYYYYYYYYYYYYYYYYYYYYYYY 13.83 (59.07)
LectZ  ZZZZ ~ ZZZZZZZZZZZZZZZZZZZZZZZZZZZ 13.27 (54.86)
```

Gunning-Fox Grade Level Index (avg. of WW, CG)

```
      0   ~   14       15       16       17       18
      |... ~ ...|.........|.........|.........|.........|
LectX  XXXX ~ XXXXXXX 14.25 (36.64)
LectY  YYYY ~ YYYYYYYYYYYYYYYYYYYYYYYYYYYYY 16.95 (60.69)
LectZ  ZZZZ ~ ZZZZZZZZZZZZZZZZZZZZZZZZZZZ 16.05 (52.67)
```

Eclectic Grade Level Index (avg. of WW CG RW PCSTY PROSC PARSE FOG)

```
     0  ~   13       14       15       16       17
     |.. ~ ...|.........|.........|.........|.........|
LectX  XXX ~ XXXXX 13.11 (36.14)
LectY  YYY ~ YYYYYYYYYYYYYYYYYYYYYYYYYYYYY 16.41 (59.36)
LectZ  ZZZ ~ ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ 15.72 (54.50)
```

Viewing the T-scores in tabular format shows that the various measures were quite consistent:

T-Scores: Averages and Overall Averages

	Flesch-Kincaid	Gunning-Fox	Eclectic Index	Overall Average
LectX:	36.07	36.64	36.14	36.29
LectY:	59.07	60.69	59.36	59.71
LectZ:	54.86	52.67	54.50	54.01

Averaging these values yielded overall T-score measures for grade level:

Overall T-Score Averages of Grade Level Indexes

```
0   10  20  30  40  50  60  70  80  90  70
|...|...|...|...|...|...|...|...|...|...|
LectX  XXXXXXXXXXXXXXXXXXX 36.29
LectY  YYYYYYYYYYYYYYYYYYYYYYYYYYYYY 59.71
LectZ  ZZZZZZZZZZZZZZZZZZZZZZZZZZZZ 54.01
```

The differences in reading levels are quite dramatic between LectX (36.29),on the one hand, and LectY (59.71) and LectZ (54.01) on the other. The difference is approximately two grade levels.

On another readability measure, Flesch Reading Ease, we found a 10-point difference:

Flesch Reading Ease (avg. of GMK4, CG, WW, PROSC)

```
0  ~  20      30      40      50      60
|...~...|.....|.....|.....|.....|
LectX  XXXX~XXXXXXXXXXXXXXXXXXXXXXXXXXXX 46.05
```

LectY YYYY~YYYYYYYYYYYYYYYYYYY 35.80

LectZ ZZZZ~ZZZZZZZZZZZZZZZZZZZZ 35.65

On this scale, the higher the score, the better the readability level. Again, the difference between LectX and the other two is substantial. Other Measures of Style

Besides gross and grade-level data, we examined several measures of style. In proportion of active verbs, as measured by _PC-Style_, LectX (2.3) uses over twice as many as the other two (0.9):

Active Verbs (PCSTY)

```
      0       1       2       3       4

      |.........|.........|.........|.........|

LectX  XXXXXXXXXXXXXXXXXXXXXXXX 2.3

LectY  YYYYYYYYYY 0.9

LectZ  ZZZZZZZZZZ 0.9
```

In percentage of passive constructions, as determined by _Grammatik 4_ (Scovell, 1991), LectX (11%) also used far fewer passive constructions than LectY (20%) or LectZ (15%):

Passive Construction (GMK4)

```
(%)    0   11   12   13   14   15   16   17   18   19   20   21

      |. ~|....|....|....|....|....|....|....|....|....|....|

LectX  XX ~ X 11%

LectY  YY ~ YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY 20%

LectZ  ZZ ~ ZZZZZZZZZZZZZZZZZZZZZ 15%
```

According to _PC-Style_ and _Grammatik 4_, LectX (3.05%) used nearly twice as many personal words as LectY (3.05%); nearly three times as many as LectZ (2.0%):

Personal Words (avg. of PCSTY and PROSC)

```
     0%  ~   2%       3%       4%       5%       6%

     |....~....|.........|.........|.........|.........|....

LectX  XXXXX~XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 5.95

LectY  YYYYY~YYYYYYYYYYYYYYYY 3.05%

LectZ  ZZZZZ~ZZZZZ 2.0%
```

In _Word for Windows_, we ran a separate check of first-person (I, me, my, myself, we, us, our, ourselves) and second-person (you, your) pronouns as measures of personal language. Analysis shows that LectY (0.32%) and LectX (0.35%) used nearly three times as many first-person forms as LectZ (0.11%):

First-person Forms (I, me, my, myself, we, us, our, ourselves)

.00% .10% .20% .30% .40% .50%

|.....|.....|.....|.....|.....|

LectX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX .35% (49)

LectY YYYYYYYYYYYYYYYYYYYYYYYYYYYYYY .32% (201)

LectZ ZZZZZZZZZZZ .11% (44)

In second-person forms, the difference in frequency between LectX (0.43%) and the others (0.06%) was significant:

Second-Person Forms (you, your)

.00% .10% .20% .30% .40% .50%

|.....|.....|.....|.....|.....|

LectX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX .43% (15)

LectY YYYYYYY .06% (10)

LectZ ZZZZZZZ .06% (6)

DISCUSSION

Of the 155 messages that passed between lecturers and students, 142 involved LectX. There are any number of explanations for this discrepancy. One is that he/she was the first to present his lectures. S/He had approximately 35 days for e-mail exchanges, whereas LectY had 27 and LectZ, 16. Presumably, the additional days gave him an advantage, perhaps more time to develop a rapport with students. However, after 16 days, LectX had already been involved in 93 exchanges: students accounted for 51 of the posts; LectX, 42.

Another explanation is that the novelty of computer mediated communication wore off after the first few weeks and that, consequently, the frequency of posts decreased. This explanation holds true to some extent. The traffic in messages involving LectX decreased by approximately 50 percent during

the second half of the summer session. However, the figures were still relatively quite high: 49 messages in all, 25 from the students, 24 from LectX.

Yet another possible reason is that once students established personal correspondence with one lecturer, they would be reluctant to start up exchanges with others, simply because of the time and effort involved. Surprisingly, the students who were the most avid e-mailers were also most apt to post messages to all three lecturers.

The sequence in which lectures were presented might have played a part in the lopsided number of exchanges. However, the data in support of this view is inconclusive. Based on an analysis of the opening lectures, we tend to believe that, rather than sequence, the lecturers' writing style might be the deciding factor.

In nearly all measures, LectX's style was decidedly different from LectY's and LectZ's. The overall length of his presentation was much shorter: 1760 words to 8075 and 4941. His sentences were shorter: 15.82 words per sentence versus 23.25 and 21.82.

Using various readability indexes, we found that his lecture enjoyed a two grade-level advantage over the others'. Thus, the ideas in his presentation were less formal (Murray, 1988, p. 17; Scovell, 1991) and theoretically much more accessible to the students.

In other measures of style, LectX again stood apart. He used active verbs and personal words (Rice & Love, 1987, p. 101) twice as often as his counterparts, and he resorted to passive constructions significantly less often.

We feel that the results point toward a positive relationship between specific factors in an on-line lecturer's writing style and intensity of message exchanges between him and his students. In this study, we are suggesting that some of those factors are readability and use of personal (Beals, 1990, p. 6; Adkins, 1991) and active language.

CONCLUSION

This study has shown that the style of lecture delivered electronically strongly influences the responsiveness of students. Additional studies, however, are needed to examine many other questions, for example, Do students benefit from active involvement in dialogues with guest lecturers? If so, how?

Another question is suggested from research in composition. One of the educational benefits of frequent practice is improvement in writing skills. Does practice in composing informal e-mail messages contribute to improved writing skill (Holvig, 1989; Phillips & Santoro, 1989, p. 159; DiMatteo, 1990; Casey, 1990; Miller-Souviney & Souviney, 1987; Roberts, 1987)?

Other questions are: When students are actively involved in writing about issues pertinent to their discipline, are they likely to learn more about the issues? Does stimulating the learning environment

with guest lecturers who are able to evoke written responses produce deeper thinking about concepts?

Since students have the time and freedom to consult a dictionary during an electronic lecture, will they do so and thus expand their vocabulary (Reinking, 1988)? Does engaging in written dialogue with a guest lecturer expose students to a broader and deeper vocabulary, and will students apply this vocabulary in subsequent posts or papers?

Could other disciplines benefit from the process or the results of this study? Could replications of this study in other academic fields prove beneficial?

Finally, in order to reduce some of the variables that might have confounded this study, it may be useful to structure alternative studies that do not exactly duplicate the methods used here. For example, a lecturer could be asked to deliberately adhere to alternative styles; this could remove the uncertainty attributable to unique individuals.

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