Journal of
INDUSTRIAL
TECHNOLOGY

Volume 15, Number 3 - May 1999 to July 1999

A Study of Computer-Mediated Communication to be Used for Classroom Instruction

By Dr. Cynthia C. Gillispie

KEYWORD SEARCH

Administration
Research
Teaching Methods

Reviewed Article

The Official Electronic Publication of the National Association of Industrial Technology • www.nait.org

A Study of Computer-Mediated Communication to be Used for Classroom Instruction

By Dr. Cynthia C. Gillispie

Dr. Cynthia Gillispie is an Assistant Professor in the Department of Graphic Communication Systems and Technological Studies at North Carolina Agricultural and Technical State University. She holds Ph.D., M.S. and B.S. degrees. Dr. Gillispie recently received funding for a proposal entitled "Flexography for Classroom Instruction" and incorporated two flexographic courses to the course offerings at her university. Dr. Gillispie has taught seven different courses and established the first Technical Association of the Graphic Arts in the School of Technology where she serves as the advisor. She is a member of NAIT, International Graphic Arts Education Association, Inc., Flexographic Technology Association, Technical Association of the Graphic Arts, Omicron Tau Theta (national graduate honorary professional society in vocational education), Epsilon Pi Tau Gamma Zeta Chapter, American Business Women's Association, Delta Pi Epsilon, and the National Association of University Women.

Introduction

We are now living in the information age. Berge and Collins (1995) noted, "We have entered an information age in which power comes to those who have information and know how to access it" (pp. 4-5). Just imagine these scenarios discussed in a study by Johnston (l992) entitled "Toward A Global Classroom: Using Computer-Mediated Communication at UAA":

> Keeping up-to-date by participating in discussion with your colleagues that involve the latest information and ideas in your field. The time of day or night or whether you are at home or in the office makes no difference in your participation; a course in which your students take part in discussion both in and outside of class—students ask you questions without calling on the telephone, visiting during office hours, scheduling an appointment or meeting face-to-face; or having a course in which you can have a different guest speaker every week.

Today, opportunities exist to enhance the delivery of instruction through Computer-Mediated Communication (CMC). Answering questions, solving problems, and exploring new ideas require that people work together. The collaboration requires communication with people in the next office, in another city, or around the world (Harasim, 1989; Kamper, 199l; Kearsley & Lynch, 199l; Mason, 1989; Goode & Johnson, 199l). Some educators are using CMC for classroom instruction to help manage the complexities of an information-based society. "No longer are teachers the sole experts and information providers, teachers become facilitators and guides" (Berge & Collins, 1995 p. 6).

Bates (l995) stated, "It is still open to debate whether this technology will result in a truly new paradigm, or merely allow valued old paradigms to be used more effectively for learners." Nevertheless, there is a great deal of innovation in the use of CMC in education; and it is also one of the fastest growing technologies, in terms of the numbers of teachers and learners who are using it (Johnston, 1992). Many teachers found with computer-mediated communication that the level of teacher-student and student-student interactions is higher than in most traditional classroom settings (Kearsley & Lynch, 199l; Grabowski & Pusch, 1990; Boshier, 1990; Davie, 1987). "CMC refers to communicating at a distance by means of a network that utilizes personal or mainframe computers as a communications medium (Holden & Mitchell, l993; Basham, 199l). "CMC would seem to encompass any system where the computer is used to mediate communications between and among humans as individuals or as groups" (Turoff, 1989, p. 108). Instruction may be delivered through correspondence study, computer-mediated course work, live (one-way or interactive) or pre-recorded televised courses (utilizing satellite, ground or microwave broadcast), and audio teleconferencing (telephone) courses. "Computer-mediated communication is also seen as a set of possibilities which exist when computer and telecommunication networks are used as tools in communication (Mason, 1990, p. 221). "For some teachers, telecommunications expand the horizons of their classroom, opening the doors to real audience and exciting interactive activities from locations around the country and the world" (Rogers, Andres, Jacks, 199l, p. 25). CMC is also multi-dimensional. It can use not only text and graphic, but also animation video and sound sequenced multiple information paths that allow for a dynamic, interactive interface (Defining software.., l994).

CMC provides educators with instructional tools that can be useful in meeting information challenges of today (Somekh, 1989, p. 242). Satellites, video recorders, and computerized data can eliminate not only distance barriers, but time barriers as well (Grabowski & Pusch, 1990; Kamper, 199l; Mason, 1990; Norton & Stammen, 1990; Tooey & Wester, 1989). CMC can make the teaching and learning process more flexible and instruction more effective in aspects such as speed, cost effectiveness, flexibility, and convenience (Goode & Johnson, 199l; Phelps, Wells, Ashworth, & Hahn, 1990; Grabowski & Pusch 1990; Romiszowski & Jost, l989; Harasim, 1987; Kaye, 1987). CMC can be used successful at the postsecondary level (Brookshire, 199l; Davie, 1987; Mason l988). CMC can expand, not limit, what faculty do when they teach. Thus, if CMC has the potential of becoming one of the most powerful instructional tools available to educators, what are the relative advan-

tages of CMC's use for instructional purposes? A need exists to better understand the relative advantages of using computers for instructional purposes.

Purpose

"By using CMC a teacher can expand the classroom beyond its traditional boundaries. Keys of successful planning and utilization of CMC in instruction include understanding appropriate uses of the technology and understanding the advantages and disadvantages associated with its use" (Rogers, Andres, & Jacks, 199l p. 26). This study, therefore, examined the use of CMC by faculty at four North Carolina public universities and their perceptions of its use. The research question addressed was:

> What perceptions do faculty have in regard to the use of CMC for instructional purposes?

Limitations of the Study

This study is limited to faculty from colleges or schools of business in four universities in North Carolina. It is also limited to those faculties who reported using CMC in relation to their instruction.

Delimitation of the Study

Multiple t-tests were used in analyzing the data; therefore, a probability existed that 1 comparison out of 20 involved a Type 1 error.

Data Sources and Methods

The population for the study was 290 instructors at four North Carolina universities. In the fall of l995, they were sent a survey instrument that requested information about demographics, the use of CMC for instructional purposes, and their perception of the relative advantages and disadvantages of CMC. To establish validity of the instrument, two panels of experts reviewed it. The panel members were selected based on their reputation for expertise in computer usages, and their knowledge of survey instrument development. Further, the instrument was pilot tested with faculty at a university in Virginia.

A week after the initial survey mailing, respondents received a follow-up post card; then a week later they received a replacement survey, and one-week thereafter they received a second replacement survey. This procedure yielded a return of 172 surveys (59%), of which 121 (70%) respondents indicated that they used CMC for instructional purposes and 5l (30%) indicated they did not. Two procedures were used to assess whether nonrespondents were comparable to respondents. First, 10 randomly selected nonrespondents were contacted by phone and their answers were compared to 10 randomly selected respondents. Second, 10 randomly selected early respondents were compared to 10 randomly selected late respondents, since late respondents tend to resemble nonrespondents (Miller & Smith, l983). T-tests were used to evaluate the non-respondent bias and to establish the respondent's proxy of the population. The Statistical Package for Social Science (*SPSS Version 6.0*) was used to process the data and to answer the research question. Also, *a priori* alpha level of .05 was used throughout this study.

The research question was related to perceived values associated with advantages and disadvantages of using CMC for instructional purposes. There were 25 perceived value items. Respondents were asked to circle their response for each item on a scale from strongly agree to strongly disagree, with strongly agree being the most positive and strongly disagree the most negative response for the perceived value of using CMC for instructional purposes. Values were assigned to the scale with 4 being the highest and l being the lowest. Reverse coding was used for negative items. On the 1-4 scale, a value of 2.5 was taken to indicate neutrality. The question implies a null hypothesis that respondents would hold neutral perceptions regarding the perceived values of CMC use for instructional purposes.

Thus H_o: $\mu = 2.5$

H_a: $\mu^1 \neq 2.5$

μ = mean population (25 perceived value items)

The t-test of the hypothesis of neutrality of responses related to the perceived values of CMC for instructional purposes was calculated as follows for each of the 25 items.

$$t = \frac{\overline{X} - 2.5}{Se}$$

$\overline{X}$ = mean value for 25 items related to the perceived values of CMC use for Instructional purposes.

Se = SD/n

SD (standard deviation) indicates the extent of variability or dispersion of scores about the mean. The mean and standard deviation, taken together, provide a description of how valuable respondents perceived CMC to be for instructional use. The use of multiple t-tests led to the probability that the family of conclusions will contain at least one Type l error, which is called the family wise error rate (FW). The complete set of comparisons determining if the mean values were different than 2.5 for the 25 items related to the perceived value of CMC use for instructional purposes were called the family of conclusions.

Findings

The research question was: What perceptions do faculty have in regard to the use of CMC for instructional purposes? There were two subquestions: first, whether means for each advantage and disadvantage were different than a neutral response; and second, whether respondents agreed or disagreed that the statements were advantages or disadvantages of CMC use for classroom instructional purposes. Table 1, comparing the respondents' mean values to a value of 2.5 for a test of the respondent's means being different from a neutral response revealed no significant difference from neutrality for the following advantages of CMC use: can work at any site, eliminates time barriers, provides group interaction, and provides a record of the entire course, with t-

values of 1.91, 1.15, 1.02, and -1.61 respectively.

Regarding the second sub-question, generally the respondents agreed with the perceived value statements. The respondents in this study did not perceive the two items as advantages. They were eliminates students' daydreaming and eliminates students' absenteeism, with means of 1.98, and 1.9l, respectively. The respondents neither agreed nor disagreed with four of the advantage statements. They were can work at any site, eliminates time barriers, provides group interaction, and provides a record of the entire course, with means of 2.63, 2.58, 2.56, and 2.39 respectively. The respondents agreed with findings of Willis (1991); Goode & Johnson, (1991); Grabowski & Pusch, (l990); Romiszowski and Jost (l989); and Harasim (l987) that the following were advantages: useful technology, eliminated distance barriers, facilitates collaborative efforts, provides for student participation, facilitates individualized instruction, serves more students at one time, and provides immediate feedback.

Table 2, comparing respondents' mean values to a value of 2.5 for a test of the respondents' means being different from a neutral response revealed there was a significant difference for all the listed disadvantages of CMC use. The findings further revealed that respondents disagreed that four disadvantages of CMC use were actually disadvantages. They were promotes procrastination, responses long and disorganized, takes too much time to learn, and takes too much time to implement, with means of 2.97, 2.87, 2.76, and 2.67, respectively. The respondents agreed with Willis (l99l); Grahowski & Pusch, (1990); Romiszowski & Jost (l989); Riedl, (l989); Tooey & Wester, (1989); Grint, (1989); Turoff, (1989); Mason (1988); and Davie, (1987) that the following were disadvantages of CMC use: lacks face-to-face communication, in the beginning phases is expensive, requires change in methods of instruction, requires access to specialized equipment, requires access to specialized software, requires knowledge of on-line resources, must be trained to use CMC options, and requires the support of top level administration.

Conclusions

Outcomes of the study revealed that faculty tend to agree with advantages and disadvantages of CMC used for instructional purposes identified through the literature. Thus, for them to adopt the use of CMC in developing their instruction and in using it with their students, they need adequate support, training, equipment, and software. The faculty who responded to this study agreed that 7 of l3 advantages identified from the literature were advantages. For four of the advantages, the respondents neither agreed nor disagreed that they were advantages. Further, they agreed that 8 of 12 disadvantages were disadvantages. For faculty to adopt the use of CMC in their instruction, they need to address perceived disadvantages related to training that include: use of CMC options, knowledge of on-line resources, changes in methods of instruction, and face-to-face communication. Disadvantages that need to be addressed were related to support and included the need for top level administrative support and meeting expenses of CMC use. Those related to equipment and software include use of specialized equipment and use of specialized software. For CMC to be broadly encompassed in instruction, disadvantages associated with its use must first be addressed. As an example, top administration must provide the financial support needed to insure CMC success; and they must provide users with the training to incorporate CMC use in their instruction.

Implications

Several implications of this study may have relevance to educators: CMC has the potential of becoming a powerful tool that educators can use in bringing together information from a variety of sources. CMC is relevant to collaboration, students' participation, and individualized instruction. It can be used as daily information exchange media among colleagues, between instructors and their students, among students, for delivering distance education, and for access to resources and information. Faculty must perceive that CMC has advantages over other instructional tools, and that it has proven useful to their colleagues. They will then put forth the effort needed to confront complexities they face in using CMC and in adapting to instructional procedures that capitalize on its use.

Reference

Bates, T . (1995). Technology. Open learning and distance education. Routledge Studies in Distance Education, Hampshire, England.

Berge, Z. L. & Collins, M. P. (1995). Introduction. In Computer mediated communication and the online classroom (Vol. 2, pp. 1-l0). Cresskill, NJ: Hampton Press.

Boshier, R. (1990). Socio-psychological factors in electronic networking. International Journal of Lifelong Education, 9(1), 49-64.

Basham, D. A. (1991). The impact of computer-mediated communication Dissertation. Abstracts Internation. 52(7), 2509A.

Brookshire, R. G. (1991). Electronic bulletin boards as teaching tools in a university setting. Proceedings of the Tenth Annual Research Conference, 141-146. Washington, DC: Office Systems Research Association.

Chen, D. & Brovey. D. J. (1985, October). Information technology and the educational system: Implications for organization development. Paper presented at the National Technology Leadership Conference, Albany, NY. (ERIC Document Reproduction Service No. 290 456).

Cheng, H., Lehman, J., & Armstrong, P. (199l). Comparison of performance and attitude in traditional and computer conference classes. The American Journal of Distance Education, 5 (3), 51-64.

Davie, L. E. (1987). Learning through networks: A graduate course using computer Conferencing. Canadian Journal of University Continuing Education, 13(2), 11-16.

Defining software for the curriculum (1994, September). Syllabus 8(1), l6-l7.

Goode, J. & Johnson, M. (199l, November). Putting out the flames: The etiquette and law of e-mail. Online, 61-65.

Grabowski, B. & Pusch, W. (1990). Social and intellectual value of computer mediated communication in a graduate community. Educational and Training Technology International, 27(3), 276-283.

Grint, K. (l989). Accounting for failure: Participation and non-participation in CMC. In Mason, R & Kaye, A (Eds) Mindweave: Communication Computers and Distance Education (pp. 189-l92). New York: Pergamon Press.

Harasim, L. (1990). Online education: An environment for collaboration and Intellectual application. Online Education (pp. 39-59). New York: Praeger.

Harasim, L. (1987). Teaching and learning on-line: Issues in computer-mediated graduate courses. Canadian Journal of Educational Communication, 16(2), 117-135.

Holden, M. & Mitchell, W. (l993, March/April). The future of computer-mediated communication higher education. Educom Review, 28(2), 31.

Johnston, V. L. (1992). Toward a global classroom: Using computer-mediated Communication at UAA . University of Alaska, Anchorage (ERIC Document Reproduction Service NO. 356 759).

Kamper, R. J. (1991, November). Computer-mediated communication: Conquest of time and space or just an other technological seduction? Educational Technology, 31(11) pp. 20-25.

Kaye, A. (1987). Computer conferencing and electronic mail. Open Learning for Adults, pp 186-193.

Kearsley, G. & Lynch, W. (1991). Computer networks for teaching and research: changing the nature of educational practice and theory. DEOSNEWS – The Distance Education Online Symposium, 1(l8). BITNET.

Mason, R. (1990). Computer conferencing in distance education. In Bates, A. W. (Ed.) Media and Technology in European Distance Education, (pp. 221 –226). Milton Keynes: Open University, Walton Hall.

Mason, R. (1989). An evaluation of CoSy on an Open University course. In R. Mason & A. R. Kaye A. (Eds.), Mindweave: Communicating Computers and Distance Education, (pp. 221-226). New York: Pergamon Press.

Mason, R. (1988). Computer conferencing: A contribution to self-directed learning. British Journal of Education Technology: Journal of the Council for Educational Technology, 19(1), 28-41.

Miller, L. E. & Smith K. L. (1983). Handling nonresponse issues. Journal of Extension, 21, 45-50.

Norton, R. E. & Stammen, R. M. (1990). Long distance learning, a look at the future. Vocational Education Journal, 65(5), 26-27, 41.

Phelps, R. H., Wells, R. A. Ashworth, R. L. Jr., & Hahn, H. A. (1990). Effectiveness and costs of distance education using computer-mediated communication. The American Journal of Distance Education, 5(3), 7-19.

Riedl, R. (1989). Patterns in computer-mediated discussions. In Mason, R. & Kaye, A. (Eds.) Mindweave: Communicating Computers and Distance Education (pp. 215-220). New York: Pergamon Press.

Roberts, N. G., Blakeslee, G., Brown, M., & Lenk, C. (1990). Integrating telecommunications into education. Englewood Cliffs, New Jersey: Prentice Hall.

Rogers, A., Andres, Y., & Jacks, M. (1991, May). Key to successful telecomputing. The Computing Teacher, 25-28.

Romiszowski, A. J., & Jost, K. (l989, August). Computer conferencing and the distance learner: Problems of structure and control. Paper presented at the 1989 Conference on Distance Education. University of Wisconsin, Madison, Wisconsin.

Somekh, B. (1989). The human interface: Hidden issues in CMC affecting use in schools. In Mason, R. & Kaye, A. (Eds). Mindweave: Communicating Computers and Distance Education (pp. 242-247). New York: Pergamon Press.

Tooey, M. J. & Wester, B. R. (1989, July). Computer conferencing: A campus meets online. Online, 54-60.

Turoff, M. (1989). The anatomy of a computer application innovation: Computer-mediated communications. Technological Forecasting and Social Change, 36, 107-122.

Willis, J. (l99l). Computer-mediated communication systems and intellectual teamwork. Social psychological issues in design and implementation. Educational Technology. 31(4), 10-20.

See page 6 for Tables 1 & Table 2.

Table 1. Analysis of the Respondents' Perceptions of CMC

Advantages of CMC Use	Number of Cases	Mean	SD	SE of Mean	t-value	df	Probability[a]
Useful technology	119	3.37	.58	.05	16.35	118	.000
Eliminates distance barriers	120	3.00	.66	.06	8.29	119	.000
Facilitates collaborative efforts	119	2.97	.57	.05	8.98	118	.000
Provides for student participation	118	2.94	.57	.05	8.34	117	.000
Facilitates individualized instruction	117	2.83	.66	.06	5.39	116	.000
Serves more students at one time	116	2.81	.70	.07	4.80	115	.000
Provides immediate feedback	115	2.78	.59	.06	5.14	114	.000
Can work at any site	116	2.63	.73	.07	1.91	115	.058
Eliminates time barriers	120	2.58	.80	.07	1.15	119	.253
Provides group interaction	110	2.56	.66	.06	1.02	109	.312
Provides a record of the entire course	114	2.39	.70	.07	-1.61	113	.111
Eliminates students' daydreaming	117	1.98	.73	.07	-7.65	116	.000
Eliminates students' absenteeism	116	1.91	.68	.06	-9.29	115	.000

[a]Comparing respondents' mean value to a value of 2.5 for a test of respondents' mean being different than a neutral response.

Table 2. Analysis of Respondents' Perceptions of CMC[a]

Disadvantages of CMC Use	Number of Cases	Mean	SD	SE of Mean	t-value	df	Probability[a]
Promotes procrastination	113	2.97	.59	.06	8.54	112	. 000
Responses long and disorganized	112	2.87	.47	.05	8.16	111	. 000
Takes too much time to learn	117	2.76	.61	.06	4.62	116	. 000
Takes too much time to implement	117	2.67	.63	.06	2.86	116	. 005
Lacks face-to-face communication	119	2.18	.78	. 07	-4.40	118	. 000
In the beginning phases is expensive	116	2.10	.68	.06	-6.31	115	. 000
Requires changes in methods of instruction	120	2.10	59	.05	-7.48	119	. 000
Requires access to specialized equipment	120	2.04	.61	.06	-8.18	119	. 000
Requires access to specialized software	121	1.99	.52	.05	-10.66	120	. 000
Requires knowledge of on-line resources	120	1.98	.60	.06	-9.58	119	. 000
Must be trained to use CMC options	118	1.94	.63	.06	-9.63	117	. 000
Requires the support of top-level administration	121	1.75	.60	.05	-13.81	120	. 000

[a]Comparing respondents' mean value to a value of 2.5 for a test of respondents' mean being different than a neutral response. Reverse coding was used for the disadvantage items.