

Computer-Mediated Communication (CMC)3: state of the art

Peter J. Murray and Robin Mason

Peter J. Murray, Association for Learning Technology
Executive Secretary,
Association for Learning Technology, Oxford, UK

Robin Mason, The Open University
Professor of Educational Technology,
Institute of Educational Technology, The Open University, Milton Keynes, UK

REFERENCES

Allbritton, M (1996) Collaborative Communication among Researchers Using Computer-Mediated Communication: A Study of ProjectH. MA Thesis (unpublished), Department of Communication, University of New Mexico, USA.

Andrusyszyn, M.A (1996) Facilitating reflection in computer mediated learning environments. EdD Thesis (unpublished), Graduate Department of Education, University of Toronto, Canada.

Archer, NP (1990) A comparison of computer conferences with face-to-face meetings for small group business decisions. *Behaviour & Information Technology*, 9(4), 307-317.

Aycock, A. (1995) "Technologies of the self": Michael Foucault online. *Journal of Computer-Mediated Communication*, 1(2). [Online]. Available: <http://www.ascusc.org/jcmc/vol1/issue2/aycock.html>

Bacsich, P & Ash, C (2000) Costing the lifecycle of networked learning: documenting the costs from conception to evaluation. *ALT-J, Association for Learning Technology Journal*, 8(1), 92-102.

Baym, NK (1995) The emergence of community in computer-mediated communication. In S.G. Jones (ed.), *Cybersociety - computer-mediated communication and community*. Thousand Oaks, CA: Sage Publications Inc.

Berge, Z.L. & Collins, M. (1993) Computer conferencing and online education. *The Arachnet Electronic Journal on Virtual Culture*, 1(3). [Online]. Available: <http://www.emoderators.com/papers/bergev1n3.html>

Berge, Z.L. & Collins, M. (1995) Computer-mediated scholarly discussion groups. *Computers in Education*, 24(3), 183-189.

Bolter JD (1989) Beyond word processing: the computer as a new writing space. *Language and Communication*, 9(2/3), 129-142.

Bowers, L. (1997) Constructing international professional identity: what psychiatric nurses talk about on the Internet. *International Journal of Nursing Studies*, 34(3), 208-212.

Boyle T & Cook J (2001) Online interactivity: best practice based on two case studies. ALT-J, Association of Learning Technology Journal, 9(1), 94-102.

Brennan, P.F. (1997) The ComputerLink Projects: a Decade of Experience. In U. Gerdin, M. Tallberg & P. Wainwright (eds.), Nursing informatics: the impact of nursing knowledge on health care informatics, Proceedings of the Sixth International Congress on Nursing Informatics (NI97), Stockholm, Sweden. Amsterdam: IOS Press.

Bringelson, L.S. & Carey, T. (2000) Different (key)strokes for different folks: designing online venues for professional communities. Educational Technology and Society, 3(3), 58-64.

Brookfield, S.D. (1986) Understanding and facilitating adult learning: a comprehensive analysis of principles and effective practices. Milton Keynes: Open University Press.

Burge, E.J. (1993) Students' perceptions of learning in computer conferencing: a qualitative analysis. EdD thesis (unpublished), Graduate Department of Education, University of Toronto, Canada.

Cavazos, E.A. & Morin, G. (1994) Cyberspace and the law: your rights and duties in the on-line world. Cambridge, Mass: The MIT Press.

Collins, M.P. & Berge, Z.L. (1995) Volume two: computer-mediated communication and the online classroom in higher education. In Z.L. Berge & M.P. Collins (eds.), Computer mediated communication and the online classroom. Volume 2: Higher education. Cresskill, New York: Hampton Press.

Collins D & Bostock S J (1993) Educational effectiveness and the computer conferencing interface. ETTI, 30(4), 334-342.

Collis, B. (1996) Tele-learning in a digital world: the future of distance learning. London: International Thomson Computer Press.

Collis B & Moonen T (2001) Flexible learning in a digital world: experiences and expectations. Kogan Page, London

Collis B (2002) Information technologies for education and training. In Adelsberger HH, Collis B & Pawlowski JM (eds) (2002) Handbook on information technologies for education and training. Berlin: Springer-Verlag.

Coomey M & Stephenson J - Online learning: it is all about dialogue, involvement, support and control - according to the research. In Stephenson J (ed) (2001) Teaching and learning online: pedagogies for new technologies. Kogan Page, London.

Daniel, J. (1997) Mega-universities and knowledge media: technology strategies for higher education. London: Kogan Page.

December, J. (1996) What is Computer-mediated Communication? [Online]. Available at: <<http://www.december.com/john/study/cmc/what.html>>

Dede, C. (1996) The evolution of distance education: emerging technologies and distributed learning. The American Journal of Distance Education, 10(2), 4-36.

Dickinson D & Stewart V (2001) Towards an andragogy for living in an information society. In Stephenson J (ed) (2001) Teaching and learning online: pedagogies for new technologies. London: Kogan Page.

Dillenbourg P, Baker M, Blaye A & O'Malley C (1996) The evolution of research on collaborative learning. In E Spada & R Reiman (eds), Learning in humans and machine: towards an interdisciplinary learning science, Oxford: Elsevier

Dillenbourg, P & Schneider, DK (2002) A call to break away from imitating schooling.<http://musgrave.cqu.edu.au/clp/clpsite/guest_editorial.htm>

Doherty P (1998) Learner control in asynchronous learning environments. ALN, www.aln.org/alnweb/magazine/alnpaga.htm
<<http://www.abed.org.br/publicue/cgi/cgilua.exe/sys/authoring/www.aln.org/alnweb/magazine/alnpaga.htm><http://www.aln.org/alnweb/magazine/alnpaga.htm>>

Eastmond DV (1993) Adult learning of distance students through computer conferencing. PhD dissertation, New York: Syracuse University.

Ehrmann, S (1995) Asking the right question: what does research tell us about technology and higher education? Change: the magazine of higher learning, 27 Mar/Apr (online) <<http://www.learner.org/edtech/rscheval/rightquestion.html>>

Eisenstadt, M. & Vincent, T. (1998) The knowledge web: learning and collaborating on the net. London: Kogan Page.

Eldred, J.C. & Hawisher, G.E. (1995) Researching electronic networks. Written Communication, 12(3), 330-359.

Ellsworth, J.H. (1995) Using computer-mediated communication in teaching university courses. In Z.L. Berge & M.P. Collins (eds.), Computer mediated communication and the online classroom. Volume 1: Overview and perspectives. Cresskill, New York: Hampton Press.

Engelhardt, H.T. & Wildes, K.W. (1994) The four principles of health care ethics and post-modernity: why a libertarian interpretation is unavoidable. In R. Gillon (ed.), Principles of health care ethics. Chichester: John Wiley & Sons Ltd.

Ess, C. (ed.) (1996a) Philosophical perspectives on computer-mediated communication. Albany NY: State University of New York Press.

Ess, C. (1996b) Introduction: thoughts along the I-way: philosophy and the emergence of computer-mediated communication. In C. Ess (ed.), Philosophical perspectives on computer-mediated communication. Albany: State University of New York Press.

Etzioni, A. & Etzioni, O. (1999) Face-to-face and computer-mediated communities, a comparative analysis. The Information Society, 15, 241-248

Fanderclai T L (1995) MUDs in Education: New Environments, New Pedagogies. Computer-Mediated Communication Magazine, <<http://www.ibiblio.org/cmc/mag/1995/jan/fanderclai.html>>

Fawcett, J. & Buhle, E.L., Jr. (1995). Using the Internet for data collection: an innovative electronic strategy. *Computers in Nursing*, 13, 273-279.

Feenberg A (1989) The written world: on the theory and practice of computer conferencing. In R. Mason & A. Kaye (eds), *Mindweave: communication, computers and distance education*, Pergamon Press, Oxford, pp.22-39.

Foucault, M. (1988). *Technologies of the Self: A Seminar with Michel Foucault*. (L.H.Martin, H. Gutman, & P.H. Hutton, eds.). Amherst, Mass.: University of Massachusetts Press.

Franco, V., Piirto, R., Hu, H.-Y. & Lewenstein, B.V. (1995) Anatomy of a flame: conflict and community building on the Internet. *IEEE Technology and Society Magazine*, Summer 1995, 12-21.

Friedman, E.D., Haefele, L., Keating, K.M., Mullen, M., Patrick, M., Plotkin, D. & Strenski, E. (1995) An electronic discussion list in an undergraduate writing course. *Computers in Education*, 24(3), 191-201.

Gresham, J.L. (1994) From invisible college to cyberspace college: computer conferencing and the transformation of informal scholarly communication networks. *IPCT, Interpersonal computing and technology: an electronic journal for the 21st century*, 2(4), October. [Online]. Available: <http://www.infomotions.com/serials/ipct/ipct-v2n04-gresham-from.txt>

Hall, K. (1996) *Cyberfeminism*. In S.C. Herring (ed.), *Computer-mediated communication: linguistic, social and cross-cultural perspectives*. Amsterdam: John Benjamins Publishing Company.

Han, H.R. & Belcher, A. (2001) Computer-mediated support group use among parents of children with cancer - an exploratory study. *Computers in Nursing*, 19(1), 27-33.

Harasim, LM (1987) Teaching and learning on-line; issues in computer-mediated graduate courses. *Canadian Journal of Educational Communication*, 16(2), 117-135.

Harasim, L.M. (1990) Online education: an environment for collaboration and intellectual amplification. In L. Harasim (ed.), *Online education: perspectives on a new environment*. New York: Praeger Publishers.

Harasim L (1999) What are we learning about teaching and learning online: an analysis of the Virtual-U field trials. Telelearning Network of Centres of Excellence, British Columbia. http://www.telelearn.ca/g_access/research_projects/news/vufieldtrials.pdf

Henri F (1991) Computer conferencing and content analysis. In A.R. Kaye (ed), *Collaborative learning through computer conferencing: the Najaden papers*, Springer-Verlag/NATO Scientific Affairs Division, Berlin, pp.117-135.

Herring, S. (1996a) Linguistic and critical analysis of computer-mediated communication: some ethical and scholarly considerations. *The Information Society*, 12, 153-168.

Herring, S. (1996b) Posting in a different voice: gender and ethics in computer-mediated communication. In C. Ess (ed.), *Philosophical perspectives on computer-mediated communication*. Albany: State University of New York Press.

Herring, S.C. (ed.) (1996c) *Computer-mediated communication: linguistic, social and cross-cultural perspectives*. Amsterdam: John Benjamins Publishing Company.

Herring, S.C. (1996d) Two variants of an electronic messaging schema. In S.C. Herring (ed.), *Computer-mediated communication: linguistic, social and cross-cultural perspectives*. Amsterdam: John Benjamins Publishing Company.

Hiltz, S.R. (1995) *The Virtual Classroom: Learning without Limits via Computer Networks*. Norwood, NJ: Ablex Publishing.

Horton, S. (2000) *Web teaching guide: a practical approach to creating course web sites*. New haven, CT: Yale University Press.

Howard T (1993) The property issue in e-mail research. *Bulletin of the Association of Business Communications*, 56(2), 40-41.

Hutchings M (2002) Computer mediated communication: impact on learning. In S Fallows & R Bhanot, *Educational development through information and communications technology*, Birmingham, Kogan page/SEDA.

Jonassen, D., Davidson, M., Collins, M., Campbell, J. & Haag, B.B. (1995) Constructivism and computer-mediated communication in distance education. *The American Journal of Distance Education*, 9(2), 7-26.

Jones C (1999) From the sage on the stage to what exactly? Description and the place of the moderator in co-operative and collaborative learning. In D Squires, G Conole and G Jacobs (eds), 2000, *The changing face of learning technology*, Cardiff, University of Wales Press.

Jones, S.G. (1995) Understanding community in the information age. In S.G. Jones (ed.) *Cybersociety - computer-mediated communication and community*. Thousand Oaks, CA: Sage Publications Inc.

Kaye, A. (1991) Learning together apart. In A.R. Kaye (ed.), *Collaborative learning through computer conferencing: the Najaden papers*. Berlin: Springer-Verlag/NATO Scientific Affairs Division.

Kiesler S (1991) Talking, teaching, and learning in network groups: lessons from research. In A.R. Kaye (ed), *Collaborative learning through computer conferencing: the Najaden papers*, Springer-Verlag/NATO Scientific Affairs Division, Berlin, pp.147-165.

Kiesler S, Siegel J & McGuire TW (1991) Social psychological aspects of computer-mediated communication. In C. Dunlop & R. Kling (eds), *Computerization and controversy: value conflicts and social choices*, Academic Press Inc., Boston, pp.330-349.

King, S.A. (1996) Researching Internet communities: proposed ethical guidelines for the reporting of results. *The Information Society*, 12, 119-127.

Klemm, P., Reppert, K. & Visich, L. (1998) A nontraditional cancer support group: the Internet. *Computers in Nursing*, 16(1), 31-36.

Klemm, P., Hurst, M., Dearholt, S.I. & Trone, S.R. (1999) Cyber solace - gender differences on Internet cancer support groups. *Computers in Nursing*, 17(2), 65-72.

Komito, L. (1998) The Net as a foraging society: flexible communities. *The Information Society*, 14, 97-106.

Lakeman, R. (1997) Using the Internet for data collection in nursing research. *Computers in Nursing*, 15(5), 269-275.

Lave, J. (1991) Situated learning in communities of practice. In L.B. Resnick, J.M. Levine & S.D. Teasley (eds.), *Perspectives on socially shared cognition*. Washington DC: American Psychological Association.

Lipman M (1991) *Thinking in education*. New York: Cambridge University Press.

Looi, C-K (2002) Communication techniques. In Adelsberger HH, Collis B & Pawlowski JM (eds) (2002) *Handbook on information technologies for education and training*. Berlin: Springer-Verlag.

Martunnen, M (1997) Teaching argumentation skills in an electronic mail environment. *Innovations in Education and Training International*, 34(3), 208-218.

Mason, R. (1988) Computer-conferencing: a contribution to self-directed learning. *British Journal of Educational Technology*, 19(1), 28-41.

Mason, R. (1991) Evaluation methodologies for computer conferencing applications. In A.R. Kaye (ed.), *Collaborative learning through computer conferencing: the Najaden papers*. Berlin: Springer-Verlag/NATO Scientific Affairs Division. Mason R (1992) Computer conferencing for managers. *Interactive Learning International*, 8, 15- 28.

Mason, R. (1993) Introduction: written interactions. In R. Mason (ed.), *Computer conferencing: the last word*. Victoria, BC: Beach Holme Publishers Ltd.

Mason R (1994) *Using communications media in open and flexible learning*. Kogan Page Ltd/Institute of Educational Technology, London.

Mason, R. (1998) Models of Online Courses. *ALN Magazine Volume 2, Issue 2*. [Online]. Available: <http://www.aln.org/alnweb/magazine/vol2_issue2/Masonfinal.htm>

Mason, R and Bacsich, P (1998) Embedding Computer Conferencing into University Teaching. *Computers in Education Vol 30, No 3/4 pp 249-258*

McConnell D (1988) Group communications via computer conferencing - the educational potential. In D. Smith (ed), *New technologies and professional communications in education: occasional paper 13*, National Council for Educational Technology, London, pp.146-164.

McConnell D (2000) *Implementing computer supported cooperative learning (second edition)*. London: Kogan Page.

McCormack, C. & Jones, D. (1998) Building a web-based education system. New York: Wiley Computer Publishing.

McCreary E (1989) Computer-mediated communication and organisational culture. In R. Mason & A. Kaye (eds), *Mindweave: communication, computers and distance education*, Pergamon Press, Oxford, pp. 109-112.

McKendree J, Stenning K, Mayes T, Lee J & Cox R (1998) Why observing a dialogue may benefit learning. *Journal of Computer Assisted Learning*, 14(2), 110-119. McSporran M & Young S (2001) Does gender matter in online learning? *ALT-J, Association of Learning Technology Journal*, 9(2), 3-15.

Murray, P.J. (1996) Nurses' computer-mediated communications on NURSENET: a case study. *Computers in Nursing*, 14(4), 227-234.

Murray, P.J. (2002) *Subject:talk.to/reflect - reflection and practice in nurses' computer-mediated communications*. PhD Thesis (unpublished). Institute of Educational Technology, The Open University, UK.

Murray PJ & Anthony DM (1999) Current and future models for nursing e-journals: making the most of the web's potential. *International Journal of Medical Informatics*, 53, 151-161.

Myles A (1991) Independent studies and the curriculum in nursing education. In S Pendleton and A. Myles (eds), *Curriculum planning in nursing education: practical applications*, London: Edward Arnold.

Naughton, J. (2000). *A brief history of the future: the origins of the internet*. London: Phoenix

Newman, D.R., Johnson, C., Cochrane, C. & Webb, B. (1996) An experiment in group learning technology: evaluating critical thinking in face-to-face and computer-supported seminars. *Interpersonal Computing and Technology: An Electronic Journal for the 21st century*, 4(1), 57-74. [Online]. Available: <<http://jan.ucc.nau.edu/~ipct-j/1996/n1/newman.txt>>

Newman, D.R., Webb, B. & Cochrane, C. (1995) A content analysis method to measure critical thinking in face-to-face and computer supported group learning. *Interpersonal Computing and Technology: An Electronic Journal for the 21st century*, 3(2), 56-77. [Online]. Available: <<http://jan.ucc.nau.edu/~ipct-j/1995/n2/newman.txt>> (accessed 14 January, 2001).

Owen, T. (1993) *Wired writing: the writers in electronic residence program*. In R. Mason (ed.), *Computer conferencing: the last word*. Victoria, BC: Beach Holme Publishers Ltd.

Panitz T (1997) The case for student-centred instruction via collaborative learning paradigms. <<http://www.capecod.net/~tpanitz/tedsarticles/coopbenefits.htm>>

Paulsen MF (1995) *The online report on pedagogical techniques for computer-mediated communication*, Oslo, Norway. <<http://www.nettskolen.com/forskning/19/cmcped.html>>

Perrolle JA (1991) Conversations and trust in computer interfaces. In C. Dunlop & R. Kling (eds), *Computerization and controversy: value conflicts and social choices*, Academic Press Inc., Boston.

Phillips AF & Pease PS (1987) Computer conferencing and education: complementary or contradictory concepts? *The American journal of distance education*, 1(2), 38-51.

Phillips C (1990) Making friends in the electronic student lounge. *Distance education*, 11(2), 320-333.

Porter JE (1993) E-mail and variables of rhetorical form. *Bulletin of the Association of Business Communications*, 56(2), 41-42

Poster, M. (1990) *The mode of information: poststructuralism and social context*. Cambridge: Polity Press.

Preece, J. (1998) Empathic communities: reaching out across the Web. *Interactions*, March-April, 32-43.

Rafaeli, S., Sudweeks, F, Mabry, E. & Konstan, J. (1997) ProjectH: A collaborative qualitative study of computer-mediated communication. In F. Sudweeks, M. McLaughlin & S. Rafaeli (eds.), *Network and netplay: virtual groups on the Internet*. Menlo Park, CA: AAI/MIT Press.

Ripich S, Moore SM & Brennan PF (1992) A new nursing medium: computer networks for group intervention. *Journal of Psychosocial Nursing*, 30(7), 15-20.

Rojo, A. (1995) Participation in scholarly electronic forums. PhD thesis, University of Toronto, Canada. [Online]. Available: <<http://www.digitaltempo.com/e-forums/thindex.html>> Romiszowski AJ & DeHaas J (1989) Computer-mediated communication for instruction: using e-mail as a seminar. *Educational technology*, 24(10)

Romiszowski AJ, Jost K & Chang E (1990) Computer-mediated communication: a hypertext approach to structuring distance seminars. In proceedings of the 32nd Annual ADCIS International Conference. Association for the Development of Computer-based Instructional Systems (ADCIS).

Rumble G (1997) *The costs and economics of open and distance learning*. London: Kogan Page.

Russell, TL (1999) The no significant difference phenomenon, North Carolina State University. <<http://teleeducation.nb.ca/nosignificantdifference/>>

Ryan R (1992) International connectivity: a survey of attitudes about cultural and national differences encountered in computer-mediated communication. *The online chronicle of distance education and communication*, 6(1).

Salmon, G (2000) *E-moderating: the key to teaching and learning online*. Kogan Page, London

Salmon, G (2002) Approaches to researching teaching and learning online. Steeples C & Jones C (eds) (2002) Networked learning: perspectives and issues. Springer-Verlag, London

Seale J & Rius-Riu M (2001) An introduction to learning technology within tertiary education in the UK. Oxford: Association for Learning Technology.

Steeples C & Jones C (eds) (2002) Networked learning: perspectives and issues. Springer-Verlag, London

Savicki, V., Lingenfelter, D., & Kelley, M. (1996) Gender language style in group composition in Internet discussion groups. *Journal of Computer-Mediated Communication*, 2(3). [Online]. Available: <<http://www.ascusc.org/jcmc/vol2/issue3/savicki.html>>

Schrum, L. (1993) Social interaction through online writing. In R. Mason (ed.), *Computer conferencing: the last word*. Victoria, BC: Beach Holme Publishers Ltd.

Schrum, L. (1995) Framing the debate: ethical research in the information age. *Qualitative Inquiry*, 1(3), 311-326.

Seaton, W.J. (1993) Computer-mediated communication and student self-directed learning. *Open Learning*, June, 49-54.

Shank, G. & Cunningham, D. (1996) Mediated phosphor dots: toward a post-cartesian model of CMC via the semiotic superhighway. In C. Ess (ed.), *Philosophical perspectives on computer-mediated communication*. Albany: State University of New York Press.

Siegel, J., Dubrovsky, V., Kiesler, S. & McGuire, T.W. (1986) Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes*, 37, 157-187.

Spender, D. (1995) *Nattering on the net: women, power and cyberspace*. North Melbourne, Australia: Spinifex Press Pty Ltd.

Sproull L & Kiesler S (1986) Reducing social context cues: electronic mail in organizational communication. *Management Science*, 32(11), 1492-1512.

Squires D (1999) Peripatetic electronic teachers in higher education. In D Squires, G Conole and G Jacobs (eds), 2000, *The changing face of learning technology*, Cardiff, University of Wales Press.

Steinberg ER (1992) The potential of computer-based telecommunications for instruction. *Journal of Computer-Based Instruction*, 19(2), 42-46.

Stratfold M (1998) Promoting learner dialogues on the web. In Eisenstadt, M. & Vincent, T. (1998) *The knowledge web: learning and collaborating on the net*. London: Kogan Page.

Sudweeks, F., McLaughlin, M. & Rafaeli, S. (eds.) (1997). *Network and Netplay: Virtual Groups on the Internet*. Menlo Park CA: AAI/MIT Press. Thomas, J. (1996)

Introduction: a debate about the ethics of fair practices for collecting social science data in cyberspace. *The Information Society*, 12, 107-117.

Todd, N.A. (1998) Using e-mail in an undergraduate nursing course to increase critical thinking skills. *Computers in Nursing*, 16(2), 115-118.

Walsh, J.P. & Bayma, T. (1996) Computer networks and scientific work. *Social Studies of Science*, 26, 661-703.

Walther J B (1992) Interpersonal effects in computer-mediated interaction: a relational perspective. *Communication Research*, 19(1), 52-90.

Waskul, D. & Douglass, M. (1996) Considering the electronic participant: some polemical observations on the ethics of on-line research. *The Information Society*, 12, 129-139.

Waskul, D. & Douglass, M. (1997) Cyberself: The emergence of self in on-line chat. *The Information Society*, 13, 375-397.

Watson, N. (1997) Why we argue about virtual community: a case study of the phish.net fan community. In S.G. Jones (ed.), *Virtual culture: identity and communication in cybersociety*. London: Sage Publications.

Weinberg, N., Schmale, J.D., Uken, J & Wessel, K. (1995a) Computer-mediated support groups. *Social Work in Groups*, 17(4), 43-54.

Weinberg, N., Uken, J.S., Schmale, J. & Adamek, M. (1995b) Therapeutic factors: their presence in a computer-mediated support group. *Social Work in Groups*, 18(4), 57-69.

Wenger E (1998) *Communities of practice*. Cambridge: Cambridge University Press.

Yakimovicz, A.D. & Murphy, K.L. (1995) Constructivism and collaboration on the Internet: case study of a graduate class experience. *Computers in Education*, 24(3), 203-209.

Yates, S.J. (1994) The textuality of computer-mediated communication: speech, writing and genre in CMC discourse. PhD thesis (unpublished), The Open University, Milton Keynes, UK.

Yoon, S.H. (1996) Power online: a poststructuralist perspective on computer-mediated communication. In C. Ess (ed.), *Philosophical perspectives on computer-mediated communication*. Albany: State University of New York Press.

Zack, M.H. & McKenny, J.L. (1995) Social context and interaction in ongoing computer-supported management groups. *Organization Science*, 6(4), 394-422.