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# Free and Inexpensive Materials on Computing in Teaching and Learning Activities[x]

## AN INFORMAL APPRAISAL

### INTRODUCTION

This is an excerpt from a document intended for persons wishing to establish inexpensively a library of reference materials and periodicals on use of computing in teaching and learning activities. The primary intention is to be of service to colleges and universities participating in Project EXTEND in the state of Michigan or elsewhere. However, the information has proved useful to other sectors of education and training as well, e.g. high schools and industrial training.

The information is drawn from a variety of sources, in particular the Guide to Information Sources from Project CLUE (see entry in Reference Materials Section). Although many of these entries have been checked against current issues of the periodicals or reference works, we do not mean to assure that the materials are still available at the price indicated, or even available at all. Furthermore, additional sources not known to us at the date of this current revision (April 1975) may be equally helpful. We would appreciate being informed of additional information to add to this advisory note.

The first section lists periodicals available free or by subscription of $8 or less per year. Most of the annotations are informal opinion; other views should be considered if one is seeking critical comment on the periodicals. Furthermore, other periodicals should be considered without regard to cost because they may add significantly to the collection of information (see the Project CLUE Guide to Information Sources for a longer listing). The entire set of 20 periodicals listed here would cost only $34 per year.

The second section lists reference materials available for $10 or less. The list could be very much longer but a selection has been made in order to keep the total cost of such a library low. Another way to reduce the cost is to acquire some reference works in microfiche format if reading equipment is available. Indeed, some

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[x]Prepared for the Project EXTEND Information Exchange. Excerpted by the editors of System.

of the very expensive books are available for a few dollars
in microfiche.

The third section summarizes some key projects which any
newcomer to the field should know about. Some of them main-
tain mailing lists and distribute useful technical reports
and other documents without charge. This list also could
be made much longer; a selection has been made to be of
maximum assistance to persons beginning work on instruc-
tional use of computing in colleges and universities.

The user of this guide cannot be reminded too often to
look to other sources for information. Sometimes a commer-
cial publication priced at more than the limit set for
this guide is well worth the additional money. Also other
sources may lead to yet further hints about inexpensive
materials.

PERIODICALS

ACM SIGCUE Bulletin. Four issues per year; $4 for members
of ACM; $6 otherwise. Editor: Joyce Statz, Computer
Science, Bowling Green State University, Bowling Green,
OH 43403. Membership: ACM Headquarters, SIGCUE, Associa-
tion for Computing Machinery, P.O. Box 12105, New York,
NY 10249.

> This bulletin is distributed to about 1,400 members
> of the Special Interest Group on Computer Uses in
> Education (SIGCUE) of the Association for Computing
> Machinery (ACM). It is probably the single best
> source for computers in college teaching and
> learning, including a calendar, news, brief tech-
> nical reports, book reviews and comments on confer-
> ences.

CALCULI. Six issues per year; no charge for current issues.
Back issues and indices to pages 1-100 and 101-202 are
available for $7.50 ($8.50 if billing is required). Edi-
tor: Steven V.F. Waite, Classics, Dartmouth College,
Hanover, NH 03775.

> Each number is four to eight pages, pre-punched for
> easy addition to a binder in which information about
> computers in classics and news of meetings and a
> bibliography are accumulated. The periodical is
> published by Dartmouth College with support from
> the American Philological Association, and its
> success indicates how an institution can provide
> a very helpful service to a discipline at very low
> cost.

CAPRICE: Computer-Assisted and Programmed Instruction in
Communications and Education. Four issues per year; no

charge. Editor: Dawn Cizmar, Office of Instructional
Resources, 450 Library East, University of Florida,
Gainesville, FL.

> CAPRICE carries news of current research in com-
> puter-assisted and programmed instruction with
> particular emphasis on communications and educa-
> tion. The newsletter also carries a conference
> calendar and news about journals.

Computer Education. Three journals per year; $5. Editors:
Peter Lambert, National Computing Centre, and C.N. Dally,
Sandhurst School. Subscriptions: Mrs. P. Jackson, The
Computer Education Group Treasurer, North Staffordshire
Polytechnic Computer Centre, Blackheath Lane, Stafford,
England.

> The Computer Education Group, an affiliate of the
> British Computer Society, does an excellent job
> getting information to teachers and others in-
> terested in computers in school. Each issue in-
> cludes ideas for classroom use, reports on acti-
> vities in various schools, news of new develop-
> ments, and information about conferences and re-
> ports particular to the United Kingdom. Ideas
> for individual and group activities relating to
> computing studies and computer literacy transfer
> readily across the Atlantic.

Creative Computing. Six issues per year; $8; $6 for
students or groups; $15 for institutions. Editor: David
H. Ahl, Ideametrics, Box 789-M, Morristown, NJ 07960.

> A very new publication having only a few issues
> as of this date. The previous work of the editor
> on similar publications is very good. The style
> is very light, and perhaps more for elementary
> and secondary schools than for colleges and uni-
> versities, although half the editors are in high-
> er education. One can expect articles pertinent
> to higher education from editors A. Kent Morton,
> Karl L. Zinn, Alfred Bork and others.

EDU. Six issues per year; no charge. Editor: Sally R.
Bower, Digital Equipment Corporation, 146 Main Street,
Maynard, MA 01754.

> This newsletter is primarily for users of educa-
> tional computing systems marketed by Digital, but
> its interesting reports, news and suggested ac-
> tivities are useful to anyone. Although much of
> the writing may be directed at secondary school
> users, many of the ideas apply to any level.

EDUCOM Bulletin. Four issues per year; free to faculty of
member institutions; $5 to educators and students; $10 to
others. Subscriptions: EDUCOM, Box 364, Rosedale Road,
Princeton, NJ 08540.

> News on computer and information systems in higher
> education is covered in each issue with particular
> attention to the activities of EDUCOM (Interuniver-
> sity Communications Council). Although very helpful
> for general information and pointers to specific
> sources, this periodical does not usually contain
> specific ideas for computer use.

HP Educational Users Group Newsletter. About eight issues
per year; no charge for users of HP equipment; $6 other-
wise. Carol Scheifele, 11000 Wolfe Road, Cupertino, CA
95014.

> This newsletter is primarily for users of educational
> computing systems marketed by HP (Hewlett-Packard).
> Similar to EDU, it offers helpful information and
> ideas to many readers regardless of the computing
> system they use. Both HP and Digital are providing
> a significant service to education as each one
> builds its share of a growing market.

Information Resources. About four issues per year; no
charge. Editor: Maxine Sitts. Editorial Officers: ERIC
Clearinghouse on Information Resources, Stanford Center
for Research and Development in Teaching, Stanford Uni-
versity, Stanford, CA 94305.

> This clearinghouse, one of about a dozen on various
> topics, is the most likely to carry information
> about computers in teaching and learning. Almost
> every issue of its newsletter has some note on re-
> ports dealing with computer-assisted instruction
> or sometimes other kinds of computer use. The
> various clearinghouses are supported by the Office
> of Education to collect, review and abstract pub-
> lications and documents, and to index them for
> inclusion in a computer-accessed data base. A few
> free materials are available dealing with various
> phases of information resources.

ON-LINE: A Newsletter on Educational Use of Computers
Among Michigan Colleges and Universites. Six issues
per year; no charge to persons in colleges and universi-
ties in Michigan, and other institutions cooperating in
the information exchange; $4 otherwise. Editor: Karl L.
Zinn, U-M CRLT, 109 E. Madison St., Ann Arbor, MI 48104.

> This newsletter informs faculty and administrators
> about computers in teaching and learning activities,

focusing on matters of interest within Michigan and neighboring states and provinces. Each issue carries brief reports, conference information, news, reviews and comments. A special issue each summer reports on an annual Conference on Instructional Computing in Michigan. Probably this publication is not very helpful outside the Midwest; in any case, the SIGCUE Bulletin provides national scope at the same price.

Peoples Computer Newsletter. Five issues per year; $5. Editor: Bob Albrecht, People's Computer Company, P.O. Box 310, Menlo Park, CA 94025.

In newspaper format, this periodical carries much information, emphasizing ideas and activities immediately useful in a secondary school classroom using computing. Many games, problems and other challenges are put forth in its pages. Back issues are a bargain.

PLANIT Newsletter. Four to six issues per year; $4 to individual subscribers in the USA; $5 to individual subscriber outside the USA; $10 for an institutional subscription. Editor: Lyle B. Smith, PLANIT Users Group, SCIP at SLAC, Bin 97, Stanford, CA 94305.

Dedicated entirely to information about the authoring language PLANIT, this periodical would not be of much interest except to users and potential users of that language. It provides information about meetings, new installations, and program exchange.

THE Journal (Technological Horizons in Education). Eleven issues per year; no charge to persons who qualify (e.g. administrators and department chairmen); $15 otherwise. Editor: John F. Martell, Information Synergy, Inc., P.O. Box 992, Acton, MA 01720.

This periodical covers a range of technologies (video, film and specialized print materials as well as computers) with emphasis on future developments. Every one of the first five issues has had two or more articles on computers in teaching.

UCODI Newsletter. About four issues per year; no charge. Services and subscriptions: Centre Imago - UCODI Department, Celestijnenlaan, 200-C, 3030 Heverlee, Belgium.

The Centre for Educational Research and Innovation (CERI) of OECD (in Paris) established a documentation center for computers in education. This newsletter conveys information about its activities and resources.

REFERENCE MATERIALS

Computers in Humanistic Research: Readings and Perspec-
tives. Englewood Cliffs: Prentice-Hall, Inc., 1967. $7.95.

> A collection of papers from six regional conferences
> in the United States dealing with the role of the
> computer in humanistic research. Contents include
> surveys of the varied uses of the computer in anthro-
> pology, archaeology, history, political science, lan-
> guage and literature, and musicology, as well as
> discussions of the special problems confronting a
> humanist scholar dealing with computer research.
> Most of the articles are written in non-technical
> language and are comprehensible to lay readers.

Holtzman, Wayne H., ed. Computer-Assisted Instruction,
Testing and Guidance. New York: Harper & Row, 1970. $10

> The twenty papers in this book were prepared for a
> conference at the University of Texas at Austin in
> October, 1968, organized by the Social Science Re-
> search Council and the College Entrance Examina-
> tion Board. They encompass a wide range of subject
> areas including: system and instructional design,
> learning strategies, complex man-machine systems,
> and computer guidance and counseling. Although a
> number of the papers are technical and require some
> expertise in computer technology, the critical dis-
> cussions are of general interest and are comprehen-
> sible to a novice in the field. This book is a
> useful supplement for a course on educational tech-
> nology, or for psychological aspects of computers
> in education.

Levien, Roger. Computers in Instruction: Their Future for
Higher Education. Proceedings of a Conference. Rand Cor-
poration, October 1970. Report Number R-718-NSF/CCOM/RC.
$7.00.

> About 25 contributions were arranged to consider com-
> puter capabilities and costs, sources of service,
> sources of instructional materials, and the impact
> on higher education and policy recommendations. This
> proceedings is a very helpful collection of state-
> ments about computers in higher education. The book
> is available from the Rand Corporation, 1700 Main
> Street, Santa Monica, CA.

Moursund, David, Mike Dunlap, et. al. Computers in Educa-
tion Resource Handbook. University of Oregon: Department
of Computer Science, 1973. Approximately 500 pp. $10.80.

> A group of persons involved in studying, teaching

and using computers in education assembled a resource
handbook during Summer 1973. The effort was motivated
by a series of NSF-supported institutes in computer
science run by Moursund and a course on computers
in education taught by Dunlap. The handbook covers
education about, with and by computers and includes
additional sections on facilities, training, research
and sources. It is currently being revised for re-
printing and is available from the Department of
Computer Science, University of Oregon, Eugene, OR
97403.

Nelson, Theodor. Computer Lib/Dream Machines. Hugo's Book
Service, Box 2622, Chicago, IL 60690. $7.00.

This book is an unusual resource. From the front
side (Computer Lib), it provides a course in com-
puter applications and appreciation, including more
anecdotes and inside stories than one is likely to
find in the repertoire of any single, exceptional
lecturer on the subject. From the "flip side" (Dream
Machines), the book offers a look into the future,
challenging (potential) computer professionals to
make something of value out of the powerful resources
becoming available.

Organization for Economic Cooperation and Development.
Seminar on the Use of Computers in Higher Education, Port-
land, Oregon, 1970. Paris: Organization for Economic Co-
operation and Development (OECD), 1971.

This seminar was organized by the U.S. Office of
Education and the Northwest Regional Educational
Laboratory with a subsidy from the National Science
Foundation; it was attended by experts from Europe,
the Far East, and the United States. The proceedings
contain an overview of current activities in com-
puters and instruction along with some recommenda-
tions for internationalizing and exchanging research
and experiences. Copy is available without charge
from OECD/CERI at 2 rue Andre-Pascal, Paris 75700,
France.

Proceedings of a Conference on Computers in the Under-
graduate Curricula. 1970 through 1974. CCUC Proceedings,
University of Iowa, Computer Center, LCM, Iowa City, IA
52242. $10 each.

The Conference on Computers in the Undergraduate
Curricula has become an annual event. There are
approximately 80 papers in each collection de-
scribing a wide variety of ideas and techniques
for improving the teaching of traditional subjects
through adjunctive use of the computer.

United Nations Educational, Scientific, and Cultural Or-
ganization. Consultation on Computer-Assisted Instruction
for Developing Countries. Final Report. Paris: UNESCO, 1970.

> In response to a number of inquiries about computers
> in instruction from developing countries, UNESCO
> called together experts in this field for a con-
> sultation session in Paris, March 16-18, 1970. Ex-
> perts from around the world were asked to comment
> on fourteen important questions prepared by the
> UNESCO secretariat and to consider a large-scale
> CAI project in Spain. This report is a good inter-
> national review of the current state of computers
> in education and includes guidelines. It is intended
> to be helpful to developing countries. Copy is
> available without charge from E.R. Prabhakar, ESM/
> MMT, UNESCO, Place Fontenoy, Paris 75700, France.

Zinn, Karl L. An Evaluative Review of Uses of Computers
in Instruction. Ann Arbor: Center for Research on Learning
and Teaching, University of Michigan, December 1970. $5.

> The final report of Project CLUE (Computer Learning
> under Evaluation) provides a current description
> of activities in this field. Appendix A of Volume I
> (Guide to Information Sources) is particularly use-
> ful for tracking down information about computer
> uses and technology. Available from ERIC, micro-
> fiche; multilith copy from Zinn, 109 E. Madison,
> Ann Arbor, MI 48104.

SOME KEY PROJECTS

Engineers at the University of Illinois, Urbana, have
designed a computing system (PLATO IV) especially for
effective and efficient use in education. It is a large
system intended to provide instructional computing to
over 1,000 simultaneous users throughout the University
and also a number of other colleges and schools in
Illinois. The design includes notable advances in the
technology for display and special arrangements for
efficient communications through broadband channels
of the telephone system. University faculty are authoring
computer-based curriculum materials. The development work
has been of considerable interest to universities and school
systems in other states. Some other institutions (e.g. uni-
versities in Indiana, Iowa and Florida) are exploring the
need and requirements for installation of PLATO IV systems.
A list of available documents can be obtained from CERL,
University of Illinois, Urbana, IL 61801.

TICCIT (Technology for Interactive Computer Controlled
Informational Television) is a name given to systems
being developed by Mitre Corporation in McLean, Virginia.
The first version of an instructional system is designed

especially for use in a small college. It is based on a
medium-sized computer system and video technology to ob-
tain low-cost operation with about 100 simultaneous users.
The hardware and software design has been coordinated with
the development of instructional materials which are very
carefully prepared according to certain rules of effec-
tive instruction. The first set of materials are being
prepared by instructional design teams at Brigham Young
University in Utah to provide basic remedial instruction
in mathematical and language skills at small colleges.
Technical reports are available from ICUE, Brigham Young
University, Provo UT 84601 and a system overview from
MITRE Corporation, Westgate Research, McLean, VA 22101.

Stanford University operates a computing system which
distributes instructional computing to a number of centers
throughout the country. It is a large-scale, service
operation at present, depending on long distance tele-
phone communications. Satellite computer systems control
clusters of terminals at remote centers usually associated
with elementary school demonstration projects and special
education institutions. The service operation is conducted
in parallel with an extensive program of research and
development at the Institute for Mathematical Studies
in the Social Sciences, Stanford University. Curriculum
materials have been prepared for young children (elemen-
tary school), learners with special difficulties (for
example, the deaf) and certain university courses (es-
pecially second language learning). A list of reports is
available from IMSSS, Ventura Hall, Stanford, CA 94305.

Dartmouth College has demonstrated the ability of an
institution of higher education to make computing as
available to students as the library or science labora-
tory. Essentially all students at Dartmouth College learn
about computing and are expected to make effective use
of the computer throughout their four years of study.
All disciplines of study at the college have been affected,
including language instruction, history, and art as well
as the expected areas of sciences and mathematics. The
same time-sharing computing system is used by a number
of other colleges and secondary schools within convenient
telephone distance of Dartmouth College, and has been
duplicated at other institutions and in commercial time-
sharing services.

The University of California at Irvine hosts the Physics
Computer Development Project. A number of simulations
and dialogues (typically discussions of problem solutions
and proofs) have been prepared for use in college physics
teaching, and some in other disciplines as well (e.g.
chemistry, mathematics and biology). The project uses
the general purpose computers available on campus, and
the dialogues are available to all students who know

how to access the computers. Faculty and students at other
campuses in the University of California system also use
the materials, and some are authoring new dialogues. A
list of available documents can be obtained from PCDP,
Physics, University of California, Irvine, CA 92664.

A consortium of regional computing services is exploring
means for exchange of computer-based instructional com-
puter programs and related curriculum materials. Guide-
lines have been prepared for preparation and documenta-
tion of programs to make them less costly to implement
on another computer. Another set of guidelines is for
related written materials necessary for effective use
of the computer programs in another academic setting (stu-
dent guide, teacher manual, etc.). A list of documents,
programs under review and a newsletter are available
from CONDUIT, Box 388, University of Iowa, Iowa City,
IA 52240.

Many colleges and universities in North America are pur-
suing interesting developmental projects and worthwhile
operations with computers in education. A small but sig-
nificant percent of elementary and secondary schools in
North America are providing computing experiences for
all students in science and mathematics classes, and to
some extent in social sciences and humanities. The four
projects mentioned above have large budgets or visible
impact, but they represent a small portion of the total
instructional computing activity.

Considerable excellence in instructional computing is
also apparent in institutions and special projects in
Europe and Japan. Often these are pursued with consider-
ably less financial investment than the most visible pro-
jects in the United States.

Project EXTEND
Part of a Development Program on
Information Processing Facilities as a Basis for Learning
Environments

Center for Research on Learning and Teaching
109 East Madison Street
Ann Arbor, Michigan 48104

Staff: Karl L. Zinn, Director (313/763-4410)
       Diann Bradarich, Assistant Editor (313/763-0158)

Project EXTEND's major goal is to expand effective use
of computing in the academic programs of Michigan colleges
and universities. The first phase was supported by Exxon
Education Foundation during 1971-73. It included gathering
computer-based learning aids from various sources, docu-
menting them for more convenient use, and advising users

of computing in a sample of colleges and universities in the state.

A major product of Project EXTEND has been a set of introductory and reference materials for the initiation of computer applications in college courses and independent study programs. The materials are intended to reduce the need for extensive consultation with computer experts. The goal is to make computing resources more relevant for undergraduate students and teachers and more usable for new and infrequent computer users.

Project EXTEND continues to function as a point of exchange for computer programs, ideas and experiences from schools of all sizes in the state. The newsletter ON-LINE is distributed to over 1,000 subscribers six times a year. An annual conference on Instructional Computing in Michigan is held in the spring of each year. Assistance is provided for publication of reports on effective use of computers for instruction in Michigan colleges and universities.

The MERIT Computer Network. EXTEND has built upon the considerable resources brought together by MERIT, a cooperative venture among the three largest universities in the state, to develop an educational computer network connecting the existing central computing facilities of MSU, U-M, and WSU. Engineering development of the network was begun in 1969 and full operations were first demonstrated in 1972. The MERIT Network provides individual users acces to a richer variety of computing resources in Michigan than would otherwise be possible.

The Center for Research on Learning and Teaching. Project EXTEND is housed at a University of Michigan resource center which has been exploring computer applications within the college learning environment for some time. The Center has given particular attention to developments which can be applied to student use of computing in various disciplines, and its staff has advised many University of Michigan professors on effective use of computers in the instructional process.

Selected Documents from CRLT:

"Computer Assistance with Learning and Teaching." Proposed text for Encyclopedia of Computer Science. Anthony Ralston, Ed. New York: Mason and Lipscomb, in preparation. Preprint for comment.

"Free and Inexpensive Materials on Computers and Education." Ann Arbor: Center for Research on Learning and Teaching, December 1974. Single copy distributed without charge; $1 per 8 copies. (12 pages)

Center for Research on Learning and Teaching
University of Michigan