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John B. Cook
Area Education Agency 6

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INEXPENSIVE COMPUTER SOFTWARE FOR SCIENCE TEACHING IN IOWA SCHOOLS

*John B. Cook
AEA 6
210 South 12th Avenue
Marshalltown, IA 50158*

Between January and April 1989, the author collected and compiled information on inexpensive instructional computer software to support science teaching. For each piece of software, information was collected on the topics it covered, how it could be obtained, and how much it would cost for school purchase in Iowa. The compiled data was limited to inexpensive software for two reasons: (1) to keep the size of the data base manageable, and (2) to focus on software that schools can afford to obtain.

Inexpensive software

Inexpensive software was defined, rather arbitrarily, as software for which the cost per copy is \$10 or less for eight copies. This means that a science teacher who can somehow obtain eight computers for a lesson can have a copy of the software for each computer for \$80. A class of 24 could work at the eight computers in groups of three—not an ideal situation, perhaps, but a realistic one in many schools.

When the only cost for software is the cost of a blank disk, the cost was considered "free." Blank 5 1/4 inch Apple disks are available now for less than 30 cents each. Blank disks should be purchased in bulk by the school and treated as supplies like paper and chalk.

Sources of software

The following are possible sources of inexpensive software:

- 1) Software on loan from an AEA
- 2) Public domain software
- 3) Freeware—copyrighted, but may be duplicated for educational purposes
- 4) Commercial software with state-wide duplication rights (e.g. MECC)
- 5) Commercial software with AEA-wide duplication rights
- 6) Shareware—may be duplicated, but users are expected to pay a fee
- 7) Commercial software with a quantity discount (the discount implies both technical feasibility and legal permission from the publisher):

Multi-load program: The software can be loaded completely into the memory of the computer. Using just one copy of the program,

this can be repeated for as many computers as you wish to use. Site license: Multiple copies can be made on site. Limitations vary. Lab pack: A package of multiple copies is sold by the publisher. Use may be restricted to a single facility (e.g. a computer lab). Network license: The software may be installed on a network so that all the computers on the network can run the software.

Table 1 describes some of the advantages and disadvantages of each of these sources.

Information was collected from the list of software which Area Education Agency 6 duplicates for the schools it serves and from a survey of commercial suppliers. Only software which the schools could obtain and keep was included. Software available on loan from the AEA was not included.

Survey of science software suppliers

The *NSTA Supplement of Science Education Suppliers 1989* was sent to all NSTA members in the spring of 1989. A postcard inquiry was sent to each of the 99 firms listed in the *Supplement* as a source of computer software. The postcards contained the following request:

Please send your latest catalog of software for science education in grades K-12. Please include single-copy prices and any discounts which may apply for use on eight computers in a lab, not networked (e.g. duplication rights, site license, lab pack, multi-boot, etc.).

Results

Seventy companies responded with catalogs and other information. From these catalogs and others available to the author, 242 titles from 17 sources were identified as "inexpensive." The distribution by science discipline is as follows:

Chemistry	87
Physics	81
Biological science	44
Earth Science	25
Multiple areas	12
Science processes	5
Tools	5

The types of quantity discounts were as follows:

Site license	179
Public domain/freeware	41
State-wide license	15
Shareware	9
Multi-load	3
Lab Pack	1

The number of programs available for each of five brands of microcomputers is:

Apple II series	217
MS-DOS (IBM et.al)	73
Commodore 64	71
TRS-80	54
Macintosh	26

The information was compiled on an AppleWorks data base. Each record, representing a single software package, includes fields for title, publisher, science discipline, topic covered, grade level, type of discount available, cost, type of computer that may use the software and special notes. The database may be obtained from the author on a diskette. (Send a blank diskette and a self-addressed mailer.)

Table 1

ADVANTAGES AND DISADVANTAGES OF SOURCES

Source	Advantages for teachers	Disadvantages for teachers	How to find it
Software on loan from the AEA	<p>No cost to the school. Includes high quality commercial software. May be used to preview commercial software before you buy it. Someone else takes care of inventory, maintenance & storage.</p>	<p>Must be booked in advance - not immediately available, may be checked out to someone else. Usually there's only one copy available if multiple copies are needed for lab.</p>	<p>Use the AEA Media Catalog; check with the AEA science consultant.</p>
Public domain software and free-ware	<p>Minimal cost to the school. (The first disk may have a small cost or it may be free from the AEA or from a computer club. Additional copies are free.) Additional copies may be made as needed. May be given to students for home use.</p>	<p>It may be difficult to locate something worthwhile from among many poor-quality programs. There is usually little quality control or support. It takes time to copy diskettes.</p>	<p>Public Domain catalogs user's groups, AEA collection.</p>
Commercial software with state-wide duplication rights (i.e. MECC)	<p>Inexpensive to schools (cost varies from \$/disk to free for schools who have paid an up-front fee). Good quality commercial software. It may be possible to borrow software and preview it before you buy it. Support is available from AEA consultants and others.</p>	<p>Additional copies must be ordered from the AEA.</p>	<p>AEA Catalog or listing.</p>

Commercial software with AEA-wide duplication rights	<p>Inexpensive to schools (cost varies).</p> <p>Good quality commercial software. It may be possible to borrow the software and preview it before you buy it.</p> <p>Support may be available from AEA consultants and others.</p>	Additional copies must be ordered from the AEA.	AEA Catalog or listing.
Shareware—may be copied, but users are expected to pay a fee.	<p>Inexpensive (prices vary). Additional copies may be made as needed.</p> <p>May be given to students for home use.</p> <p>Some support from the author may be available.</p>	<p>It may be difficult to locate something worthwhile from among many variable-quality programs.</p> <p>Making payment may require correspondence and negotiations with the author (especially to get a site license).</p> <p>It may also be a hassle to get the paperwork needed for the school business office.</p> <p>It takes time to copy diskettes.</p>	Public Domain catalogs, user's groups, AEA collection.

Commercial software with a quantity discount

Multi-load commercial programs	<p>Inexpensive to schools for use with multiple machines. (The school pays for one copy only—not even for extra blank disks.)</p> <p>Good quality commercial software.</p> <p>Support is usually available from the company.</p> <p>Only one diskette to store—not a whole box full.</p>	It takes time to boot up a lab full of machines from one diskette. Newer, more sophisticated software often will not work as a multi-load program.	Commercial catalogs, reviews in periodicals, AEA lending collection.
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Site license

May be inexpensive to schools for use with multiple machines (prices vary).

Good quality commercial software.

Support is usually available from the company

Additional copies may be made as needed (depending on license terms).

Teachers must keep track of different license terms from different companies.

It takes time to copy software.

Commercial catalogs, reviews in periodicals, AEA lending collection.

Lab pack

May be inexpensive to schools for use with multiple machines (prices vary).

Good quality commercial software.

Support is usually available from the company.

Diskette copying is done for the teacher by the company.

Additional copies may not be made as needed—they must be ordered from the company.

Multiple diskettes must be distributed, retrieved and cared for.

Commercial catalogs, reviews in periodicals, AEA lending collection.

Network license

May be inexpensive to schools for use with multiple machines (prices vary).

Good quality commercial software.

Support is usually available from the company.

Avoids distributing, retrieving and caring for multiple diskettes.

Teachers must keep track of different license terms from different companies.

It may take time and expertise to install software properly on a network.

Use may be limited to machines tied to the network.

Many programs will not work properly on some or all networks.

Commercial catalogs, reviews in periodicals.