Technological Advances Affecting
School Instructional Materials Centers

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The non-book technology presently available is grossly inadequate to support the kind of school media program envisioned by the new Standards For School Media Programs. Very little of the currently available instructional technology is designed to support individual use of the vastly expanded collection of educational media. Specialists in the field have been forced to adapt existing devices for use in the media center with the resultant technological over-kill. The dearth of well-designed, quiet, inexpensive student-media interface devices for use in carrels in individual or small-group inquiry is one of the chief factors affecting more comprehensive use of media designed for this purpose. An examination of the current issue of The Audio-Visual Equipment Directory supports the general thesis of "more of the same."

Manufacturers of educational equipment have not kept pace with the current developments in curriculum and educational methodology. To be sure, the self-contained classroom with its typically undersize screen, a 16m.m. projector, record player, and possibly an overhead projector along with the ever present chalkboard is the overwhelming reality, but increasingly, schools are building and equipping facilities to support individual student use of media. The available equipment for this individual and small group use of media is what is lacking. Equipment designed for the thirty student classroom just does not fit well in a 2' × 3' carrel and is much too heavy for an elementary school youngster to carry home.

The school media center, if it is to serve as a vital force in education, must be greatly expanded beyond its traditional role as a repository for books to encompass that of an information center which

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houses books, films, tapes, slides, games and instructional programs that make use of integrated multimedia formats designed to implement specific learning objectives. The media specialist or educational technologist has the task and responsibility of freeing teachers to work with children as individuals, an often expressed goal that has been seldom realized. Instead of making education more mechanical, technology provides educators with their first opportunity to truly humanize teaching and learning.

The various quantitative statistics representing holdings of various media and equipment which are advocated in the recent revision of the 1960 Standards for School Libraries are realistic support levels for school programs attempting any type of innovative program. Team teaching, individually prescribed learning and non-graded programs all require high levels of material support from educational technology. The use of non-print materials must be made as simple for the student as the use of the book. This implies a new family of devices for use in the instructional materials center that may easily be moved in and out of carrels for use in the center, classroom, or home. Educators must begin to demand technological devices that are designed for specific educational tasks, rather than continue to adapt educational materials and methods to existing devices. Manufacturers cannot be blamed completely for the situation for few educational media specialists have taken the trouble to communicate with equipment suppliers concerning their needs.

Characteristics of Media Interface Units. What are the characteristics of the new interface units needed by educators and students in the new instructional materials centers?

1. Devices are needed for individual or small group use of conventional media. They should be designated for use by two or three students at most.

2. Since these units will be used in the center where a variety of learning activities will probably be going on simultaneously, they should operate as quietly as possible.

3. Lamp life should be measured in terms of years instead of hours. Low output levels needed for small screen presentation should make this feasible.

4. Devices should be visually pleasing with controls well marked, color coded or otherwise human engineered so that a pre-school child may use materials with a minimum of supervision or instruction.

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5. A design goal of continual operation demands a drastic shift of engineering emphasis from the level currently available. This equipment will be in use constantly rather than the occasional use now found in most school programs. Anyone who has attempted to use equipment in a self-instruction laboratory will be sympathetic to this requirement. The teaching machine must have an even greater resistance to breakdown than the teacher.

6. Provisions should be built into equipment to clean and lubricate film or tapes automatically as materials are used. This is especially important when encapsulated media such as 8 m.m. loop films or tape cartridges are used.

7. Claws, sprockets and other similar film handling components should be eliminated in order to minimize damage and prolong the life of teaching materials.

8. Encapsulation of all materials should be encouraged if they lend themselves to this type of packaging.

9. Standardization of formats should be demanded. New formats should be encouraged because of their technological superiority rather than because of economics.

10. Components subject to wear or deterioration should be easily replaceable, preferably without the use of tools. Integrated circuits, standard components, unitized construction and modular design all contribute to simple maintenance and minimal downtime.

Storage and Circulation of Non-Print Materials. Considerable thought needs to be given to the design and construction of storage units for non-book materials. It may be feasible to design a family of modular containers that makes use of standard library shelving; however, special storage cabinets for each type of media have not proven to be very suitable. Containers for sound filmstrips, films, tape recordings, film loops and filmstrips need to be designed so that these materials may be housed on standard shelving with appropriate space on the container for numbering and teachers’ guides or other descriptive information. The plastic containers now available for 16 m.m. films and 8 m.m. film loops provide at least a starting point for thinking along these lines. Perhaps plastic foam inserts could be placed in a standard size container so that a complete set of filmstrips or an individual title could be accommodated in the same type of modular container. Storage and circulation of non-print materials represent one of the biggest headaches to the media librarian. Hinges and latches
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on containers need to be designed for long wear. Semi-rigid folders of plastic sheathing for the storage of long playing recordings having sufficient space on the spine for accession or catalog numbers would also be appreciated. Where media is to be circulated to students for use in carrels in the media center, or even for home study, new storage and circulation formats are necessary.

Machines are being used in many public libraries for circulation control. These devices are a tremendous help in speeding up the charging of materials. Student ID cards should be planned to mesh with the library system so that different cards are not required. We need to be concerned with the human use of human beings in all phases of the operation of the instructional materials center. We need to concentrate our attention on each repetitive task performed by the professional library staff with a view toward designing systems whereby technology may take over the bulk of these operations. Professional staff need to be able to spend their time with teachers and students. The age is past when we can afford to spend our time lovingly pasting pockets in books and carefully divining the appropriate Dewey number to the third decimal place for each new piece of material.

Instructional media specialists are being swamped with materials purchased under Titles I and II of the Elementary and Secondary Education Act. Completely processed instructional media is a must. There is no reason why each individual librarian in each individual school across the land should be spending his time processing materials. Centralized processing and the commercial processing services are essentials; however, why not take the ultimate step and require the processing of all materials by the original publisher or manufacturer? The school market is now so large that it represents a major source of income for publishers. In some school systems months and even years pass before new materials can be processed for circulation. This is where technology can truly make a significant contribution.

The Computer. While computers offer the potential of unlimited information storage and retrieval, and a possible way to expand student access to information, very little of this potential is currently available to the typical school instructional material center. A discussion of needed systems design, information processing strategies and an overview of the problem of man-machine interfaces with the ever growing body of knowledge is contained in an excellent book by
Licklider. Some of the unsolved problems outlined in his book, *Libraries of the Future*, concern the limiting factor of computer memory in relation to the sum total of human knowledge and the lack of suitable audio-visual output devices. The knowledge of the ages at our fingertips represents a goal and vision, not a present reality that will affect the school media center in the near future. While computer storage and retrieval of information represents the only hope for the overwhelming task of information processing, the elementary and secondary schools have information support needs that are not at all of the same magnitude as those of a major university. Space needs for media storage and circulation for an elementary school of 500 or a secondary school of 2,500 can still be met with present technologies.

A number of elementary and secondary schools have experimented with shared-time computer access in such curriculum areas as math and language arts. The computer projects at the Brentwood Elementary School in Palo Alto, California, and Project Plato based at the American Institute for Research at Stanford University (which involves several schools around the country connected with leased long lines) are important, innovative and well-funded research programs directed toward establishing parameters for computer contributions in education. The costs of computer hardware, shared time charges, line fees, and terminal equipment, all represent sizable investments with the current state of the art. Costs of program development for computer-assisted instruction are also very high.

It is important to remember that the computer is not a thinking machine and cannot make decisions, give answers or provide instruction not previously programmed into memory tapes, discs or cores. Highly detailed instructional sequences must be built for computerized teaching with presentation sequencing and testing programmed for a specific computer language. This task will undoubtedly be accomplished over a period of years as more sophisticated and learner-oriented terminal devices are developed.

The instructional materials center of today should be planned so that space will be set aside for computer terminal equipment which probably will be adjacent to the center. This could be in the form of a glass-walled conference area which will still allow identification with the center and the necessary sound attenuation for the terminal equipment.

*Audio-Video Retrieval Systems.* Much has been made in recent years
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of dial controlled random access systems. This terminology conjures up an image for the unsophisticated and unwary of a student snugly seated in a study carrel equipped with a telephone dial, headset and television receiver, who is capable of commanding instant contact with the assembled knowledge of the ages. However, some of the realities of the situation are:

1. Audio and video programs must be preplanned and produced for the specific tape format designed into the system. These materials, adaptable to specific curriculum objectives, are generally not available commercially.

2. Audio tape programs are generally stacked so that four programs are contained on one tape deck. The first student dialing into any one of the four programs preempts the tape deck and accessibility to the other three programs.

3. Video retrieval play units are expensive and, candidly, not very reliable in automatic access modes. Video tape recorders are remarkable instruments and have been improved greatly in recent years, but they still are not as reliable as their audio counterparts, and require frequent “human preventative” maintenance.

A recently announced random access audio retrieval system would appear to offer a promising solution to some of these problems. In this system, master tape programs are transferred at high speed to student buffer recorders so that transfer of a fifteen minute real time program is accomplished in thirty seconds, thus freeing the master tape for additional student access. The system involves the use of a special purpose computer which controls the various functions of access, switching and student use of transferred tapes. Video retrieval is not available currently as a part of this system. New types of video tape transports are under development at Ampex Corporation as a final phase in this system development. The audio system is currently in operation at Oak Park and River Forest High School in Oak Park, Illinois.

Duplication of audio program materials as needed to cassette format for student use in the instructional materials center may be an acceptable alternative to the system just described. Programs would be shelved for student retrieval just as books, filmstrips or other materials are currently handled. Cassette recorders are small, light weight and inexpensive. Students could check out these devices and the appropriate tape to a carrel or for home use. Costs of a computer controlled
random retrieval system may easily approach $250,000. A fraction of this will purchase cassettes tape units and tape stock along with a duplicating device. Video access is available inexpensively by simply providing coaxial distribution systems to each carrel or classroom. Programs may be fed to standard small screen R.F. receivers in these locations from a half inch format video recorder through appropriate modulating equipment designed for free VHF channels in the area. Head end equipment would involve approximately $2,000 per channel. Carrel receivers are available for $100 to $150 each. This is a demand system. The student would pick up a phone or intercom unit and request that, for example, yesterday's science tape be played to his viewing location. The technician or instructional aide would inform the student of the channel to be used and place the tape on the appropriate tape deck. This is a simple, inexpensive system that works well. Recordings of broadcast programs may be taped and retained for subsequent play or replay for follow-up use by teachers and students. Original materials may be created with the addition of a studio facility to this basic video library equipment.

Center Design Problems. The integration of technology into the traditional library facility involves a number of specific design considerations. A few suggestions based on observation of both new and remodeled instructional materials centers are discussed below.

Centers are typically designed with inadequate electrical power. Outlets are too few in number and often located in back of stack units. The use of microfilm readers and printers, filmstrip viewers, audio tape units, record players, listening tables, and film projectors and viewers requires much expanded electrical service. Generally a separately fused twenty amp circuit is required for each bank of four carrels; carrels are often designed without power unless specifically requested. Supplementary illumination and a furniture design that lends itself to the addition of instructional technology should be kept in mind. The design should include as a minimum a perforated underpanel and tubular legs to accommodate electronic equipment and distribution systems. Each carrel should be supplied with two duplex outlets, one located above the work surface. Carrel lights should be wired directly into the underpanel power supply in order to free both carrel outlets for viewing and listening equipment.

Power and audio-video distribution within the center should be designed so that all tables, chairs, and other furniture are adjacent to
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electrical outlets. Separate conduits must be provided for audio and video distribution systems; these two systems require advanced planning for carrel location in respect to power sources or the use of some type of flexible ducting. Conduits for distribution of recorded audio and video programs should also be placed in conference rooms and any satellite facilities.

Areas should be planned so that lighting may be controlled and lower light levels are possible. Lighting zones should be created in order to provide varying levels for different viewing tasks. Special display lighting for working with three-dimensional materials is a necessity. Alternatives to the standard 100 foot candles of illumination in every area of the media center should be considered and more than one switch for all fixtures should be installed.

Another must in the instructional resources center is acoustical flooring. The acoustical treatment of the environment is as important as good lighting or air conditioning. This area is going to be a busy one and the sounds of conversation, machines, and people require careful planning for sound control. A “quiet” sign is not the answer. Typewriters and teletype consoles will probably need to be placed in a glass-enclosed conference area. The sound produced by this equipment is distracting because of its discontinuous nature. The sound of conversation or running projectors is continuous and much less distracting. Placing acoustic materials in carrel walls is generally not worth the effort. Completely enclosed carrel designs should be approached with caution. Carrels should be placed in the center of the room and not in rows as they are in the typical language laboratory.

Needed Technology. It is encouraging to see that manufacturers are becoming aware of the requirements for new devices designed specifically for use in the instructional materials center. The new 16 m.m. film viewer designed and manufactured by Viewlex should go far in encouraging individual and small group use of 16 m.m. films. In the past, projectors designed for classroom use have been too large and heavy to work in learning carrels. Perhaps we can count on more specially designed devices becoming available in the near future. The following are suggestions for some needed items:

1. An 8 m.m. cartridge film viewer with a built-in 5" × 7" rear screen. Designed to operate quietly with some stop frame capability and accessory foot switch for hands-free control, this unit is a natural for a variety of individual self-instructional situations. The device
should be capable of fitting on a shelf ten inches deep. Cartridge loading should be from the front and all controls should be front mounted for easy use. The design parameter should allow continuous operation.

2. A cassette recorder than can either be built permanently into a carrel or used in a portable mode. The unit should be sturdy, made of metal with an integral cover of protective material; it should have a keyed interlock for play-only mode of operation and a slide-filmstrip synchronizing control. For the accessory headset a standard phone jack should be used rather than one of the mini-plugs. This unit should be designed for heavy duty operation as it will be loaned to students for home use.

3. A superior-quality high-speed cassette duplicator for resource center use is needed as an accessory for current models of reel to reel duplicators.

4. Better designed devices for filmstrip, slide and microfilm viewing are needed to service both individuals and small groups.

It is important to realize that technology can be made a valuable part of the school resource center without going to dial retrieval systems. With a few new pieces of equipment expressly designed for media center services, any school can individualize its use of media and technology.

References


