In-House Production of Computer Software

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Local production of school library media materials has been the responsibility of school library media specialists since audiovisual media joined print materials as integral parts of the information collections of schools. When the audiovisual media were placed in the media center, responsibility for the equipment to project or play the media was also moved into the media center.

One of the most recent questions challenging the library media specialist is how deeply to become involved in the newest technology, the use of microcomputers in the school. Questions concerning the handling of equipment, software, and consultive services are common. In many schools, library media specialists have abdicated responsibility for this new computer technology to other teachers and departments in the school. Such a policy, if continued to its natural conclusion, will encourage the growth of a different organization in the school, perhaps a computer advisory center, with its own facilities, equipment, and trained staff to provide for the demands of this new educational technology.

For those school library media specialists who have had the vision to adopt the microcomputer as just another part of educational technology and thus, the natural province of the school library media program, some major decisions must be made. This article examines one of those major decisions: whether to, and how to, incorporate local production of microcomputer software as part of the microcomputer services of the school library media center.

The Need for Local Production

Before any decision is made to initiate a local program of software creation, the whole context of local production needs to be examined philosophically. For many years, some form of local production has been a part of the library media program. We have produced overhead transparencies, tape recordings, videotapes,

slides, filmstrips, and a wide variety of graphic products. In the early years, such a production program was the province of the audiovisual department, but more recently it has been merged into the school library media program as a regular facet of media services. Normally, schools have provided production services for the teachers complete with space, equipment, supplies, and consultive help. In recent years school library media centers have provided production services for students—places where young people can express themselves creatively in a wide variety of media or fulfill assignments involving the production of media.

Local media production programs have developed for a number of reasons. First, school library media specialists and teachers have recognized that commercially prepared media do not always fulfill the needs of the local curriculum or student population. Another impetus has been cost. Audiovisual media is expensive. A number of teachers and school library media specialists have become experts at producing media that not only meet a local instructional need, but also cost far less than a similar commercial product. School library media specialists have also realized that the production of major teaching packages is very expensive, requires a trained staff, and takes a great deal of time. Consequently, most media specialists have learned to ascertain when they should tackle a proposed local production project. Most, for example, will not initiate a major video project that involves multiple lessons and carefully planned content with lengthy scripts. Such a project is often not feasible given the usual staff expertise, equipment, and time constraints.

If one examines the local production programs for traditional types of media, one finds that, in general, one or more of three different levels of service are practiced in a school library media center production program. The levels, which follow, will be helpful when incorporating microcomputer software production into the regular production program.

1 Space, equipment and supplies are provided—teachers may produce audiovisual materials themselves.

2 Space, equipment and supplies are provided as well as consultive help. Some assistance is provided in producing audiovisual materials.

3 Staff and resources are available to produce audiovisual materials for teachers. Teachers provide the content requirements; media center staff do the technical work.

School library media specialists have promoted one or more of these services depending on the size of the staff, their expertise, the size of space devoted to production, the types and amount of equipment, and the money available for supplies.

All of these points must be taken into account when trying to decide whether to include the production of microcomputer software as a part of other production services. Experience with the commercial market of microcomputer software to date gives the same strong arguments for locally producing some software in-house. As with other commercial audiovisual software, there is much microcomputer software on the market that does not fit the needs of the teachers' units. Some microcomputer software is very expensive and beyond the budgets of smaller schools. Copyright restrictions prohibit duplication throughout the district, between schools, or for multiple grade levels within one building.

Microcomputer experts have discouraged school library media specialists and teachers from even considering the local production of microcomputer software. They point to generous funding, expertise, and time as necessary ingredients that are usually lacking in a local school. While the experts are probably right in maintaining that extensive development should not be the responsibility of the local school, they are incorrect when assuming that all local development should be discouraged.

The need for locally produced microcomputer software is the same as the need for local production in every other audiovisual medium. The problems and the potential are the same. How will space, equipment, supplies, trained staff, and time be provided so that the production of microcomputer software is a successful service of the school library media center?

Types of Software for Local Production

The school library media specialist who is embarking on a microcomputer software production program must choose carefully between the type of work that can be done in the local school and that which should be left to commercial firms. As with other au-

diovisual media, there are various levels of sophistication of software development to be considered. The choice among the following levels is critical.

1 *Adapting and Altering Commercial Programs.* Perhaps the best and first service to offer from the library media center is to assist teachers in adapting or altering the purchased commercial programs. This does *not* apply to the copyrighted programs which are designed to be used only as the author intended. Rather, two types of programs are available that are designed to be adapted to a local situation. The first is called a skeleton, or a shell, since the content of the program may be added by the local staff. For example, a program might contain a spelling word drill complete with a game designed to increase student motivation. The programmer designs the lesson so that the local teacher can input any list of spelling words. School library media specialists can find these types of programs, purchase them, demonstrate their usefulness, and see that the teacher can successfully tailor the program to specific curricular need. In this application, the content of the program is changing—not the program itself. Very little programming skill is required to make this type of computer lesson successful in the local school. Thus it is a good place for the school library media specialist who is a microcomputer novice to begin offering services.

Another reason for choosing the adapt/alter production service first is that teachers are often fearful of the computer and they appreciate one-to-one assistance. Since a skeleton program can be tailored easily to their immediate needs, teachers are most appreciative of a school library media specialist who can offer this type of simple, yet effective, service.

A second type of program to watch for is the commercial program which is sold unprotected (i.e., anyone may list the program and see how it was programmed), and in which the authors give permission to alter the program to suit local needs. For example, a program for handling overdue library materials or a program to handle equipment inventory might come in an unprotected format. The programmer cannot design a single program to fit every local need, so the program is designed to handle the most common situations. With some programming knowledge, the school library media specialist can alter the program slightly to handle the local situation. For example, the program may allow four characters for a

call number and your situation requires seven characters. In this case, you could change the dimensions of the array that contains the call number from four to seven characters, then try the program and debug it (correct any errors).

The more you know about programming, the easier it will be to tailor a computer program to a local need. The media staff might offer this type of consultation on programs or at least be able to refer a teacher to a programming specialist who could handle the adaptation. A number of these programs designed for adaptation are available from school library media specialists. Often a program has been created to handle a local problem and then is advertised for sale, usually at a very reasonable price. Many times, it is much easier to start with someone else's program than to create your own. Occasionally, however, such adaptation will be more work than creating an entirely new program. As school library media specialists gain experience in adapting programs, they will quickly learn when to adapt and when to start from scratch.

2 *Finding and Trading Noncopyrighted Programs.* One certain way to create dependence on the school library media center for microcomputer software and assistance is to become a trading center for noncopyrighted programs. School library media specialists already have a network of contacts set up for handling reference questions, accessing materials, and finding consultive assistance. This technique and skill are easily adapted to the microcomputer software exchange concept.

School library media specialists should also become members of a local computer interest group. Usually these groups attract a wide range of programmers: novices, those with intermediate skills, and advanced programmers. These clubs meet regularly and have software exchanges. If a member has a program to offer, he can also get one in return. Invaluable assistance and advice can be obtained from members of a microcomputer interest group. If the school library media center becomes the place in the school where a "pool" of programs capable of being copied is available, both students and teachers are likely to support (even enthusiastically) a trading center concept. If the school library media specialist already provides the adaptive/altering service, then the pool becomes even more attractive.

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While there are a great many junk programs available for trade, some are also very useful. Some computer stores have such a pool of programs available for copying. School library media specialists might choose, from that bank, the programs that would be helpful in an educational setting. This would save the teachers a tremendous amount of time because the sifting process would have been completed already. Great camaraderie can be fostered among the teachers and the school library media staff with this type of pool. Such cooperative ventures will pay dividends far broader than simply sharing microcomputer software. It may lead, for example, into close communication and contact in planning and executing instructional units between the teacher and the school library media staff.

3 *Assisting in Computer-Assisted Instruction (CAI) Authoring.* A number of programs are available that are designed to make the task of creating computer tutorials easier. Programs such as Super Apple Pilot and Blocks and Pass are examples. Supposedly, these programs require very little programming knowledge. Rather, they rely on the subject expertise of the teacher who then uses the authoring language as a tool to create a computer lesson. While these programs are easier than programming lessons from scratch, they require a fair amount of inservice or introductory assistance if a teacher is going to create lessons in a reasonable amount of time. School library media specialists who devote the time necessary to learn these systems fully are then in a position to assist teachers in the creation of effective lessons. The school library media specialist not only can assist the teacher in using the package, but also can become involved in the design of the lesson. What may start out as a simple one-to-one introduction to an authoring program might end up in a full-scale instructional development project.

4 *Programming Computer Lessons from Scratch.* When the school library media staff become skilled in programming techniques, a whole new vista of possibilities opens up. Often, an experienced programmer can create a program faster than one can be adapted from another source. This is particularly true if the programmer has access to a number of commercial packages and peripherals for the computer which make programming computer lessons much easier.

Commercial packages exist which allow the programmer to take some shortcuts to development. For example, the program Electric Duet allows easy creation of two-voiced music which can be added to computer lessons. Graphic's Magician allows the programmer to create spectacular computer graphics in high resolution and with a minimum of time and effort. Tools such as these and others which will become available in the future provide the beginner with many advantages in lesson creation.

In addition to helpful software packages, there are some techniques which, if followed by the programmer, can make lesson creation on a microcomputer a much easier task. This author has jointly authored a booklet entitled *Modular Computer Lesson Design* with Paul M. Roper, which describes a useful technique for creating computer programs.[1] Briefly, the technique works like this:

A lesson is designed for content just as carefully as any other lesson would be. A choice of which part of a lesson or unit to put on the computer is made. Objectives and features of the programmed lesson are written. At this point, the lesson is divided into small chunks or modules. Each module consists of one small task and is a complete working entity. Each of the pieces of the program is programmed and tested separately and then joined together as subroutines to be called by the program at any time.

For example, one may wish to write a program that teaches the student some of the things a computer can do. In the planning of the lesson, it was decided that this lesson could be divided into the following modules:

1 I can count module

2 I can create graphics module

3 I can compute and compare module

4 I can drill module

Furthermore, it was decided that each of the modules needs to be broken down into submodules as follows:

1 I can count module

  a) Both high and low

b) And in increments

2 I can create graphics module

a) Shapes

b) Full screen graphics

c) Graphics in color

3 I can compute and compare module

a) Add, subtract, multiply and divide

b) Comparing two values

4 I can drill module

a) Drill in addition

b) Drill in multiplication

Each of the submodules is programmed, tested, and then pieced together into the program. Useful parts and pieces like graphics and music that have been created before can be joined together to create an entire lesson. This technique is similar to the cut-and-paste technique in the graphic arts. Take whatever useful materials are available and piece them together.

The school library media specialist who can collect a wide variety of useful pieces or parts of programs, which are called subroutines, can use these pieces very effectively in the creation of computerized lessons. The authors have recommended that the school library media specialist keep a notebook of "tricks" or techniques that can be incorporated into computer programs. Having a number of subroutines available on a "utility" diskette makes them easy to draw in and use when creating lessons. This type of development will require major blocks of time for planning and development but is not beyond the skill of most school library media specialists. That is, one does not need to have a degree in computer science to develop locally produced microcomputer software.

Implementing a Software Production Program

To prepare a successful software production program, the following steps should be taken as part of the planning process:

1 Get some training in microcomputers and in programming. The more one has, the better able he or she is to implement a sound production service. Training can be taken: a) on a self-teaching basis, b) with an in-service course, c) with a course at a university, or d) at conferences and workshops.

2 Decide on the level of sophistication for a computer production service at which to start and set a goal for the future.

3 Arrange for space, equipment, and supplies to meet the level of sophistication you have chosen. This may include a single computer with ample commercial software, blank diskettes, and consultive help in the production process.

4 Inform teachers and students of the services available and how they can take advantage of those services. Coordinate services with others that are available in the school, district and community so that as large a service program as possible can be offered and still be successful.

5 Arrange the time necessary to implement the level of service promised.

6 If resources, time, or expertise have been overcommitted, do not hesitate to cut back. Offer only what can be done well, but don't give up planning for future expansion.

7 Share ideas and programs with colleagues. They are dealing with similar problems and all can benefit from one another's successes and failures.

Challenges for the Future

Is the development of microcomputer software in the local library media program likely to be a viable service in the future? The answer is probably yes, but with some prerequisites. School library media specialists must acquire adequate computer training if they expect to be leaders of this instructional technology in their schools. If they do not get the training, others can and will offer these services in the schools. Computer literacy and programming

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skill are grasped fairly early by almost anyone. Fear should not be a deterrent to the acquisition of training.

One good possibility both now and in the future is the employment of programmers as a part of the school library media staff, either at the building or district level. School library media specialists who have computer training can communicate quite effectively with programmers. In this method, the teacher serves as the content expert, the school library media specialist as the process expert, and the programmer as the coding expert. The three together can produce some programs of excellent quality.

The journals keep promising easier and easier programming languages. Some visionaries foresee computer languages that will do the coding when given straightforward instructions in normal English language statements. Others say that individuals may be able to talk to the computer and tell it what to do. If these "dreams" are not perceived as realistic, school library media specialists are in danger of becoming obsolete very quickly. On the other hand, it is likely that school library media specialists will have to learn much about computers before they will be able to design programs as they desire them. The realization that programming languages will change in the future is no excuse for waiting. The competency of man/machine interface, skills at debugging, and logical thinking are all skills which, if learned now, will be of value to use in the future.

Perhaps the most important thing for school library media specialists to do now is to establish that microcomputers are another form of instructional technology. As such, they are in the domain of the school library media program. Schools may employ specialists to deal with this technology, but these persons should be part of the media center staff.

A bright future exists for producing microcomputer software in the local school. The commercial companies will never produce all the software that is needed in local situations and is suited to individual students. There will always be room for the creative person who can adapt, assist others, and create materials that fit local needs.

Notes

1 Paul M. Roper and David V. Loertscher, *Modular Computer Lesson Design* (Fayetteville, AZ: Hi Willow Research and Publishing, 1982).