

Long-Range Planning for Computer Use

There's more to getting ready for the microcomputer revolution than just buying the equipment.

M. TIM GRADY

Curriculum planners faced with the mandate to integrate computers into the curriculum have few models to turn to for help in framing their ideas. This article gives examples of how school districts might structure such plans, drawing on my experience helping districts execute a similar change.

Planners need the support of the school board and the community, and that support is more likely when all the variables are taken into account. Critical variables include: (1) district learner goals, (2) instructional priorities, (3) hardware and software selection, (4) staff development, (5) expected technological advances, and (6) systematic review of the long-range plan. Each of these variables is important, but planners frequently attend only to numbers 3 and 4 and neglect the others. I have found it best to begin by revising districtwide learner goals and restructuring priorities.

Goals and Priorities

The following goal statements are examples of appropriate revisions or additions to district goals:

- Each student will become aware of uses of computers and information technology in our society.
- Each student will gain knowledge of computer-related terminology.
- Each student will acquire minimal competence in the use of computers and information technology.

These and related goals should be presented to the board. Once adopted, they serve as the basis for curriculum development, materials acquisition, and staff development.

Planners should also address priorities. Since few districts have the resources for immediate, full-scale computerization, the staff must set priorities. Figure 1 shows a sample three-year priority list. This list is an example, not a prescription; different districts might set different priorities.

Identifying the priorities in terms of

M. Tim Grady is Director of Secondary Curriculum, Fort Campbell, Kentucky, Dependent Schools.

Figure 1. Sample Three-Year Priority List.

Year	Subjects	Grades	Target Population
1	Language Arts, Math	6-8	Remedial: 7-15% of student population
	Computer Literacy (required)	6-8	All students
2	Language Arts, Math, Science, Social Studies, Basic Skills	3-5	General population
	Science, Math	4-8	Gifted and Talented
3	Computer Science (elective)	10-12	General population No prerequisites
	Language Arts, Math	9-12	Remedial: 7-15% of student population

Figure 2. Hardware Needs.

Year	Target Population	Grades	Hardware	Approximate Costs
1	Remedial	6-8	1 computer for each 10 students in group	\$1,600/unit \$1,200/unit in network
	Computer Literacy	6-8	4-8 computers per literacy class	
2	Basic Skills	3-5	1 computer per class per grade level	\$800-\$1,200 per unit
	Gifted and Talented	4-8	1 computer per building	\$1,600/unit
3	Computer Science	10-12	20 computers per high school	\$1,400-\$1,800 per unit \$1,200 in network
	Language Arts, Math	9-12	4-6 computers per high school	\$1,000/unit

subject area, grades, and target populations focuses the work. Planners can move from a list like the one in Figure 1 to specific curriculum, software, hardware, and staff development needs.

A priority list is also helpful in selecting software. As in any systematic curriculum development task, the selection of computer software to support the instructional program should be consistent with district goals and priorities. For that reason, those responsible for developing long-range plans should also have control over software acquisition. All choices should support the priority objectives. Scarce funds should not be wasted on unnecessary software. Criteria for software selection are set out in ASCD's *Computers in Curriculum and Instruction*¹ and need not be restated here.

Hardware

Nearly everyone has an opinion about hardware selection. *Computers in Curriculum and Instruction* offers helpful chapters on the subject. In addition, decision makers can use a chart such as the one in Figure 2 to sketch minimal hardware needs.

In year one, planners should purchase computer units that support good computer-assisted instruction (CAI) software in the basic skills. Computer literacy classes have less restrictive needs and can benefit from a wide range of hardware. Where units can be clustered, a network scheme can result in financial savings.

In year two, a wide range of options for basic skills hardware is open to planners. (For example, use of cassettes for program storage is an option more

schools should choose.) Brand allegiance has no place in prudent planning, however. Gifted students seem to make use of whatever is on hand, and multiple brands should be available wherever possible.

In year three, computer science classrooms should house a network of computers using an operating system such as Intertec's Compustar System. Such systems give students an opportunity to use multiple languages and sophisticated software, and they are more flexible for the study of computers.

Basic skills needs cited in year three can be met with less sophisticated equipment. Computers similar to those used in elementary schools for basic skills CAI are suitable here.

Other priorities and target groups would result in different hardware needs. For example, if a district decided to emphasize the use of information data bases and telecommunication systems, it might want to place telephone modems and terminals, or microcomputers acting as terminals, in school libraries.

Staff Development

Long-range plans must include a study of staff development needs. Like hardware and software, staff development should support district goals and objectives. Planners need to look within the district for the bulk of their staff development. One approach is the "bootstrap" model of staff development, in which the district hires a consultant or consultant team to develop skills and concepts with a districtwide team of six to 30 workshop leaders. The workshop leaders then work individually with five to 20 teachers at the building level.

Figure 3. Sample Staff Development Plan.

Workshop Level	When Offered	Title	Main Objectives
1	August Inservice	Introduction to Microcomputers	Learn operation and terminology
2	August Inservice	Advanced User Topics	Learn system commands, system analysis, troubleshooting
3	September	Subject Area Software	Become familiar with available software in subject area
4	September	Computer-Managed Instruction (CMI)	Learn use of CMI packages
5	September	Software Evaluation	Learn software evaluation techniques
6	October	Curriculum Integration	Learn to plan for computer use within normal routines
7	November-June	Authoring Languages	Learn to use an authoring language
8	November-June	Programming (several levels)	Learn principles of computer programming

District leaders should define a set of workshops, including timeline, objectives, and curriculum materials. Figure 3 details one such set of workshops. Keying the workshops to the school calendar is important in a large-scale staff development plan. Teachers should have a chance to attend from two to four workshops in the first year. It is also important to provide enough workshop time so that teachers will be able to learn to use computers on their own.

Consider a hypothetical middle school with ten teachers in grades six

through eight. The district can conduct level 1 and 2 workshops in August during regular staff development days. The workshops can be led by local teachers who have already been taught by a paid consultant. Level 3 to 5 workshops, held while school is in session, will require hiring substitutes. If a teacher is expected to attend four half-day workshops, for example, the district will need one substitute for the equivalent of two days for each teacher involved. In our hypothetical building, then, a total of 20 sub days will be

needed for the staff development of math and language arts teachers. The building will also have two or three workshop leaders, each needing three or four sub days. By hiring substitutes, establishing a program of study, and using existing staff to conduct workshops, the district will have a manageable plan that will produce competent computer-using teachers. In fact, some districts are issuing credentials based on a staff development plan of this type.

Other staff development plans are also available. But whatever plan they adopt,

Figure 4. Three-Year Cost Summary.

Year	Grades	Target Population	Computers		Software		Staff Development			Sub-totals
			Quantity	Cost	Types	Cost	No. teachers	No. sub days	\$40/Day	
1	6-8	Remedial; 2 buildings; approx. 60 kids	4	\$ 6,000	Language Arts Math Science	\$ 1,000 1,000 400 2,400	14	31	\$1,240	\$ 9,640
	6-8	Computer Literacy (350 kids)	6	9,000	Languages, Simulations, Games	1,000	2	6	240	10,240
Subtotals			10	15,000		3,400		37	1,480	19,880
2	3-5	Basic Skills	42	42,000	7 × 1,500	10,500	85	170	6,800	59,300
		Gifted and Talented	0	0	0	0	7	14	560	560
Subtotals			42	42,000		10,500		184	7,360	59,860
3	10-12	Computer Science (300 kids)	40	60,000	2 × 2,000	4,000	2	8	320	64,320
	9-12	Remedial (200 kids)	6	6,000		1,000	4	8	320	7,320
Subtotals			46	66,000		5,000		16	640	71,640
TOTALS			98	\$123,000		\$18,900		237	\$9,480	
									Three-Year Total	\$151,380

Figure 5. Amortizing Per-Pupil Cost.

Year	Hardware and Software Costs	No. Pupils Served	Cost per Pupil, Current Year	Total Cost to Date	Total No. Pupils Served to Date	Average Cost per Pupil, All Years	Average Cost per All Pupils
1	\$18,340	410	\$44.73	\$ 18,340	410	\$44.73	\$2.62
2	52,500	850	61.76	70,840	1,260	56.22	5.06
3	66,000	1350	48.89	136,840	2,610	52.43	6.52
4	0			136,840	3,960	34.55	4.89
5	0			\$136,840	5,310	\$25.77	\$3.91

decision makers need to ensure that the workshops are not singleton or one-shot sessions.

Cost Summary

Figure 4 summarizes the four areas of concern cited above and summarizes cost in terms of teacher salary days or substitute teacher days. For this example, we have chosen a district with 7,000 students, one high school, two middle schools, seven elementary schools, and 350 teachers. Other districts can modify Figure 4 on the basis of their own target populations, goals, and priorities. The reader should note that hardware represents approximately 80 percent of the total cost. The ratio of hardware costs to software costs should decrease in the near future, however.

Figure 5 shows how the per-pupil cost can be amortized over a three- to five-year period. When analyzed this way, the cost-effectiveness of computers is clear.

Obsolescence and Long-Range Plans

Clearly, technology is changing. In the next few years, we can expect faster, more powerful microprocessors, improved memory chips, and sophisticated subsystems, such as modems and video systems on single chips. Storage technology is improving, and flat-screen monitors are imminent. Moreover,

hardware costs are expected to go down. Within four years, a powerful personal computer system complete with video screen, keyboard, modem, 256 kilobytes of memory, and 1 megabyte mass storage should cost only \$500 to \$600.

School planners will have to be prepared for these changes. They should also realize that while hardware purchased this year will probably have a wear life of five to seven years, it will be technologically obsolete within three. Long-range plans should reflect these facts.

Figure 6 illustrates how 80 to 90 percent of old equipment can be re-assigned or consolidated in new settings. New hardware and software should be added to support district goals and priorities. In addition, although it is not included in Figure 6, continuous staff development will be needed and should be planned at various levels for all teachers, both new and experienced.

Finally, planners will want to present the results of their work in a formal document describing three- and five-year plans for microcomputer adoption and implementation. The following outline suggests one approach to organizing such a document:

Chapters

Introduction/Rationale
Modified District Goals

Instructional Priorities

- a. Subjects/grades/target population
- b. Educational objectives

Hardware-Software Needs Assessment

- a. Compatability
- b. Selection criteria
- c. Quantity justification

Staff Development Plan

- a. Rationale/value
- b. Levels/program of study
- c. Bootstrap model
- d. Cost summary

Cost Analysis

Planned Reevaluation: Year 6

Appendixes

Instructional Objectives

Districtwide Computer Committee:
Structure and Responsibility
Computer Literacy Course Outline
Computer Science Course Outline.

I have presented some examples of how school district program planners might approach the development of a long-range plan for the instructional use of microcomputers. These ideas are not prescriptions; rather, they are models from which educational planners can draw as they develop their own long-range plans. □

¹M. Tim Grady and J. D. Gawronski, eds., *Computers in Curriculum and Instruction* (Alexandria, Va.: Association for Supervision and Curriculum Development, 1983).

Figure 6. Revision of Three-Year Plan.

Year	Subject	Grade	Target Population	Hardware/Software	Cost
6	Language Arts, Math	5-8	Remedial	Consolidate original equipment (2/3 of which will be fully operational) into lab settings. Replace 50-100% of original equipment.	30% of Year 1 cost
	Gifted and Talented	4-8	Gifted and Talented	Consolidate 10% of old hardware into gift setting. Purchase equipment equal to about 1/4 of original number of computers.	10% of Year 1
7	Computer Literacy	6-8	All students	Redistribute about half the original computers so that about half the buildings will have more. Buy new equipment and software to replace computers that have been moved.	25% of year cost
8	Computer Science	10-12	General Population	Much old equipment will be obsolete or not operational. Reduce the number of machines to about half the original number and buy replacements. Transfer original equipment that is still operational to middle schools.	25% of year cost

Copyright © 1983 by the Association for Supervision and Curriculum Development. All rights reserved.