# COMPUTER LITERACY AND APPROPRIATE CURRICULUM CONTENT

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Since the mid-1970s several national mathematics organizations and committees have published position papers, statements and recommendations regarding the need for people of all ages to become computer literate and to help others to become computer literate.

1975 The Committee on Computer Education of the Conference Board of the Mathematical Sciences recommended the preparation of courses in computer literacy at many educational levels.

1976 The National Council of Supervisors of Mathematics published a position paper on the ten basic skills and designated computer literacy as one of these basic skills.

1980 An Agenda for Action - Recommendations for School Mathematics in the 1980s, published by the National Council of Teachers of Mathematics, included the following recommendation:

Recommendation 3

Mathematics programs must take full advantage of the power of calculators and computers at all grade levels.

3.4 A computer literacy course should be a part of the general education of every student.

3.5 All mathematics teachers should acquire computer literacy either through pre-service programs or through in-service programs funded by school districts in order to deal with the impact of computers on their own lives and to keep pace with the inevitable sophistication their students will achieve.

3.9 Provisions must be made by educational institutions and agencies to help in the necessary task of educating society's adults in computer literacy and programming.

3.11 Teacher education programs for all levels of mathematics should include computer literacy including experience with computer programming.

3.12 Certification standards should include preparation in computer literacy and the instructional uses of computers.

1980 The National Council of Teachers of Mathematics issued a position statement regarding computers in the classroom. In part, the document states that computer literacy is an essential outcome of contemporary education.

1982 The entire October issue of ASCD's Curriculum Update was devoted to computer literacy.

Definitions of and curricula for computer literacy have been suggested by the aforementioned sources. A three-part approach has been recommended:

A. Staff Education
B. Student Education
C. Programming Proficiency

Regarding staff education special mention was made of the need for a non-threatening atmosphere because so few teachers have any background in computers. Several sources mentioned that many training courses designed for teachers would be more appropriate for computer science majors. Such in-service attempts are often counterproductive in attempting to prevent or reduce computer anxiety.

Staff development programs in computer literacy should include:

1. Activities to overcome negative attitudes or anxieties
2. Definitions of computer terms
3. Familiarity with the major components of a computer system
4. Familiarity with microcomputer operations through hands-on experiences
5. Introduction to basic programming
6. Sources of information (books, periodicals, organizations)
7. Methods of critiquing software
8. Sources of software
9. History of computing devices

Other topics could include:

10. Social impact of computers and the occupational outlook for computer-literate people
11. Classroom applications of microcomputers
12. The possible evolution of new roles for teachers and students

In general, four modules are suggested as appropriate curriculum for students:

A. The history of computers
B. The anatomy of the computer (hardware)
C. Programming (software)
D. The social impact of computers

The historical evolution of the four generations of computers helps to explain how doubling of human knowledge has accelerated from every 50 years by 1800 to every ten years by 1950 to every five years by 1980.

The second module, computer anatomy, allows the student to examine parts of a computer and understand how it works. It also involves a basic understanding of the computer circuitry and its relationship to the binary number system and computer languages. A critical aspect of computer literacy is that it be taught within the framework of hands-on experience. The binary number system is itself a topic worthy of closer examination.

The third module, programming, allows the student control over the computer. Through programming techniques, the student can instruct the computer to solve a variety of problems, can display data in a variety of ways, and can interact with the computer. Students who know how to program perceive the computer realistically--as a fast and accurate tool, not an all-knowing "brain."

The fourth module examines the role of computers in our everyday lives--their advantages and disadvantages; their role in business, government, medicine, home, school; computer ethics and computer crime. Students could use available resources to make scrapbooks, photo displays and reports about computers, and to design collages and mobiles.

Computer literacy should include these topics:

1. How computers are used
2. What a computer can and cannot do

3. How computers work
4. How to use a computer
5. The impact of computers on society
   a. Applications
   b. Occupations
   c. Uses and abuses of information gathering
6. How computers can develop the skills of decision making and coping with change
7. An introduction to programming
8. The history of computers

The computer was developed by humans to serve humans. Understanding the computer is the key to reducing the anxiety that accompanies this new technology. A well-organized, well-designed computer literacy course can provide a means to accomplish that goal.

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## STUDYING ON THE "LINE AT INFINITY"

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Sometimes it is instructive to look at things "another way" and different approaches often reveal properties new to us. The use of homogeneous coordinates does this and such a topic might well become a special study for students in upper high school mathematics.

Homogeneous coordinates in the X,Y-plane arise from replacing variables x and y by the ratios $x_1/x_3$ and $x_2/x_3$ respectively. New consequences follow immediately for the line whose equation is $3x + 2y = 10$ is now written as $3x_1 + 2x_2 = 10x_3$ or $3x_1 + 2x_2 - 10x_3 = 0$; the parabola $y = 3x^2 + 5$ becomes $x_2x_3 = 3x_1^2 + 5x_3^2$ and we note that the equations have become "homogeneous" because each term now has the same degree. The point (2,5) has its coordinates replaced by ratios 2/1 and 5/1 and we now write (2,5,1). The origin (0,0) becomes (0,0,1) while the unit point (1,1) assumes the name (1,1,1). Although the