For adequate computer software teachers and publishers must consult and work together.

Educational Software: Why are Teachers Dissatisfied

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Over the past few years every educator, parent, and student has been bombarded with the statement, "Computers can be a very powerful tool in the learning environment." Without question, computers do have capabilities to perform many diversified functions. They can assist students in writing, calculating, remediation, acquiring new skills, and simulating hazardous or impractical exercises. The list of possibilities for the computer in the educational process seems endless and this enthusiasm has carried over into the schools. Since 1982 the numbers of microcomputers in schools have grown at an astounding rate with 96 percent having at least one microcomputer (Ingersoll, Smith, & Elliot, 1983).

Although the microcomputer has gained popularity in classrooms, surveys reveal that instead of employing the microcomputer as a tool, microcomputers are used primarily to teach programming (Becker, 1983). Additional research has revealed that regular classroom teachers have developed serious concerns regarding the development of educational software currently available. Computer manufacturers, software developers, and educational publishers have entered aggressively into the development and marketing of equipment and software to support various educational applications of microcomputers (Otte, 1984). Since software publishing is in its infancy, many of those who engage in the publication of instructional materials lack requisite skills both in instruction and in the management of appropriate evaluation activities designed to have informational value for the user and to provide a basis for revision and modification of the software (Steffin, 1983). Further, software programs are frequently authored either

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by programmers who have little background in education or by educators who have little background in programming (Gold, 1984). These deficiencies have resulted in much software that is inappropriate or technically unsound (Gold, 1984).

Many of the current software packages have left teachers dissatisfied and frustrated. A 1981 survey of computer use revealed that educational software was viewed as little more than electronic flashcards and workbooks (Gold, 1984). There was a general sense among educators that software was dull, unimaginative, and of questionable pedagogical soundness (Ingersoll et al. 1983). Similarly, a 1983 survey of teachers using computers revealed that the majority were disappointed with the amount and quality of software available (National Education Association, 1983).

The literature contains repeated references to the need for good quality software and criteria for developing that software. However, few references have been made regarding what software publishers are doing to meet these educational needs. The following study was conducted to bring to light the educational criteria used by manufacturers in the development and publication of educational software and compare it to an evaluation system used by educators. In this study, the educational criteria for software evaluation were those used by members of the California Software Evaluation Consortium, which is constituted of approximately 30 member groups who routinely evaluate software.

The 132 subjects in the study were educational software manufacturers, developers, and publishers identified by the 1986 Educational Software Preview Guide (California Department of Education). Subjects were initially contacted by letter requesting the procedures and criteria used by the subjects to select educational software for publication. The data received from subjects were classified and percentages calculated based upon their compliance with the following 22 criteria (Bitter, 1986):

1. **Correctness of Content Presentation**: Is the program free from content, informational, computational, grammatical, and syntactical errors?
2. **Content Presentation**: Is the pedagogical content presented in a clear, concise, logical, and manageable fashion and in sufficient depth of instruction and/or practice so that learning will take place?
3. **Use of Technology**: Does the program make appropriate use of computer technology such that the program takes full advantage of the computer's capabilities and provides students with a learning experience that cannot be presented better in another media?
4. **Integration into Classroom Use**: Can the program be effectively and easily integrated into classroom use? Does the software lend itself to use within a classroom time frame? Are effective and appropriate teacher support materials available? Can the program be easily used by a teacher?
5. **Ease of Use**: Is the program "user friendly?"
6. **Curriculum Congruence**: Does the content directly support the curriculum?
7. **Interaction**: Is interaction effectively achieved for the target audience? Is there sufficient amount and a sufficiently high quality of interaction to promote learning?
8. **Content Sequence/Levels**: Are there multiple levels of difficulty with appropriate incremental steps between the levels so that the development sequence and the difficulty of the levels is appropriate to the target audience?

9. **Reliability:** Is the program free from programming and technical errors?
10. **User Control of Program:** Can the user (student or teacher where appropriate) control the rate, amount, and sequence of the presentation?
11. **Feedback (General):** Does the program correctly assess student input and provide appropriate and effective feedback messages?
12. **Objectives:** Are objectives clearly stated and are they met?
13. **Motivation:** Is the program motivational?
14. **Branching:** Are there branches to provide facility for individualized instruction according to the student's needs?
15. **Negative Feedback/Help:** Are corrective feedback messages or help screens provided as needed?
16. **Content Modification:** Can the content be modified by the teacher?
17. **Content Bias:** Is the content free from bias (race, gender, cultural, ethnic, stereotyping, and violence)?
18. **Teacher Documentation:** Is the documentation comprehensive, easy to understand, and well organized?
19. **User Support Materials:** Are user support materials present? Where present, are they appropriate and effective?
20. **Color, Sound, Graphics, Animation:** If these features are present, are they used effectively to enhance the program?
21. **Screen Displays:** Are screen displays effectively and appropriately formatted?
22. **Management System:** Is there a management system which provides an effective means for record keeping and/or assignment control?

Of the original 132 subjects, 91 (69 percent) of the publishers responded. Forty-one (31 percent) did not respond, either by choice or by virtue of having reportedly gone out of business between the publication of **The 1986 Educational Software Preview Guide** and the execution of this study. Of the 91 respondents, 59 responded by letter. Thirty-two responded by telephone contact. The participants in this study represented 20 different states in the United States, and Canada. The scope of responses differed greatly. Of the responses, eight (or 8.8 percent) respondents sent detailed, typeset information explicitly outlining 15 or more guidelines and the procedural and developmental process they employ when developing and selecting educational software for publication. Twelve (13.1 percent) respondents briefly outlined 4–14 or more guidelines in a letter format. Eleven (12.1 percent) respondents listed three or fewer criteria. Sixty (67 percent) respondents stated they had no formal guidelines.

Table 1
Educational Microcomputer Software Producers'
Responses to Inquiries Regarding Criteria Guidelines
Used to Select Educational Software for Publication

	No.	Percentage of Population
Software producers responding with pre-prepared, detailed information which included fifteen or more guidelines	8	8.8
Software producers responding reporting four-fourteen guidelines	12	13.1
Software producers responding reporting three or fewer guidelines	11	12.1
Software producers responding reporting that they had no formal guidelines	60	67.0

Forty (44 percent) respondents stated that although they had no formal policy or educational criteria employed in software selection, they do request that software be submitted so that it may be evaluated individually. As one publisher stated, "If we like the software and it fits into our line, we'll publish it."

Publisher responses were categorized by the researchers by criteria. Some responses applied to more than one criteria and were placed in both categories. The following percentages were found:

Correctness of Content Presentation	9.9%
Content Presentation	9.9%
Use of Technology	10.9%
Integration into Classroom Use	8.8%
Ease of Use	6.6%
Curriculum Congruence	10.9%
Interaction	5.5%
Content Sequence/Levels	5.5%
Reliability	5.5%
User Control of Program	2.2%
Feedback (General)	3.3%
Objectives	6.6%
Motivation	7.7%
Branching	3.3%
Negative Feedback/Help	3.3%
Content Modification	1.1%
Content Bias	0.0%
Teacher Documentation	4.4%
User Support Materials	3.3%
Color, Sound, Graphics, Animation	5.5%
Screen Displays	2.2%
Management System	2.2%

Overall, the great majority of educational software publishers DO NOT HAVE a formal or standard set of criteria to guide in software development or to employ in the selection of educational software for publication submitted from external sources. However, the small number of publishers employing formal or informal criteria and policies regarding the development and selection of educational software for publication do not employ the same criteria that *educators* deem important in the development of educational software.

Similarly, many manufacturers request that potential programs be submitted to them for evaluation on an individual basis. This evaluation is conducted by some publishers on the basis of that manufacturer's individual agenda.

Is it any wonder, then, that educators often feel frustrated and confused when examining or utilizing computer software in the curriculum? Clearly, it seems to be in the best interest of producers and consumers alike for educators to insist:

That publishers consult with educators and develop a standard set of criteria and procedures used to develop and select software for publication.

That review boards consisting of educators and programmers evaluate software before field testing.

That field tests with students and teachers should be conducted before products are marketed. The results

of field testing should be included with the package information.

That educators should be involved in identifying areas of future software development.

That recommendations for integration of the software into curricular areas should be included, along with lesson plans for each product.

Publishers and educators must work together, each contributing their expertise, to advance and improve the quality of educational software. Not to do so will most surely result in reduced sales for producers, a marked tentativeness on the part of educators to utilize this remarkable technology and, sadly, a disservice to our children who deserve all of our best efforts.

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