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ABSTRACT

The role of copyright and other limitations on use of educational software and the effective training of teachers to utilize changing technology were the focus of the third and final session of a 1983 series of educational technology review panels. Daniel Brooks and Michael Remington discussed the current and changing status of copyright regulation and legislation. Policy implications of copyright law for federal funders of educational software, including television, were addressed by Richard Huber of the National Endowment for the Humanities, George Tressel of the National Science Foundation, and Frank Withrow of the Center for Libraries and Education Improvement (Department of Education). New technology and software rights were discussed by Eugene Aleinakoff, an attorney, John Carey of New York University, Larry Benincasa of Reston Publishing, and John Cecil of the Public Broadcasting Service. The need for proper teacher preparation and training for a changing technology was considered by Charles Tidball of George Washington University, Mont Mondale of the Educational Computer Service (National Education Association), Allan Hershfield of the Instructional University Consortium for Telecommunications and Learning, and David Wormser, an attorney for the Association of Data Processing Service Organizations. Paul Mertins and Joan Katz made brief presentations on current National Center for Education Statistics projects and research, including an arrangement with the Corporation for Public Broadcasting for several joint projects. An appendix lists 11 readings. (LMM)

OVERCOMING IMPEDIMENTS TO NEW TECHNOLOGY

A Summary of the Third Invitational Postsecondary Educational Review Panel

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Introduction

The third and final session of the 1983 series of educational technology review panels, cosponsored by the National Center for Education Statistics (U.S. Department of Education), and the Center for Telecommunications Studies (George Washington University), was held on December 7, 1983, with some 40 persons participating. This session focused on two topics in postsecondary education: the role of copyright and other limitations on use of educational software, and effective training of teachers to utilize changing technology. Christopher Sterling, Director of the Center for Telecommunications Studies, introduced the sessions and acted as moderator for the day-long meeting.

The Impact of Copyright on Educational Software

A long morning panel was broken into two major subtopics. In the first, two legal experts on the current (and changing) status of copyright regulation and legislation provided (1) some essential background on recent developments and (2) some discussion about what is still needed in the complicated realm of copyrighting.

Daniel Brooks, a principal attorney with Computer Law Advisors in Washington, D.C., opened by noting that the main impact of federal policy in this area will be to make the development of computer literacy extremely expensive. He and other expert observers feel that not only are computer programs "literary works" under terms of the 1976 Act (an opinion recently upheld by court decisions), but that such programs were probably protected already under the old 1909 legislation! All of this was made even more certain with the passage of 1980 amendments to the recent Act. Any owner of an "original" program copy can make copies for his/her own use. (Brooks detoured into an interesting legal discussion of what "original" and "copy" mean in terms of copyright as an example of the intricacies of this subject.)

Developing true computer literacy will be expensive partially because, thus far, development of computers has been what he termed a "razor/blade" game, in which the "blades" consist of programs, services, and teacher training--all required to make effective use of something often less expensive; i.e., the "razor," or computer hardware. The related "lock-in" factor, which is the fact that only compatible software will run on any given hardware, makes the initial hardware investment a crucial educational decision, limiting, as it does, all future software purchases. Furthermore, computer costs can be related to an iceberg analogy: Hardware costs run about 10% of the probable long-term total expenditure; the remainder, 7% on software, 30% on operation and maintenance, perhaps 50% on related follow-on purchases and upgrades, and 1% each on communication, site preparation, and training. While the proportion of hardware to software costs is now about the same as in past years, the cost of effectively trained personnel is up sharply, from 9% to 24% in the past few years. Wrapping up his discussion of costs (supported by a number of useful visuals), Brooks estimated that, if schools pursue the notion of one computer for every three students in the coming years, the likely national cost would be $5 billion.

Turning to ethical and legal problems of computer applications in schools and colleges, Brooks suggested that the real solution (if one is possible) lies in the training of teachers and students rather than in any given law. Mere addition of more laws is not likely to prove effective since "performance" with computer programs is seldom done in public, thus raising the substantial problem of detection of infringements. In later discussion, Brooks noted the need to persuade teachers that computers do not really threaten their job security because the new technology will develop many new kinds of jobs for which training will be needed.

Michael Remington, counsel for the House Subcommittee on Copyright, Patents and Trademarks, chaired by Wisconsin's Robert W. Kastenmier, described his Subcommittee's jurisdiction over patents, trademarks, and copyrights. The Subcommittee has doubled in size (to 14 members) in recent years, attesting to the subject's growing legislative importance. Remington noted that the members and staff have to grapple regularly with three interrelated questions: What is technology? What are the Federal (and especially Congressional) policy implications of new technology? What is the role of law in technological change? Congress in particular has real trouble dealing with broad societal issues as opposed to those relevant to specific subgroups. Besides, what can Congress do when a large majority "violates" a given law? Perhaps the law is inadequate in such a case. While Congress, faced with such problems, has been slow to codify rights growing out of changing technology, in the past few years, it has been, increasingly willing to examine the matter, at least.

Remington turned to some specific copyright questions of interest to the educational community. Technology constantly provides new and distinct forms of potentially protected (patents, copyrights) material, such as the now ubiquitous "microchip" heart of computers. This has contributed to the rise of a concept of "industrial," as opposed to the more traditional "author," copyright. The question then arises as to what form and term of protection should be given to these new forms of copyrighted works as the market life of industrial goods is almost always much shorter than that of literary works. As an example, he raised the current discussion about the relative merits of leasing and the concern over what is known as the "first sale" doctrine. Both are means of assessing user rights, with the lessor generally being seen as more vulnerable than the purchaser with regard to flexibility in creating two copies of computer software. In education, for example, what is the role of materials in the public domain? This status is sometimes the result of Government funding. Can a Government-supported, computer-assisted instructional program on language be copied indiscriminately? What about materials produced within or for Government agencies? Remington noted that in the House Subcommittee discussions over these and other questions, education sits somewhere in the middle--it is both the creator and the user in the copyright sense. Unfortunately, the Subcommittee has heard virtually nothing from the educational community on these matters. Even if educators were to get together to make a common presentation, Remington pointed out the likely anti-trust problem which might result if this common approach were expanded to the contractual and day-to-day dealings with information providers. He concluded with

the comment that, while Congress is supposed to make overall Government policy in this and other areas, the complex social, technical, economic, and political pressures over these issues are especially difficult--more than two decades elapsed while replacing the 1909 law with the present 1976 legislation. At present, Congress is trying to sort out the competing demands by creating a definitional framework to clarify the roles of the individuals and the institutions involved.

Policy Implications for Federal Funders of Educational Software

The second topic of the panel addressed the more specific implications of the copyright conundrum of Federal agencies funding the creation of software with educational applications. Representing the National Endowment for the Humanities, Richard Huber outlined his agency's guidelines in the development of quality programming for public television and in-school applications. Three major guidelines affect the rights of those receiving NEH grants: (a) the applicant holds all the rights to the material; (b) a one-year "window" exists in which material may be offered to commercial stations or vendors, but thereafter must be provided/sold to public stations; and (c) while the applicant may keep up to the first $50,000 in income, anything above that must be shared 50-50 with the agency for further development of other projects. NEH encourages secondary distribution of grant-supported programming to schools at the lowest possible cost.

George Tressel of the National Science Foundation provided some very useful commentary on how most of us tend to be unrealistic in thinking about the role of computers. They are NOT a cure-all for education's problems. We need to analyze more carefully what we can do vis-a-vis what should be, or needs to be, done. Computers are far more likely to show up in homes rather than in schools for some time, and educators must plan accordingly. The problems of formal education lie in the system and are not to be remedied solely by technology or by any other single initiative, let alone computers. A real danger of disillusionment abides in too rapid an investment in, and adoption of, computers within schools without advance planning and clear perception of their role. Too many key groups might be "turned off" (Congress and other Federal funders, teachers concerned for their job security, and parents feeling that computers might motivate underachievers), thus reducing the effective application of computers to more limited or more focused roles.

The Department of Education's Frank Withrow described television programs supported by his division, the Center for Libraries and Education Improvement which requires a three-year, open recording-and-use provision for schools--thus allowing widespread secondary use of such programs as Sesame Street. However, recognizing the venue of small computers, funding is provided for educationally sound materials which, while suitable for in-school use, are aimed mainly at home applications. A specific focus of this funding program is to help explore new software options and hardware delivery systems (including FM radio subsidiary communication authorizations), and getting the commercial and educational marketplace to invest in such nontraditional approaches.

New Technology and Software Rights

Attorney Eugene Aleinakoff, who numbers among his clients the Agency for Instructional Television (AIT, Bloomington, Indiana), suggested that the real problem is lack of funding for any aspect or level of education--even without changing technology, but especially with it. Some means of acquiring needed equipment and software must be developed, as well as developing requisite training for effective and efficient use. Aleinakoff did not view copyright as an impediment, but rather as a means to encourage the creation of new software. Indeed, he felt that the limitations on use were not because of copyright restrictions, but because materials were out of date and no longer valid, and because of union-required contract limitations on rights. Nonprofit organizations have difficulty obtaining complete distribution rights because of (a) a lack of information on how to do this, and on who gives permission; (b) limited funds; and (c) the trend toward increasing fractionalization of rights developing out of the music business and now expanding to the newer technologies. AIT, for example, gets full distribution rights, allowing no production until this status is clear. In an aside which was discussed heatedly for several minutes, he noted the University of California-San Diego's licensing of a computer language developed in that tax-supported institution to a commercial firm in order to receive maximum financial return. Several members of the panel questioned the equity of this kind of arrangement, while others defended the approach. Aleinakoff revealed the lack of university and nonprofit agency experience with effective marketing. Finally, he stressed that educators have no special rights under the 1976 Act other than the "fair use" provisions of Section 107, which permit off-air recording and use for a ten-day period (after which, a recording must be erased, or a royalty paid).

Aleinakoff suggested that, within Section 118 of the Act, a model may reside for a solution to much of this confusion and the resultant lack of effective use of materials suitable for education. Some kind of a compulsory educational license may be the best compromise to the access vs. payment conflict. It would at least make everyone "honest." Crucial to any such effort would be adequate staffing of the Copyright Royalty Tribunal (CRT) to allow effective development of, let alone conformity to, the rules. The threat of Government punishment would be likely to encourage more voluntary compliance with an Act that is now largely ignored by educators. To deal with the revitalized CRT, and with Congressional policymakers, Aleinakoff called for the creation of an Educational Defense Committee to represent educators' needs and to support those educators who are involved in copyright court proceedings. From the ensuing discussion it is obvious that everyone involved in matters of copyright wants someone else to resolve the conflicts. (Remington said that Congress would vastly prefer that the parties sit down and resolve their differences before any legislation is written.)

New York University's Dr. John Carey pointed out the many different modes by which educational programs or materials can be made available. Although the content may differ very little, the characteristics of each mode differ sufficiently to cause variable distribution, adding to the present confusion. As the number of modes increases, so does the need

for repackaging, which takes into account the interaction between economics, media characteristics, and limited market size. Thus, a huge amount of potentially useful educational materials exist in which the rights are simply unknown. From both the funder's and users' perspectives, several things are needed to ensure the best and widest possible use of funded materials over their useful life:

- A clear statement of who owns what rights should accompany all educational materials. Further, how to contact the owners should be included.

- Funders must push for a limitation on barriers to extended educational use of materials.

- The terms of rights in any possible repackaging of material must also be made clear for cost-effective application of educational material.

For, as Carey pointed out, until this funding and legal environment is clarified, creative exploration of many potential new modes of distribution will be severely limited. Audiences may not be served by the best available medium for a given situation, and funders will not achieve the most cost-effective applications of their support. (Note: many of Carey's comments are explored at greater length in his recent report to the Corporation for Public Broadcasting, which is cited at the end of this summary.)

After a break for lunch, Larry Benincasa of Reston Publishing examined these questions from the producer's point of view. He described the publisher (of either traditional print or newer modes of software delivery) as a co-creator with the author, as well as relating to the ultimate end user. Thus far, the software market has been difficult for publishers--"no one has been successful" in it. For example, development and publication of computer programs is some five to ten times as costly as traditional book publication because the market is generally much smaller for the former. Thus, his firm like many others, aims at the home market with schools as secondary options to widen the market. Some of the publisher problems that he raised include:

- How does a publisher handle evaluation/reveiw copies of software, given the ease of copying them? To a degree, development of evaluation centers (see below) is addressing this problem.

Development of license agreements is tricky with new technologies--should licensing of software applications in different modes of delivery be in an original contract with an author, or should some other kind of license be developed?

Considerable discussion followed on the role of the publisher/producer in debugging materials to be marketed. For example, too few authors have sufficient students to really pretest computer programs. (GWU's Charles Tidball stated that some 1,000-1,500 hours of classroom use are required to effectively clean up a new teaching program, a process referred to as "burning in" programs.) Lack of

equipment standardization/compatibilty is another severe limitation in the marketing of materials--many versions for different modes have to be produced.

The final speaker of this panel was John Cecil of the Public Broadcasting Service who asserted that teachers are not aware of most software availability simply because of insufficient time to look at it, let alone to research their options; effective evaluation is difficult even if one has time and the needed data; the cost of much material today exceeds what funds schools have available; and the rights situation is all too often unclear. (Even if all of these problems were overcome, in elementary and secondary education, purchases are made on a centralized basis, thus eliminating much teacher input.) Looking at this welter of problems, a teacher will often simply record and use something rather than asking any questions. Indeed, a fair number of schools are buying their own receive-only satellite "dishes" to assist in this "free" use of programming, being either unaware of, or simply unwilling to face, the legalities involved. Cecil noted that the public broadcaster is often in a situation parallel to teachers when it comes to knowing who has which rights (broadcasting, off-air recording for in-school use, home recording, closed-circuit rights, other modes of distribution rights, etc.) Clearly, some kind of centralized information clearinghouse is required for all concerned. The fact remains that we are dealing with an expensive process. Discussion amongst the group then focused on the potential of tax incentives and gifts, in addition to existing underwriting, as means of getting educational material to potential educational users after broadcast.

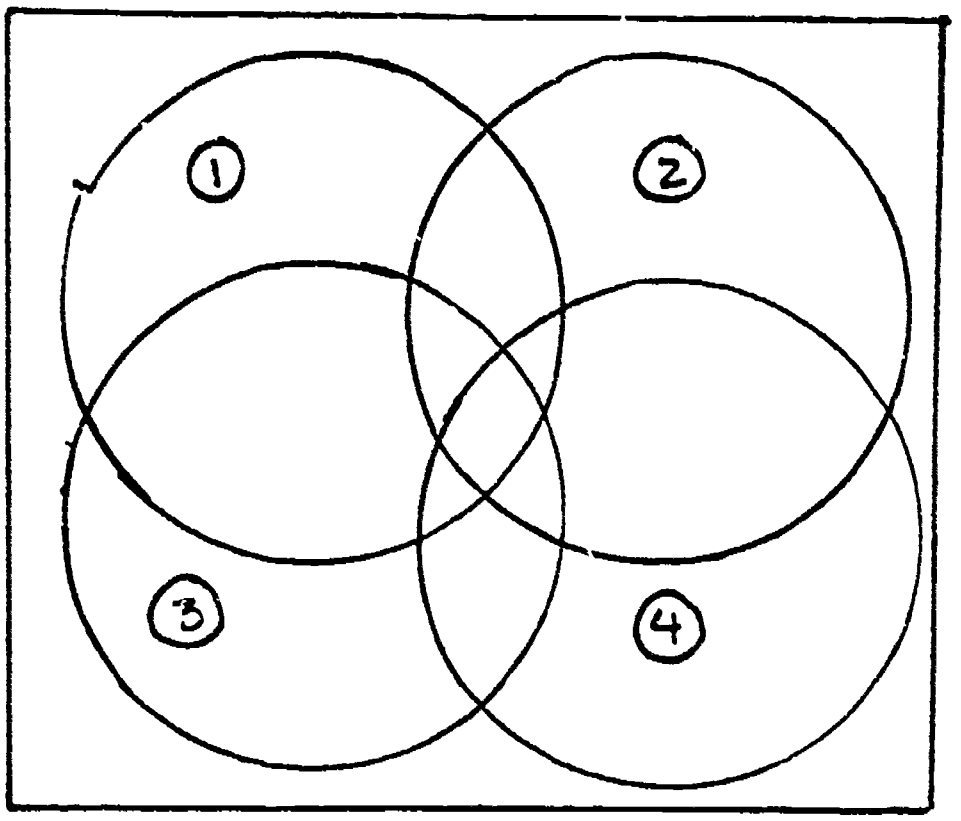
Teacher Training for a Changing Technology

The last panel session of the day took a very different tack, focusing on the need for proper teacher preparation and training if students are to meet the demands of an increasingly technological age. Dr. Charles Tidball, developer and director of a computer literacy program at George Washington University, led off the discussion with a description of just what "computer literacy" is and what it includes. He noted that the definition must change over time as computer utilization changes, as the variety of tasks which can be performed are varyingly defined, and as little agreement exists among so-called experts on just what the term really includes. Tidball feels, in any case, that "hands-on" experience is a fundamental aspect of any good computer literacy approach, though it is not stressed enough in many courses. In his own course, students on their very first day learn to "sign on" to a computer and begin to pick up the jargon. He presents the material as a foreign language with a glossary to build needed vocabulary. In both the tutorial and simulation sense, the course is interactive in order to eliminate fear of computers, the major obstacle for novices. Tidball feels that the process of programming is not an essential element of computer literacy for teachers. Instead, he stresses editing and being comfortable with the machine and its parts. He stresses principles rather than any specific language or machine.

The gist of the content of his basic course is as shown on the diagram on the following page. It demonstrates the overlapping vari-

ables in computer literacy. Tidball intends to get students at least halfway to their own defined needs within this scheme--and tells them so. Some of the topics are intermixed to show interrelationships.

Tidball Computer Literacy Model



1. Changing Computer Utilization (includes such topics as a 30-year perspective, representation of data, batch vs. interactive computing, the skills required by computer users, file vs. data base management, and fear reduction).

2. Computer Terms and Practices (includes reading and glossary skills, basic computer vocabulary, the components of a computer, and several other elements).

3. Interactive Computer Experience (includes how to log on and off a computer, accessing programs, learning BASIC, practice programs, and class projects).

4. Future Computer Utilization (defined mainly as the immediate future student needs, and includes computer graphics, data reduction, word processing, computer assisted instruction, simulation, and data base management).

How to evaluate the plethora of computer software was the next topic addressed. Mort Mondale of the National Education Association's "Educational Computer Service" described his organization's formation, purpose, methods, and role in aiding teachers to use newer technologies effectively. The problems outlined earlier by Benincasa and Cecil (see p.5) were largely behind the formation of the NEA initiative (NEA Educational Computer Service, 4720 Montgomery Lane, Bethesda, MD 20814, Tel. 301 951-9244). NEA tests software rigorously on three grounds: technological assessments by engineers, instructional viability by a panel of expert teachers, and actual classroom testing by students. If the software passes all tests, it is listed as a part of the NEA-published catalog, thus opening up a huge potential classroom market in some 16,000 school districts. Mondale reported that industry figures indicate that the NEA standards are far too high; but so far, the effort has been greeted well by the educational community, and is the most extensive of its kind. Discussion afterward suggested that this NEA service should help to trim unworkable software from the market, allowing somewhat easier and more informed choices. Steve Ehrmann of FIPSE noted during the discussion that CONDUIT does a similar service for the postsecondary level of education. In addition, CONDUIT helps to further develop those software programs found wanting but also showing promise. Both systems are teacher-centered, rather than user-centered.

Allan Hershfield of the Instructional University Consortium for Telecommunications and Learning, began his presentation by saying that no new technology is going to change, let alone revolutionize, the educational process until a basic fact is recognized: Learning takes place best when a teacher relays knowledge to students. The teacher, in turn, reads to learn, and is paid each time he or she teaches a class. The "contact hour" means of measuring teacher use and pay, which is based on this decades-old approach to education, is now something of a stumbling block to budgeting, let alone applications of changing technologies, as the latter do not "fit" this teacher-focused means of measuring progress. The bottom line, he felt, was that educators must now educate legislators and other policymakers to understand that, if they are serious about using changing instructional technology (for whatever reasons--enhanced teaching, more cost-effective teaching, enrichment, etc.), sufficient funds and faculty time for development and integration of software will have to be forthcoming. In some detail, Hershfield described how courses are developed for the Consortium, making use of a multi-member teaching team aimed at a specific student audience, the process taking a couple of years and costing some $500 000. The group spent a few moments discussing advantages and problems of face-to-face vs. telecourse teaching.

The final speaker of this panel was David Wormser, an attorney for the Association of Data Processing Service Organizations (ADAPSO), who addressed the complicated matter of ethics in teacher use of technology. Ethics as a matter of conduct are not constant; and with the advent of computers, a whole new set of problems arises. Teachers, indeed all of us, need to understand the societal impact and value of what one is "playing with" when using computers--what, in other words, is "accepted" behavior. The copying of computer programs, widely practiced and accepted, is but one part of the problem. While technology can tempora-

rily "block" the copying of software, such protection seldom lasts even a year as many take such blocks as personal challenges. The sense of propriety is not recognized, and thus is not observed. Likewise, with the invasion of privacy--all too easily accomplished with computer capability and the growth of data banks. The problem, Wormser asserted, was really one of educating teachers, and through them society, in the ethics of computer theft as being the same as theft of material goods, just as computer privacy invasion is similar to physical intrusion on privacy. Because technology makes something "easier" does not make it ethical.

Update on NCES and CPB Activities

The afternoon concluded with two brief presentations on current related projects and research underway at NCES, including the forthcoming CPB surveys. Paul Mertins of NCES briefly outlined the progress on three projects: (a) a study to develop a good definition of computer literacy, along with a glossary of terms and references for a forthcoming manual to be issued by the Government Printing Office; (b) data development efforts with the Current Population Survey of the U.S. Census, focusing on the incidence of newer technologies in the home; and (c) the long-term (13-year) arrangement with the Corporation for Public Broadcasting (CPB) for several joint projects.

Joan Katz of CPB filled in details on this last project. The present focus is on a School Utilization (of new technology) Survey to update one conducted in 1977, and focusing on elementary, middle/junior high, and secondary schools. This survey includes such new technological options as computers, cable, new types of instructional television delivery, and the like. The results of this update should be available in March of 1984.

The meeting concluded with a request by Chris Sterling that participants, upon receiving this summary, forward any suggestions that they may have for topics of possible future panel meetings in 1984.

Appendix: Useful Readings on Display During the Meeting

Brooks, Daniel T. "Copyright Protection of Educational Computer Programs," Washington: Computer Law Advisors, 1983. (handed out to participants)

Brown, James W., and Shirley N. Brown, eds. Educational Media Yearbook: 1983 Littleton, Colo.: Libraries Unlimited, 1983.

Carey, John, et al. Modularization and Packaging of Public Television Programs New York: New York University School of the Arts, 1983 (available from the Corporation for Public Broadcasting).

Current Developments in Copyright Law. New York: Practising Law Institute, 1982 (Course Handbook 144)

Gaston, Janice Barbara. The New Copyright Law: A Handbook for Noncommercial Broadcasters. Washington: National Public Radio, 1978.

Hawkridge, David. New Information Technology in Education. Baltimore: Johns Hopkins University Press, 1983.

Johnston, Donald F. Copyright Handbook. New York: R.R. Bowker, 1982 (2nd edition).

Lawrence, John Shelton, and Bernard Timberg, eds. Fair Use and Free Inquiry: Copyright Law and the New Media. Norwood, N.J.: Ablex, 1980.

Personal Privacy in an Information Society: The Report of the Privacy Protection Study Commission. Washington: GPO, 1977

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Strong, William S. The Copyright Book: A Practical Guide. Cambridge, Mass.: MIT Press, 1982.