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ABSTRACT

The current trend toward the use of computers and other technology in education is becoming one of the most socially desirable applications in our time. However, the increasing use of these media could lead to developments constituting invasions of privacy: the mass media tend to desensitize people to real invasions of privacy. Dangers exist also in the storage and re-use of data compiled during seemingly innocuous uses of technology, such as computer-assisted instruction and videotaping. We should take precautions to control such problems caused by the widespread use of instructional technology. (SP)

The Impact of Instructional Technology on the Right to Privacy

by ARTHUR R. MILLER*

I. Introduction

Even the most casual observer of the trends in today's highly complex society must be impressed by the influence of what appears to be a geometric increase in computer and communications sophistication in recent years. The growing utilization of highspeed information technology by government, education, and industry has created an enormous capacity for handling information and a concomitant demand for information of all kinds. Record-keeping functions and decision-making processes at all levels of society from choosing employees to extending credit and verifying tax returns are becoming increasingly dependent upon the magic of the computer and its ability to deal with vast stores of data relating to the transactions, activities, and lives of all citizens.

The rate of development in the information transfer field appears to be accelerating; consequently, the application of mathematical models to more sensitive data than has been used in the past is becoming increasingly more common. With each new technological advance, whether it be in microminiaturization, laser beams, ultrasensitive radar and subliminal suggestion, speculation is stimulated as to the ultimate impact of the "information explosion" on contemporary society and on our traditional norms of individual privacy. It is apparent to many, including this writer, that the preservation of the concept of privacy as we know it today requires serious efforts

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to develop mechanisms for protecting the enormous corpus of information about individual citizens that currently is being maintained in relatively unfettered fashion by all information handling communities.

Some preliminary steps have been taken. In recent years congressional hearings have been held on the dangers of creating a National Data Bank that would centralize a wide range of government information relating to tax, criminal, military, social security, and other matters. Hearings also have been held on the evils of psychological testing, and the abuses and errors committed by credit bureaus in the course of their collecting and disseminating financial data. In addition to congressional activity, there is growing concern in many sectors of society over the ramifications of the concentration of information and the possibility that misuse, unauthorized disclosure, or misinterpretation of data may cause irreparable injury to individual citizens unless procedural, technical, and legal safeguards are imposed on the information flow. These fears are reinforced by frequent accounts in the mass media of humorous--and not so humorous--effects of computer malfunctions.

But as has been true of most periods of rapid change, cognition of the full societal implications of a course of conduct tend to be obscured. Thus, despite the many expressions of concern, there has been a high degree of insensitivity to the possible misuse of the increasingly comprehensive information that exists on all aspects of each citizen's life. Indeed, the trend in government, business, and academe is toward time sharing, information exchange agreements, and interlocking networks that permit remote access

to increasingly variant types of data. Airlines, credit bureaus, law enforcement agencies, and many governmental agencies are only a few of the institutions engaged in compiling vast quantities of individualized data. Often this is accomplished by conditioning government largesse or some basic incident of modern life, such as credit or organizational membership, on the disclosure of sensitive personal information. If the present trend continues, it is quite possible that a computer system of the future could produce, almost instantaneously, and anywhere in the country, a comprehensive dossier of each citizen's life history.

A number of variables bear upon the nature of the threat to privacy posed by the technology. One, of course, is the kind of information stored and processed by the machines. The character of the data that is adaptable to computers varies widely from relatively abstract statistical data, such as birth dates and social security numbers, to highly subjective and inherently "soft" evaluations that may be the product of psychological testing or interview or efficiency reports. Nevertheless, the relatively easy access to the raw data promoted by centralization and expanded communications capabilities increases the chance that even seemingly innocuous numerical data will be misused. For example, it is now possible for a participating member of a credit network to check the financial history of a potential customer in seconds simply by querying a remote central data bank directly from his own computer terminal. If unfavorable data is retrieved, it may emasculate the buying power of a consumer; yet, there is no effective way in which the accuracy of the stored data can be insured.

In addition to the rapidly increasingly technological capability and diversity of applications of the new information transfer machines, recent developments in the use of statistical methods and quantitative multivariate analysis make it possible to take data collected for a specific purpose and subject it to dissection in ways that have hitherto been unavailable. At least one educator, commenting generally upon the capability of the computer in the educational context, has perceived the threat to privacy that may arise from the utilization of computers in the academic environment.

> Not only are machines now able to deal with many kinds of information at high speed and in large quantities but also it is possible to manipulate these quantities of information so as to benefit from them in entirely novel ways. This is perhaps nowhere truer than in the field of education. (Suppes, The Uses of Computers in Education, Scientific American, Sept. 1966, p. 207.)

This brief introductory statement should not be interpreted as a diatribe against electronic data processing; the countervailing benefits to society from computer technology are undeniable. Many activities, such as air travel, social and resource planning, medical diagnosis, and record keeping, are made more efficient and effective by the ability of these machines to digest, store, retrieve, evaluate, and manipulate masses of raw data. Even in the context of commercial credit verification, it can be argued persuasively that computers are socially desirable because in the vast majority of cases they aid rather than imperil the vast majority of citizens by assuring them quicker approval of installment transactions.

The purpose of this introduction is to demonstrate the pervasiveness of information technology in our society and the importance of the privacy issue. It is within this framework that the

question of privacy and instructional technology must be evaluated. The increased use of computer-assisted instruction and computers in educational administration simply are symptomatic of the heightening information orientation of all phases of contemporary life. Furthermore, the failure to come to grips with the privacy problem is as characteristic of education as it is of industry and government.

Because the computer, contrary to its popular image as an infallible, brooding omnipresence, is simply a sophisticated tool that is subject both to abuse and to human and mechanical error, a great responsibility rests on the shoulders of those who employ it. It is encumbent upon them to control the ever-increasing flow of information in ways that will insure that personal privacy is protected. It is particularly important that this responsibility be recognized and discharged in the context of instructional technology in light of the huge store of information that can be accumulated during the educational process as a result of computer aided instruction and other computer applications.

The potential threats to privacy in the field of education are not limited to misuse of computer-stored data. As shall be described more fully below, the expanded application of television and other audiovisual aids in classrooms at all levels of education suggest that students and teachers may be subjected to unwanted exposure to large and ill-defined audiences. In addition, persons who ordinarily are not involved in the educational process, such as hospital patients and courtroom witnesses, may be subjected to the scrutiny of students through the use of video tape or closed circuit television. Finally, it may well be that prolonged exposure of

citizens to mass media devices such as television cameras and computer consoles may have the insidious effect of numbing individual sensitivity toward invasions of personal privacy.

II. Computer Assisted Instruction

The concept of streamlining the teaching process by the use of machines is the product of research that began in the 1920's partly as a result of a recognition by psychologists and educators of the potential benefits that could be derived from some measure of individualized instruction in what increasingly has become a mass education system. Early efforts consisted of relatively simple mechanical devices that confronted the student with a box containing a question and several alternative answers; by choosing the correct response, the learner was able to bring a new question into view, and progress through the lesson. In the 1950's Dr. B.F. Skinner's pioneering work at the University of Michigan and Harvard University greatly enhanced the potential of mechanical teaching by developing machines that required students to compose more complex responses rather than simply choosing from three or four answers presented by the earlier more primitive procedures; the resulting process was programmed learning.

Since then, the teaching machine and other forms of instructional technology have become increasingly integrated into highly sophisticated devices in ways that promise to revolutionize the educational process. When the increased speed and capacity of computers is viewed in conjunction with advances in communications, the possible applications of computer-assisted instruction are not limited either by content or geography. One recent experiment in

computerized instruction linked McComb, Mississippi with a data center at Stanford University from which students were taught mathematics on an individual basis using computer consoles that consisted of electric typewriters and teleprinters. Although the current cost per student prohibits widescale use of remote access educational systems of this type, recent advances in microminiaturization and communications technology indicate that hardware, software, and transmission costs may decline to the point at which these or related procedures are economically feasible.

The benefits to be derived from individualized instruction of this kind are readily apparent. Unlike the traditional classroom setting in which the teacher must present the lesson at a rate geared to the theoretical mean intelligence level of the entire class, the computer can present material to each student at a speed that is controlled by his own ability to comprehend. This is possible because the computer, through built-in evaluation devices, reinforcement techniques, remedial questioning, or other procedures, assures that the student has understood all of the previously presented material. This continuous process, which closely resembles individual tutoring, has allowed some students in experimental projects to learn five to ten times more rapidly than their contemporaries. Some educators have suggested that computer-assisted instruction may be part of the answer to the problem of closing the education gap of disadvantaged children and it therefore is not surprising that the Office of Economic Opportunity is involved in extensive experimentation in this area.

What then are the privacy concerns of computer assisted instruction? At the present level of development and application,

they are relatively minor. However, if we project into the future and assume the widescale use of this educational format in conjunction with high capacity computer storage units, and a shift to computer based educational record keeping, then we also must contemplate the possibility that each student will generate a synoptic flow of data from his interactions with the computer that will be transmitted to the educational dossier maintained on each student by the school. This is not an entirely unreal situation since effective teacher analysis of the student's performance will require the preservation of his machine dialogues.

The fact that huge masses of increasingly detailed raw data would be collected, evaluated, and stored during prolonged dialogues with students raises privacy issues similar to those pointed out by commentators on the proposed National Data Center. See, e.g., Miller, The National Data Center and Personal Privacy, The Atlantic, Nov. 1967, p. 53. Although the threat to privacy probably is less obvious and less severe in the context of computer-assisted instruction inasmuch as the vast majority of the data will not be personal or sensitive in character, it should be remembered that we are dealing with a rapidly developing technology that has been compared to the invention of the printing press in its ability to re-order traditional patterns in our society. Thus, in analyzing the instructional technology and privacy interaction it is important to think ahead to the risks of the future even though this may entail a fair amount of crystal ball gazing.

It is not unreasonable to expect advanced audiovisual instructional aids and sophisticated computer-teachers to unify the presently separate functions of teaching, counseling, and admini-

stration, which in turn may lead to individualized centralized dossiers that cover a student's entire educational life. In some contexts this is already coming to pass; large school systems are beginning to rely heavily upon computer services for scheduling and compiling grades as well as for maintaining detailed faculty and student data files. As the computer assumes and intermixes many of the roles of administrators and teachers, the ability to gather and preserve data on an individual basis magnifies and in order to utilize this new capacity, the amount of information of all kinds maintained on each student may increase exponentially. The potential abuse of this information and the resultant impact on personal privacy suggest the importance of controlling the preservation, accessibility, and dissemination of this data.

Moreover, as computer-assisted instruction in highly verbal subjects is developed and becomes more prevalent, it might be possible to evaluate student response patterns to determine the existence and cause of student motivation and attitudes for the purpose of making curriculum decisions. The present-day computer-assisted instruction provides proof of this trend toward machine involvement in educational decision making. Experience with a Systems Development Corporation simulation suggests that "with a population of 900 students, there would be from 30 to 40 changes between courses and about 300 mastery tests daily." On a more sensitive level, highly verbal student-machine dialogues might be used for preparing appraisals of the student that are highly subjective in character. In this fashion, an institutional computer, with its large store of accumulated data on each student, not only might simulate the teacher but also might be used by the school

psychologist as well.

Those unimpressed with the potential privacy implications of computerized instruction might argue that although a student would be exposed to a computer for extended periods of time, the overwhelming majority of the information solicited from him would be relatively bland, impersonal numerical or true-false responses, that would be difficult to use for anything other than educational purposes. This undoubtedly is true of the current state of the art, but the trend is toward computer-assisted instruction of subject matter that would require a much higher level of articulation on the part of the student. The future possibilities can be envisioned by considering the following excerpt from a recent article entitled "Computer-Tutor" in the New Republic, June 4, 1966, p. 21, by James Ridgeway

> In Project Essay Grade at the University of Connecticut, a computer was filled with a dictionary of 1,000 commonly misspelled words, then told how to detect misused words, errors in punctuation and grammar as well as certain styles flaws. The idea was for the computer to simulate a panel of English teachers who must grade papers for college boards, and the project was sponsored in part by the College Entrance Boards. The computer graded papers along with three human judges and the results of all four were said to be practically indistinguishable.

This type of experiment represents an important educational breakthrough because it opens the door to the teaching of subjects by computer that require a great deal of machine analysis of highly complex verbal responses. As Patrick Suppes, a leading expert in computerized education, has pointed out:

> One can predict that in a few more years millions of school children will have access

> to what Philip of Macedon's son Alexander enjoyed as a royal prerogative: the personal services of a tutor as well-informed and responsive as Aristotle. (Suppes, The Uses of Computers in Education, Scientific American, Sept. 1967, p. 207.)

It is quite possible that these highly interactive student-machine dialogues on topical or sensitive subjects could be employed for a variety of contemporaneous or later purposes that have limited or no educational value and often will necessitate use of the information out of its original context. These might include psychological or personality analyses, job applications, and security checks. These concerns are magnified if the data is preserved over any extended period of time. Moreover, the potential abuse of information maintained in the academic environment occasionally may be accentuated by the desire of social scientists to avail themselves of the technology in connection with behavioral research. Many scientists seem quite unconcerned about the possibility that sensitive data derived from an easily-accessible and usually compliant student population will be misused if exposed and disseminated. Unfortunately, scientific zeal often may obscure countervailing concerns of individual privacy.

In light of the foregoing, it seems important to limit access to whatever store of student responses may be collected by the computer in order to prevent them from being used in unrelated and inappropriate contexts. In addition, some thought must be given to the disposal of data when its educational or record keeping value has ended--and this standard must be applied with the interests of the student as well as the institution in mind. The preservation of raw data has serious privacy implications. Consider

the diverse uses that could be served by a dossier of every reponse made by a student from kindergarten to graduate school, keeping in mind that the computer file would contain a record equivalent to all of the student's entire written and oral participation in the learning process.

In view of the increasingly variant applications of quantitative analysis, it is not difficult to conceive that a number of people might want access to this data, despite its obvious qualitative limitations stemming from such factors as its age or the specialized context in which it was collected. If access is provided or surreptitiously secured, there are many manys in which the data could be misused. For example, Martin Gross, a critic of psychological testing, has suggested the possible creation of a Central Personality Bureau in a book entitled The Brain Watchers 239-40 (1963):

> [I]t should not be difficult for us to visualize a Central Personality Bureau of the near future, which will electronically store in each metropolitan area the personality and character traits of every resident. Like credit bureaus today, the record will be available to all interested parties--a man's employer or potential employer, his landlord, the state, his creditors, the criminal and civil courts, and perhaps his prospective bride, or her father--at a nominal fee ($10 or less).

It would be sad indeed if data generated in the course of computer-assisted instruction exercises or computer based school records were analyzed or used to promote this type of venture.

The insensitivity of some school administrators, educators, and social scientists to the privacy implications of modern education makes it dubious that the need for restraint in the collection,

storage, and use of the ever-increasing store of student information is satisfied by leaving this matter exclusively in the hands of those who have a vested interest in the data. For example, researchers recently administered the probing Minnesota Multiphasic Personality Inventory without parental consent on a compulsory basis to an entire ninth grade class in a Bronx junior high school. Upon inquiry, an indignant parent was told that in these matters it was best to "trust the judgment of the educators." See generally Miller, Psychological Testing and Privacy in an Information Oriented Society, Think, May-June, 1969.

Even assuming that educators are inherently trustworthy, or at least not inherently malevolent, the possibility of "accidental" exposure to unauthorized persons of sensitive data or masses of relatively neutral data that can be subjected to multivariate analysis is a matter of serious concern. Indeed, it is doubtful whether "soft" data should ever be preserved on a dossier basis; personality theory is a sufficiently dubious and speculative art form that there is a high risk that computer based information of this type will be used to prejudge the subject unfairly. Unfortunately, the trend clearly is toward the use of academic data banks to store highly personal information. For example, in 1966, the New York Institute of Technology initiated a project in which selected students would be tested and interviewed, the results to be stored in a central computer facility that would predict academic and vocational performance and suggest placement.

There are additional but less obvious noneducational applications to which data derived from the teaching process might be put. In the same way that today's airline computers are capable

of constructing a record of an individual's travel activities over a given time period with lightening speed, a comprehensive computerized school record could be used to ascertain all of Johnny's class and extracurricular activities and associations as well as his disciplinary and attendance records. The mere existence of this data and its use for educational purposes during Johnny's school years is not in itself objectionable. But ready availability of this information, which might not be accurate or might suggest unintended innuendos, or its use for inferential analysis in contexts unrelated to an individual's educational performance is objectionable. The possibility that this might occur dramatically underscores the necessity for control over information collected in the instructional process.

One should not view the risks of instructional technology solely as a function of human malevolence. Enormous dangers are created by human negligence and the fallibility of the modern computer. In combination these factors might increase the likelihood of prejudice resulting from use of data beyond what it otherwise might be were manual techniques of record-keeping used. The pessimism of Professor Anthony Oettinger and Miss Sema Marks, writing in the Harvard Educational Review, with regard to machine and human error in the educational institutions of today is apparent from this statement:

> Reliability is a problem with even the most modest of devices, as anyone will testify who has had a piece of chalk break in his hand or who has cursed a skipping ball point pen. The schools are not accustomed to dealing with anything less reliable or flexible than the blackboard. (Oettinger & Marks, Educational Technology: New Myths and Old Realities, 38 Harv. Educ. Rev. 707 (1968).)

Professor Patrick Suppes of Stanford University also has voiced concern over the possibility of computer error and its particularly harmful results in the educational context

> If in the school setting young people are put at computer terminals for sustained periods and the program and machines do not perform as they should, the result is chaos. Reliability is as important in schools as it is in airplanes and space vehicles; when failure occurs, the disasters are of different kinds, but they are equally conclusive. (Suppes, The Uses of Computers in Education, Scientific American, Sept. 1966, 219.)

The preceding discussion has been designed to demonstrate that the entry of the computer into the classroom will present a variety of challenges to individual privacy that requires us to give thought to the ways in which we can protect students from the dangers of educational information collection. To recapitulate the problems that might result from the unification of the teaching, testing, and administrative functions of our schools in an integrated computer system:

(1) The extended exposure of each student to computer assisted instruction would yield a large quantity of data that might be used for noneducational or privacy invading purposes. The very existence of this store of information would be inviting to professional snoopers and overzealous social researchers and governmental officials.

(2) The advancing capability of computers ultimately may permit a highly developed student-machine interaction on such subjects as philosophy, religion, and political science and thereby create a store of sensitive data on controversial matters, which, if preserved, might be used to a citizen's prejudice later in his life.

(3) Unlike other computer applications in which meaningful results can be obtained through the use of large aggregates of anonymous data, each stored response would be identified, traceable to individual students, and might be stored with other individualized data generated by the educational process on a dossier basis. Again, the resulting information store would be attractive to snoopers.

(4) The tendency toward computer interdependence through communications networks indicates that individual computers maintained by separate schools may be linked together into educational networks which in turn may be tied into broader information systems. This would provide additional access mechanisms for those who might misuse data collected during the teaching process. Without proper safeguards there will be a risk of unauthorized access to individual educational files through remote computer terminals.

(5) As will be discussed below in more detail, prolonged exposure of students to information recording teaching machines might alter traditional notions of privacy by conditioning youth to the presence of electronic intrusion in places that now are considered private.

As a leavening influence on these concerns, it is important to note that the forecasted inexorable trend toward computer assisted instruction and the transmogrification of the educational system in the near future is by no means unanimously endorsed. Some experts within the education fraternity suggest that there is considerable doubt whether today's experimental devices ever will replace the existing mode of education. In addition to the

enormous cost of machine systems, Professor Oettinger and Miss Marks, in their article in the Harvard Educational Review, point out the following:

> The observed combination of institutional rigidity with infant technology will preclude really significant progress in the next decade if significant progress is interpreted, in accord with contemporary literature, as widespread and meaningful adoption, integration, and use of technological devices within the schools. (Oettinger & Marks, Educational Technology: New Myths and Old Realities, 38 Harv. Educ. Rev. 708 (1968).)

Unimpressed by the exponential growth of technology and sophistication of scientific theory, the authors continue as follows:

> We are dealing with problems of an order of complexity for which available mathematical and analytical tools leave us quite unprepared. Worse yet, the elementary building blocks arrayed in such monumental complexity are themselves mysteries. Contemporary psychology can tell us essentially nothing about the details of individual learning processes. Contemporary social and political science can tell us essentially nothing about the dynamic processes that come to play in the transition from one form of social organization to another. Static, descriptive accounts abound, but the dynamics of social science is still in utero. (Id. at p. 715.)

This relatively pessimistic view of the adaptability of the educational profession and the near and intermediate term uses to which the technology might be put does not vitiate some important indicators of long range development in the field of computer-assisted instruction, however. It is a well-known fact that computer companies are developing educational subsidiaries and acquiring educational publishing firms at a rapid rate in order to gain a share of the sharply expanding demand for educational hardware. Moreover, many

colleges and universities have introduced specialized programs to train technical experts in the application of these new electronic aids to education. In short, instructional technology is big business and the industrial society may provide the necessary prod to the educators. Congress also is interested in instructional technology. Senator Yarborough of Texas has introduced a bill entitled the Educational Technology Act of 1969; the legislation would appropriate four hundred million dollars to encourage schools to introduce computer and audiovisual hardware into the classroom. In addition, although educators have been somewhat lethargic in eschewing the use of traditional teaching methods, the professional periodicals seem to indicate that they are entering a "catch-up" phase. Thus, in assessing the threats to privacy that might be brought about by a rapid transition to computer assisted instruction, we would be wise to heed the warning of Aldoux Huxley--"we mustn't be caught by surprise by our own advances in technology."

Because the educational system literally shapes the attitudes and values of the future, the privacy-instructional technology question is set in one of the most important contexts in society. Furthermore, young people, especially those in primary and secondary schools, are particularly vulnerable because appraisals of them by colleges and their first employers must be made primarily on the basis of their educational records and teacher evaluations. At the same time, students at these educational levels are less capable of protecting themselves against invasions of privacy than are their seniors. Thus, it is important to impose a number of privacy oriented controls on the use of computers in the educational process.

Among the possible controls are the following: First, professional guidelines, school regulations, or legislation should

define (1) the nature of the information that may be extracted from students; (2) the legitimate educational uses to which information obtained in the instructional process should be put; (3) the kind of information that is of substantial long-term educational importance to warrant its recordation and preservation as part of a student's academic file in a way that will not unduly endanger his privacy; (4) the identity of those persons who may legitimately have access to a student's records, either directly or through remote access terminals; (5) the uses to which the data may be put by the educational unit that collects it; and (6) the circumstances under which data relating to students may be transmitted to other data centers or information users. Second, the underlying psychological and educational theories of computer-aided instruction pertaining to subjects having privacy aspects to them should be validated and their reliability carefully investigated before they are employed. Third, it is necessary to implement both technological and administrative safeguards to protect against unauthorized disclosure of and access to both raw student response data and computerized evaluations of students. The concerns that have been expressed over eavesdropping, snooping, and wiretapping in industry and government apply to education as well. In addition, a record should be kept of all those who seek access to an electronic storage unit containing student or faculty records. These protector files should be monitored periodically for signs of possible abuse. Fourth, a procedure should be instituted whereby a student, or his parent, can determine what information has been stored in his computer file. Of course, it might be necessary to deny disclosure in certain cases when there is a demonstrated medical or

educational reason for doing so. But even when this is true some mechanism for periodic re-evaluation and destruction of unnecessary data is necessary.

Although it is unlikely that any protective system ever can completely insure against misuse, unauthorized disclosure, and mechanical or human error, recent advances in computer input devices, voice printing, cryptography, hierarchical storage techniques, and holography suggest that these risks can be minimized. Hopefully, educators and school administrators will recognize the potential threats to privacy of computer-assisted instruction and take appropriate precautionary steps.

III. Television and Audiovisual Aids

Audiovisual aids in the form of films and slides have been used in the classroom on a regular basis since the 1940's and, more recently, closed circuit television and video tape have assumed a major role in the educational process. Applications of these forms of instructional technology ultimately may prove to be far-reaching and revolutionary, especially when employed in tandem with computer-assisted instruction. According to Charles Wedemeyer, Director of Instructional Media at the University of Wisconsin:

> Video cameras "using ultrasonic converters, fiber optics, and character generators promise exciting new educational applications" and open the classroom to educational experiences that ordinarily would be too dangerous to replicate. High fidelity CCTV linked to memory banks will provide the teacher and learner with a vast amount of material that can be brought to the teaching-learning situation at the precise moment when it is needed. (Wedemeyer, The Future of Educational Television in the U.S.A., in Television and Teaching 132, 140 (Moir ed. 1967).)

In point of fact, however, the past and present utilization of television and related technologies has been relatively minor in contrast to their commerical applications. See, e.g., Licklider, Televistas: Looking Ahead Through Side Windows, Public Television--A Program for Action, The Report of the Carnegie Commission on Educational Television (Supplementary Paper).

The educational function performed by present-day audiovisual devices is quite different from the individualized instructional techniques promoted by computer-assisted instruction; consequently, the privacy implications are of a different dimension. Compared to computer-assisted instruction, when television and audiovisual aids are used there is (1) a lower interchange of information or interaction between the student and the teaching aid, except when both ends of the television circuit have transmission facilities; (2) a wider simultaneous dissemination of the presentation on the teaching aid; and (3) a closer approximation of the traditional teaching environment is achieved, especially when the transmission is directed to students in a lecture hall, because learning is geared to some assumed middle comprehension point of the members of a large audience.

The benefits of audiovisual technology are obvious. Students in remote locations can receive lectures by recognized experts in all fields of the humanities and sciences simply by twisting a channel selector. The availability of special lenses, lights, film, and camera positions enables the student to observe events, procedures, and objects from perspectives that are not feasible in the usual classroom setting. Dangerous experiments can be conducted

by specially trained personnel or mechanical devices while being observed at a safe distance. The use of video tape and film enables the preservation of unique educational experiences for wide dissemination through later presentations.

Unlike computer-assisted instruction, television is a reality in many of today's classrooms--college owned closed circuit stations have tripled since 1962. However, despite the increasingly wide utilization of this medium, little attention has been paid to the privacy implications of exposing students, teachers, and others as subjects for instructional programs that televise a single lecturer, group discussions, or clinical experiments that may be transmitted to large audiences in remote places who otherwise would not have the advantage of the specialized knowledge of recognized experts.

The primary threat to privacy presented by audiovisual technology stems from the focusing of the television or movie camera, or similar device upon individual students and their interaction with the instructor, or in the course of other activities. It must be kept in mind that when a classroom situation is broadcast from a particular point on an educational installation or is video taped for subsequent use, perhaps at a number of institutions, the ultimate total audience for the performances by both teacher and students may be enormous indeed. Thus, much as present-day video tape and replay systems preserve the actions of the "heroes" and the "goats" of a football game, so an embarrassing student response or an instructor's error might be preserved for posterity and used as a good example of a "poor" performance or a "slow" student or how not to teach.

Even though the use of educational television to date has been relatively bland and apparently free from privacy invading excesses,

it seems necessary to evaluate its potential capacity to infringe upon the rights of participants in the educational process. This is particularly true because the trend is toward increased exposure of students, faculty, and others to television and photography. In addition, simulation of classroom response has been used to train teachers by projecting past classroom events on a screen from a battery of projectors at the rear of the room. Teacher trainees, by reacting to various recorded student responses, gain classroom experience. The potential teacher's own performance is then recorded and analyzed. According to Charles Wedemeyer of the University of Wisconsin,

> Both films and tapes have been used in several institutions to record the behaviors of beginning teachers. This technique enables the neophyte to study his classroom manner, his presentations, management and interpersonal relationships with students, so as to gain a concept of self-as-teacher that is possible through no other method. (Wedemeyer, The Future of Educational Television in the U.S.A., in Television and Teaching 132, 146 (Moir ed. 1967).)

Although the usual classroom dialogue generally is of a nature that is considered less private than many other activities, there might well be a tendency to record atypical student responses for purposes of demonstrating the full spectrum of student conduct to a prospective teacher. Thus a very shy or an argumentative pupil might be made the subject of an undo amount of television or video tape study. Moreover, the extension of school curricula into sensitive subjects such as sex education, race relations, and other emotionally charged contemporary social issues might transmit or record embarrassing teacher-student dialogues.

The privacy implications arising from the pervasive use of television and audiovisual aids extend beyond the confines of the

classroom. Joseph Weltman, a British commentator, mentions some of the uses to which television presently is being put:

> Experiments or activities which take place in restricted space, or which could be dangerous, are viewed in privileged close up. The examples are many and familiar: observation of surgery, of psychiatric patients or of patients' behaviour under drugs, teachers in training watching a lesson from another building. (Weltman, Teaching and Television--ETV Explained, in Television and Teaching 100, 101-102 (Moir ed. 1967).)

However, the scrutiny of a television lens may affect the privacy of people who are not confined in a hospital or sanitarium. Increasingly, school curricula emphasize involvement of the student in a wide spectrum of social processes and these may be furthered by the intermediation of television. For example, closed circuit television is used in at least one well-known law school to facilitate student observation of trial techniques in a local courtroom. Although public trial is a basic tenet of our legal system, it is doubtful whether the philosophy underlying this guarantee was meant to sanction a recent closed circuit telecast of a distraught victim's description of her rape to a crowded room of law students. In another law school, divorce and legal aid interviewing is observed in a neighboring room with the aid of a one-way mirror and a hidden microphone. Parenthetically it might be added that there is some evidence that electronic eavesdropping is employed in student counseling sessions without the knowledge of the subject.

In the majority of these "clinical" situations there is a clear and justifiable educational objective to be served. However, there is a correspondingly high threat to individual privacy from the misuse of audiovisual technology, especially in the context of sensitive human conduct. A drug or mental patient or a surgery

subject should be given the same control over recorded observations that were made of him while he was receiving treatment as should a student who is exposing his thoughts to a computer console or participating in a classroom discussion. Furthermore, the very existence of certain types of medical and psychiatric instructional films and video tapes are extremely attractive to voyeuristic bureaucrats and technicians. In much the same manner that police wiretapping and eavesdropping tapes occasionally have been performed at social gatherings for entertainment, so might instructional audiovisual material be employed for similar noneducational uses.

The trend toward centralization of information, which currently exists to some degree in the form of various types of audiovisual libraries, and the ease with which tapes and slides can be duplicated, adds another dimension to the privacy implications of instructional television and audiovisual technology. As is true in the computer context, communications interdependence and television networking makes access to recordings much more convenient and economical, but it also increases the danger of unauthorized scrutiny and dissemination.

To protect individual citizens from unnecessary exposure of their psyches and their physiques both in and out of the classroom, there seems to be no readily acceptable alternative to professional guidelines or legislation dealing with the following subjects. First, the existence of a high degree of educational utility and some advantage over alternative pedagogical means should be established before a privacy invading audiovisual technique is employed for instruction. A high degree of justification also should be

demonstrated before live television observations are preserved or rebroadcast. Second, all subjects should be informed of the intention to expose them to educational television or video tape and express consent should be obtained. There are two aspects of the procedure for procuring the subject's consent that should be emphasized. It is absolutely essential to devise a procedure that precludes the suggestion that superior professional services are conditioned upon consent to be observed. In addition, it is imperative that the consent be based on the subject's being fully informed of the ramifications of the live transmission or the taping. He should be told the nature and size of the anticipated audience and given some idea of the thrust of the educational exercise. Admittedly, there are situations in which it is necessary that the subject not know in advance that he is being observed by people other than those in his immediate view. These situations must be minimized and treated very carefully. The subject at least must be informed following the exercise and given the option of having the resulting transcription destroyed. Third, recorded observations that are preserved should be protected by administrative and technical procedures against people seeking unauthorized access or noneducational uses. A record should be kept of all those using these educational materials and the records should be monitored periodically for signs of abuse.

Even if the foregoing suggestions were fully implemented, they will not completely eliminate misuse of television and other audio-visuals in the classroom or subsequent unauthorized scrutiny of video tapes for nonacademic purposes. In many situations, such as when mental patients, seriously injured people, and drug addicts

are observed, meaningful consent simply cannot be obtained. Professional guidelines or legislation should be adopted to define the legitimate uses of instructional technology in these contexts. But in many of these exceptional cases, reliance ultimately must be placed upon the sensitivity and discretion of educators who hopefully will be responsive to the threats to privacy posed by the new technology.

IV. The Numbing Effect of Technology

There are other issues arising from the introduction of computers and sophisticated audiovisual devices into the learning environment that deserve mention because they may have considerable bearing upon the evolving concept of personal privacy and its ultimate role in shaping our future society. It is possible that a high level of exposure of students to electronic devices and their instant access to masses of data, much of it having privacy-invading overtones, might aenestitize the sensitivity of the school age population, which means the entire population in the course of a few generations, to what we like to think of as being our traditional presumption in favor of individual privacy. Dr. Harold E. Mitzel, Professor of Psychology at Pennsylvania State University, has commented upon the almost hypnotic impact of computer-assisted instruction on the students it supposedly teaches.

> The students often seem dominated by the machines. Even when the lesson is dull or poorly written, they stick to it and pay attention. They don't seem to realize they are boss and can push a button at any time, turn the thing off and walk away. (Mitzel, National Observer, Nov. 29, 1965.)

Immersing children during their formative school years in a relatively depersonalized educational setting may yield a citizenry that is so technologically oriented that present-day attitudes toward humanism and the so-called "right to be let alone" will seem foreign and of little significance. If this is to be avoided, efforts must be undertaken to personalize the process of instructional technology or at least to reinforce the importance of the concept of individual privacy as part of the substance of the educational process itself. These are matters that deserve immediate attention from the educational psychologists.

It also has been suggested that the effect of heavy reliance on electronic teaching media may cause a sharp rebellion on the part of students that will take the form of something akin to the recent upheavals at various universities throughout the country. Dr. Robert D. Tschirgi, an expert in computer applications in education at the University of California, does not share this concern over the possibility of alienation. He has stated:

> A book is an inanimate, unresponsive friend at best, yet love and attachment are well recognized emotions to be displayed toward books. Why should it be surprising, therefore, that a reactive, facile, responsive computer may also generate a form of affection in its human users? Is it any less comprehensible to imagine a generation with nostalgic memories of one's old computer-tutor than to have cherished remembrances of ivy-covered walls? (Quoted in Ridgeway, Computer-Tutor, New Republic, June 4, 1966, p. 21.)

These remarks seem accurate in terms of the society's very long term adjustment to the technology but in the meantime we must be prepared to cope with violent reactions to the depersonalization of certain aspects of the educational experience, such as the recent highly

symbolic destruction of millions of dollars of computer equipment at Sir William George University in Canada. Moreover, even if Dr. Tschirgi's optimistic view of student adaptability to instructional technology is well-founded, it may be accomplished at a potentially high social cost. Adaption to the technology suggests the possibility of a malleable attitude toward the privacy-invading aspects of instructional technology, especially the intrusion of electronic surveillance into areas and activities that hitherto have been considered private.

V. Privacy and the Classroom of the Future

There should be no mistake about my position on the use of instructional technology; in its diverse forms it obviously is becoming one of the most socially desirable applications of science in our time and the promise for the future is exciting and virtually limitless. Moreover, the instructional technology of today, and even most of tomorrow's applications, presents less of a risk to personal privacy than innumerable other uses of the computer involving the collection, centralization, and dissemination of sensitive data that are being tolerated today and have far less social utility than does educational technology. But this minimal-standard approach to individual privacy hardly is a proper posture for the academic community to assume. Moreover, as has been emphasized throughout this paper, in an increasingly information-oriented age we cannot predict the range of technological applications with precision but must anticipate and prepare for developments that may substantially alter the existing balance between individual privacy and the quest for a reasonably open and informed society.

For example, in looking toward the future impact of instructional technology one trend is clear: television and computer-assisted instruction cannot be viewed as separate media. In the context of a modern society that is dependent on information collection and manipulation devices that operate on a network and multimedia basis, the conjunctive application of computers and television for teaching, testing, and counseling purposes may result in an educational environment that is highly intrusive.

James Ridgeway portrays the impact the introduction of multimedia, remote access instructional technology may have on the educational process of the future as follows:

> There will be no classes, nor, for that matter, any need for schools. The student can sit at home. In the morning he will dial into the computer and ask for French. After half an hour of this, he will switch to the library (all the books will be stored in computers) and get the machine to print out parts of Paradise Lost, which he will study, and then dial another computer to answer some questions about the poem. Once a semester a student can go along to a learning center for discussion groups and a chat with his counselor. The counselor already will have asked the computer for an audit on the student, and will be prepared to discuss his progress with the computer's predictions of his progress, which in most cases will have turned out to be all too accurate. This is not science fiction. However, more research is needed to bring down the costs and make the machinery more sophisticated before it is likely to take place on any wide scale. (Ridgeway, Computer-Tutor, New Republic, June 4, 1966, p. 20.)

Although the physical decentralization of education lies largely in the future, it is rapidly becoming a technological possibility. Slow-scan television, which enables the viewer to control the rate of picture transmission, and the recent development of the video disk,

which stores television signals on a plastic object resembling a phonograph record, have, according to one commentator, "the potential of making every home that is equipped with a 33 1/3 r.p.m. turntable and a television set into a private learning laboratory." Alluding to the possible blurring effect instructional technology of much less sophistication may have on the traditional boundaries between the school and other social institutions, two other writers recently noted:

> It is difficult to comprehend the boundaries of the so-called "school system." One of the most striking features of the educational network is the complexity of multifarious linkages between various elements of society and the school system. (Oettinger & Marks, Educational Technology: New Myths and Old Realities, 38 Harv. Educ. Rev. 703 (1968).)

There are other equally fascinating applications of technology to education. Researchers at the University of Michigan and the University of California have developed a novel photographic process that enables a hologram recording to be reconstructed by passing laser beams through light sensitive film. The result, according to Charles Wedemeyer in an article entitled "The Future of Educational Technology in the U.S.A." is "of considerable importance for education [for it will be possible to reproduce] three dimensional, highly realistic imagery, unmatched by any other photographic method." Even this type of reprography technique poses privacy problems.

The possibility that these developments will substantially alter the role of education in society and threaten the privacy of individual citizens is increased if we assume parallel advances in communication science. It has been suggested that wire and microwave

transmission capabilities cannot handle the quantity of information that would be necessary to centralize all educational functions in the home. However, laser beams, which could simultaneously transmit the information content of all the phone calls and television programs transmitted in the United States during an entire day, may solve this problem, especially when used in tandem with the transmission channels that would be made available by an expansion in satellite communication. Hill, Technology and Television, in Public Television--A Program for Action, The Report of the Carnegie Commission on Educational Television (Supplementary Paper).

Finally, it seems certain that advances in surveillance technology, which can be predicted because they always have accompanied novel applications of communications sciences in the past, will have ramifications on privacy and instructional technology. Developments in ultra-sensitive radar that can simultaneously reproduce messages printed out on electronic typewriters located blocks away and pierce protected cables while simulating the output phase of a computer suggest the potential capability for intercepting data moving through an educational information network. This is of significance to the subject matter of this paper if we assume both the increased use of instructional technology and the centralization of information in regional or national data centers, which would call for the transmission over large distances of information collected at educational institutions. Moreover, the use of subliminal and subaudial techniques to influence those using the instruments of instructional technology represents a threat to privacy because of the possibility of the implantation of unwanted information.

VI. Conclusion

Even if the precautions I have suggested in earlier sections of this paper are adopted, they will not obviate all of the problems created by widespread use of computer-assisted instruction or audiovisual devices or insure that the fruits of technological revolution are not perverted to achieve an Orwellian environment. It is important to view the preventative measures I have offered as merely a starting place in the process of achieving effective control over the rate and direction of the flow of individualized information generated by the educational process.

In addition, it is important to remember that the potentially debilitating effect instructional technology may have on the attitude of citizens toward the concept of privacy and on the right of privacy itself is part of a much larger societal problem. Achieving control over the educational information that is collected about individuals is only one facet of the larger problem of defining to what degree a person's actions, home, body, and psyche should be free from private, institutional, and governmental scrutiny in a society that has achieved the technological capacity to observe activities on earth from outer space and to transfer information between any two points on the globe instantaneously. Instructional technology must be viewed from this perspective.

But most importantly of all, the educational process, which is the control mechanism for society's intellectual regenerative system, simply cannot unthinkingly be exposed to the risks inherent in the proliferation of electronic teaching devices. Those who seek to alter the educational system by the introduction of

computers and advanced audiovisual aids must assume the obligation of insuring that the genius of instructional technology is secured with a minimum of deleterious side effects.