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ABSTRACT

This study was designed to determine the extent to which schools of health sciences offering at least a baccalaureate degree are involved in the application of instructional technology. A four page questionnaire was used to investigate the schools' involvement in curriculum revision, instructional design and development, media production and utilization, and educational evaluation within the last two years. These data were analyzed to determine the relationships between the extent of the schools' involvement in instructional technology and such variables as institutional settings and faculty involvement in instructional technology. Information from this survey should be of value to schools, funding agencies, and national associations involved in the education of health professionals in planning programs and setting priorities to improve the quality of instruction. (Author/JEG)

INSTRUCTIONAL TECHNOLOGY IN THE HEALTH SCIENCES

Final Report

1977

by

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INTRODUCTION: THE PROBLEM

Education in the health sciences is presently confronted by a number of serious problems. The American population exerts ever-increasing demands for better health care. New technologies are added to the biomedical knowledge base at a dramatic rate, making curriculum revision a constant process. In addition, the recognition of the need to expand the health sciences curriculum into such areas as the social and behavioral sciences has caused many schools to add courses in these fields. Also, the increases in enrollments in most health science specialties has been another source of pressure affecting the management of instruction in the respective schools. In the face of all these problems, the task of assembling a faculty of adequate size, composed of individuals who are current in their particular disciplines and skilled in modern teaching approaches and technologies, has suddenly become a serious concern for most health science institutions.

If these problems are to be overcome, it seems clear that a major effort must be directed at improving the effectiveness and efficiency of teaching and learning in schools of the health professions. There are, fortunately, some positive movements in this regard. Educators and learning psychologists have displayed a great deal of interest in research on teaching in its many dimensions. New instructional strategies, new media systems, and increased flexibility for the learner are just a few of the innovations being tried. If current trends continue, the schools of tomorrow will make more extensive use of media and provide for more individualization of instruction. And if this prospect is to become a successful reality, the faculty will need to receive adequate support in their efforts to make effective use of instructional technology.

PROJECT DESCRIPTION

This project sought to determine, through a questionnaire survey, the extent to which schools of health sciences are involved in the application of educational technology. Although some educators may still identify instructional technology with equipment and machines, its most fundamental aspect, in our definition, has little to do with instrumentation as such. Instructional technology involves the management of ideas, machines, and people in the educational process; it is a way of organizing and analyzing the educational process.

One of the most important components of this educational process is the curriculum. We therefore feel it is important for program planners to know what the schools of health sciences are doing to revise or expand their curricula to meet the varied societal and technological changes, the knowledge explosion, and the differing needs and capabilities of the students. Attempts will be made in the questionnaire to find out how the schools are handling curricular changes to facilitate

the effectiveness of teaching and learning.

Another component of the educational process is the design of instruction. Instructional development is a process that involves determining the instructional needs of both teachers and students; specifying learning goals to satisfy these needs; identifying restrictions and limitations such as initial student behaviors, facilities, availability of resources, as well as financial, administrative, and staff limitations; developing alternatives based on instructional content and media choices; selecting the most desirable alternative in terms of the objectives and constraints; implementing or adapting the selected alternative which, in this instance, would be the appropriate medium for the instructional content desired; evaluating learning outcomes in terms of the objectives specified; and modifying the desired learning system based on any discrepancy between specified objectives and obtained performance. This project will attempt to determine the extent to which the schools are involved in instuctional design and development.

The systematic design of instruction often leads to the production of instructional materials to meet individual needs. Often, these learning materials involve the use of media. In this questionnaire, an attempt was made to find out which schools are involved in media production, and whether or not they produce systematically designed instructional materials for their own use and to share with other schools or institutions.

In the assessment of an entire system or its components, evaluation plays an important role. Whether it is revising a course or an entire curriculum, designing a sequence or plan of instruction, producing a program with or without the use of media--some measurement is needed to determine the worth and effectiveness of the efforts made in the operation and improvement of an educational process. Provision was made in the questionnaire to find out the involvement of the schools of health sciences in educational evaluation for the purpose of revision or overall assessment of a course, product, or program.

Puspose

Since instructional technology is not an isolated phenomenon, but the interrelationship of many factors to enhance learning, the questionnaire attempted to look into at least four components of the educational process--curriculum revision, instructional design and development, media production, and educational evaluation. Specifically, this project addressed the following questions:

1. To what extent are schools of health sciences involved in curriculum revision, instructional development, media production and utilization, and educational evaluation?
2. If they are involved in one or more of these activities, what type of facilities and expertise do they have? what kind of budget are they working with? what disciplines or type of programs do they serve?
3. Is there any relationship between certain variables--such as type of school (public or private), number of schools on the same campus, enrollment size, academic background and experience of the faculty, budget allocation, availability of production equipment--and the extent of the schools' involvement in instructional technology?

Significance of the Project

A search of the literature has revealed no comprehensive study made, to date, on the extent to which instructional technology is being applied in the schools of health professions. There have been studies that are comparative, descriptive, and attitudinal in nature, but they usually concern a particular medium, a single teaching strategy, or a specific course or area of instruction. While these specific studies are valuable and add to our body of needed research in medical and allied health education, we still need to have a total picture, a state-of-the-art survey, that will enable health educators and researchers to look at the application of instructional technology as a whole.

In recent years, there has been a growing tendency among schools of health sciences to become involved in the application of instructional technology. Some schools, with or without the necessary direction, resources, or facilities, have gone ahead with their programs; others need help in getting started.

The National Medical Audiovisual Center (NMAC), a component of the National Library of Medicine, and the Learning Resources Branch, a component of the Bureau of Health Manpower (BHM), are in excellent positions to help these schools because of their combined facilities and resources. BHM administers the majority of federal funds available to schools of health professions in furthering the development and utilization of effective instructional materials. The judicious management of these resources depends upon reliable information from the field, and upon viable program goals and techniques that evolve from this information. While BHM manages the extramural program through resource support, NMAC is the major government agency responsible for in-house research, development, and training programs. These two agencies, one engaged in evolving better educational methodology and the other in direct support for use of this methodology in the schools, have as their primary mission the improvement of the quality of education in all the schools of health professions.

However, before improvements can be made or recommendations given, it is necessary to find out, first of all, what is going on in the field. What are these schools doing or what would they like to do as far as the application of instructional technology is concerned? What are their needs and problems? What type of activities do they engage in and what is the extent of their involvement in curriculum revision, instructional development, media production and utilization, and educational evaluation?

At present, there are over a thousand schools of health sciences offering four-year programs and above: 121 medical and osteopathic schools, 58 dental schools, 21 veterinary schools, 13 optometry schools, 72 schools of pharmacy, about 250 four-year nursing schools, and about 800 schools of allied health offering baccalaureate

degrees and above. Inadequate information about what is going on in the schools and what their educational needs are hampers the efforts of a national organization like NMAC or BHM to plan programs that will be of maximum benefit to these schools. The systematic and efficient way to plan strategies for improving instruction should be based on knowledge of what the current status is of the schools that we plan to help and what their actual needs are. To better serve the professional educational community, NMAC and BHM must have certain background information about each school so that a profile of needs and resources, singly or collectively, can be drawn and used as a basis for determining priorities and making realistic and feasible recommendations for a more effective methodology of instruction.

It is hoped that information from this survey would also be of value to schools of health sciences. For example, in resource sharing or consortium planning, information can be obtained about the total number or percent of schools heavily involved in instructional development or curriculum revision. One school can compare its educational needs with the needs of other schools. If enough schools in the same geographical area or enough schools of a certain type or discipline have expressed common needs, proposals and justifications for meeting these needs can then be made.

METHODOLOGY

Survey Instrument

The survey form, Instructional Technology in the Health Sciences, consisted of a four-page questionnaire (see Appendix A) which was sent to all schools of medicine, dentistry, nursing, osteopathic medicine, veterinary medicine, pharmacy, optometry, and other health-related schools offering at least a baccalaureate degree. The questionnaire attempted to find out the individual school's involvement in curriculum revision, instructional development, media production and utilization, and

educational evaluation. The format of the survey form started with a Yes/No question concerning the respective school's involvement in any of these areas, followed by a series of questions about the activities in which they have been engaged within the last two years. There were also questions about equipment, personnel, and budget as related to the application of instructional technology. The respondents were also requested to provide information about the existence of organized biomedical communications programs in their schools.

Preliminary Activities

Based on the purpose of the project, a questionnaire was developed and reviewed by selected NMAC professional staff. From their comments, the form was revised and later field-tested by nine prospective respondents representing schools of medicine, dentistry, nursing, allied health, etc. From their comments and suggestions, revisions were made and the final form developed.

OMB Clearance

The Federal Reports Act of 1942 stipulates that no Federal agency may conduct or sponsor the collection of information on identical questions from 10 or more persons unless the agency first obtains clearance from the Office of Management and Budget (OMB) for all plans or forms which will be used in such collection.

In view of this requirement, the survey form and the supporting statement or scope of work were prepared and submitted through channels in October 1975. The supporting statement included the justification for the questionnaire survey, description of the survey methods, data collection and tabulation, time schedule, cost estimate, etc. Final clearance was obtained in April 1976.

Survey Methods

Since this survey involved all the schools of health professions offering at least a bachelor's degree, the cooperation of not only all the deans and directors of each school but also their schools' national associations was solicited. A letter was sent to the executive secretary or president of the schools' national associations (see Appendix B)--e.g., Association of American Medical Colleges, American Association of Dental Schools, National League for Nursing, etc.--informing them about the forthcoming survey and requesting their endorsement, to which they responded positively. A statement to this effect was included in the cover letter to the prospective respondents.

A personally addressed letter was then sent to each dean or director of the health sciences schools to be surveyed (see Appendix C). They were likewise informed of the purpose, scope, and importance of the survey. Since only one questionnaire would be sent to each school, the dean or director was requested to send the name and title of the person who would serve as the spokesman for their respective schools. A stamped, self-addressed, return postcard was provided for this purpose (see Appendix D). In some cases, the deans or directors listed themselves as the spokesmen for their schools; others reported having no baccalaureate programs and therefore excluded themselves from the survey. Of the 1,526 letters (with enclosed postcards) sent, 1,092 postcards were returned (with 47 reporting no four-year programs and 1,045 naming the person to contact in their school). The remaining 434 not returning the postcards were added to the list of prospective respondents to receive the forms.

The total population for the actual survey, therefore, was 1,479 schools of health sciences.

A four-page questionnaire and a cover letter were sent directly to the person designated to receive the survey form, or to the dean or director if no postcard response had been received. The questionnaires were printed on green paper so that they could easily be spotted, hopefully, among the many papers that may be on the

respondents' desks. For their convenience, self-addressed, stamped, return envelopes were enclosed with the questionnaire mailing.

As in the previous letters to the deans/directors and to the schools' national associations, the cover letter for the prospective respondent also stated the purpose, scope, and significance of the project (see Appendix E). It also emphasized that he was named by his dean or director to be the spokesman for his school; or if the questionnaire was sent directly to the dean or director himself, that his cooperation was crucial to the success of the project. It was felt that a statement in the letter to this effect, as well as the endorsement of the project by their schools' national associations, would increase the likelihood of a higher response rate.

Since this project is a state-of-the-art survey on the application of instructional technology in schools of health sciences, a total population survey, instead of a selected, stratified, or random sampling of such schools, was conducted in August 1976. Junior colleges and other associate-degree or certification programs were not included, not only because of the large number of these schools, but also because they have different organizational needs and problems.

For the schools of dental hygiene and allied health, a word of qualification may be needed. As mentioned previously, contact was initially made with the schools' national associations to request their endorsement of the project and a list of their baccalaureate programs. Unfortunately, not all the schools listed were strictly four-year programs. Some disqualified themselves during the initial screening (as revealed from the postcard mailing); others returned the questionnaire with the statement that they had no baccalaureate programs. Although this limitation was made in both the cover letter and the questionnaire, a few two-year schools still chose to participate in the survey. Unfortunately, it was too late to disqualify them. Therefore, the total N's for the schools of dental hygiene and allied health may reflect this discrepancy, and the resulting data should be viewed with this qualification in mind.

Follow-Up Activities

Within one month after the questionnaires were first mailed, 54 percent responded. A follow-up letter was then sent to individuals not responding within that period of time (see Appendix F). After another month, the response rate increased to 69 percent. The second and final follow-up consisted of another letter (see Appendix G) and a copy of the questionnaire sent again to the same individuals representing the non-responding schools. Total response rate, after two follow-up attempts, was 83 percent--or 1,229 from a total population of 1,479.

Data Collection

Not all the 1,229 questionnaires received, however, were included in the data analyses; 190 of those who responded said they had neither a health science nor a four-year program (see Table 2). Because of the limitation imposed on the type of population predetermined for this survey, they were excluded, and only 1,039 questionnaires received from the schools offering at least a baccalaureate degree were considered in the final analyses of the data.

Information obtained from the completed forms was coded and entered into the computer at the National Library of Medicine. To facilitate the collection and interpretation of the data, the INQUIRE® computer program for the IBM 370/158 was used to obtain frequency counts, percentages, and some correlations between certain variables. The findings are analyzed and summarized in the next section of this report.

ANALYSIS AND INTERPRETATION OF DATA

Most of the summary tables appearing in this report provide information involving both the total number of respondents, as well as respondents by type of discipline--i.e., medicine, dentistry, nursing, osteopathic medicine, veterinary medicine, pharmacy, optometry, dental hygiene, and allied health. In view of the small number of schools of podiatry and chiropractic medicine, these two schools are combined under the category "others."

As a total population survey, descriptive statistics were used to analyze the data. Statistical description involves organizing and summarizing data that have actually been collected; in contrast, drawing conclusions from data actually on hand about a larger body of data that have not been completely collected is a problem of statistical inference. If the entire population is measured, there is no inferential aspect concerning the statistics of the study; it would not be proper, therefore, to use inferential statistics to generalize the findings to a population. As in most complete censuses and surveys, the statistical analyses of the data resulting from this survey were based on numbers of units falling in different classes and sub-classes. In some cases, the frequency counts were expressed in percentages to allow for comparisons between or among schools.

The following two tables show the response rate for the survey, Instructional Technology in the Health Sciences. Table 1 shows the percentage of respondents versus non-respondents; Table 2 gives a breakdown of the response rate by type of discipline (including some schools that reported having no baccalaureate programs or any offerings in the health science fields).

TABLE 1. NUMBER AND PERCENT OF SCHOOLS RESPONDING TO THE QUESTIONNAIRE (N=1,479)

	Number	Percent
Respondents	1,229	83%
Non-Respondents	250	17%

TABLE 2. NUMBER AND PERCENT OF SCHOOLS RESPONDING TO THE QUESTIONNAIRE, BY TYPE OF DISCIPLINE

	Quest/Ltr. Sent	No Response	No BA or Hlth.Sci.	4-Yr.Schools Responding	Total Response
Medicine	113	18	2 plus	93	84%
Dentistry	58	7	- plus	51	88%
Nursing	287	33	5 plus	249	89%
Osteopathy	10	-	- plus	10	100%
Vet. Medicine	21	1	- plus	20	95%
Pharmacy	72	5	1 plus	66	93%
Optometry	13	1	- plus	12	92%
Dental Hygiene	164	33	30 plus	101	86%
Allied Health	728	151	152 plus	425	79%
Others*	13	1	- plus	12	92%
TOTAL	1,427	250	190 plus	1,039	83%

*In all tables where this category appears, the schools referred to are podiatric and chiropractic medicine.

Of the 1,039 four-year schools of health sciences that responded to the questionnaire, 92 percent reported some involvement in curriculum revision; 82 percent in instructional development activities; 72 percent in media production; and 64 percent in educational evaluation. Since no set standards have been predetermined on what constitutes minimal or maximum involvement in these areas--and even if there were, a subjective interpretation of their involvement would, no doubt, vary from school to school--the resulting data reflect only what the responding schools reported.

A breakdown of the schools' involvement in these major areas of instructional technology, by type of discipline, is given in the following table:

TABLE 3. PERCENT OF SCHOOLS INVOLVED IN CURRICULUM REVISION, INSTRUCTIONAL DEVELOPMENT, MEDIA PRODUCTION, AND EDUCATIONAL EVALUATION WITHIN THE LAST TWO YEARS

	N	Curriculum Revision	Instructional Development	Media Production	Educational Evaluation
Medicine	93	84%	90%	95%	84%
Dentistry	51	96%	92%	100%	82%
Nursing	249	98%	82%	71%	68%
Osteopathy	10	90%	90%	80%	80%
Vet. Medicine	20	95%	100%	90%	60%
Pharmacy	66	100%	89%	82%	56%
Optometry	12	100%	100%	92%	50%
Dent. Hygiene	101	94%	88%	77%	60%
Allied Health	425	87%	75%	60%	58%
Others	12	100%	91%	83%	67%
TOTAL	1,039	92%	82%	72%	64%

Curriculum Revision

The term "curriculum" implies those learning activities and their organization which are formally included in an educational program. A sound approach to curriculum development in health professional schools includes an analysis of the full range of activities which the practitioner will perform, as well as a reflection of the needs and demands of a changing society. The need for revising or improving the curriculum is felt in many schools of health sciences. However, there has been no baseline information available for program planners as to which schools are actually involved in curriculum revision and the extent of their involvement. The questionnaire attempted to look into this activity and the results were quite revealing.

The data in the previous table (Table 3) indicate that 92 percent of the schools responding to the questionnaire have been involved in curriculum revision within the last two years--from a low of 84 percent for the schools of medicine to a high of 100 percent for the schools of pharmacy, optometry, and "others" (podiatric and chiropractic medicine). When asked about the type of curricular activities the schools

have been engaged in, 21 percent (of the 955 that answered "Yes" to the question of curricular involvement) reported having done complete revision, while 40 percent said they have done partial revision of their entire program or curriculum (see Table 4).

TABLE 4. PERCENT OF SCHOOLS INVOLVED IN REVISING ENTIRE SCHOOL PROGRAM WITHIN THE LAST TWO YEARS

	N	Revision of Entire School Program or Curriculum	
		Complete Revision	Partial Revision
Medicine	78	10%	33%
Dentistry	49	16%	45%
Nursing	244	39%	37%
Osteopathy	9	22%	67%
Vet. Medicine	19	11%	42%
Pharmacy	66	18%	53%
Optometry	12	17%	58%
Dent. Hygiene	95	12%	44%
Allied Health	371	15%	39%
Others	12	17%	33%
TOTAL	955	21%	40%

The preceding table shows that the schools involved in the complete revision of their entire program or curriculum ranged from a low of 10 percent for the schools of medicine to a high of 39 percent for the schools of nursing, while 33 to 67 percent of the schools reported involvement in partial revision of their curriculum.

The respondents were also asked how their schools are making curricular changes, and Table 5 shows that "addition or deletion of courses" and "updating course content" were among the most common activities, with 80 percent of the schools reporting such activities. This was followed by "provision for curricular flexibility" (57 percent); "change in teaching strategies--from lecture to individualized instruction" (54 percent); "consolidation of courses" (48 percent); and "change in learning modes--from classroom to small group or self-study" (44 percent).

TABLE 5. PERCENT OF SCHOOLS INVOLVED IN SOME CURRICULAR ACTIVITIES

	N	addition/deletion of courses	updating course content	provision for curr. flexibility	change in teaching strategies	consolidation of courses	change in learning modes
Medicine	78	62%	78%	46%	59%	42%	51%
Dentistry	49	69%	86%	55%	65%	67%	51%
Nursing	244	59%	80%	66%	65%	43%	56%
Osteopathy	9	67%	78%	78%	56%	56%	22%
Vet. Med.	19	79%	58%	79%	63%	58%	42%
Pharmacy	66	83%	83%	53%	45%	59%	45%
Optometry	12	83%	67%	50%	42%	75%	25%
Dent. Hyg.	95	68%	86%	35%	53%	53%	37%
Allied Hlth.	371	78%	80%	59%	49%	43%	36%
Others	12	75%	92%	58%	42%	83%	50%
TOTAL	955	80%	80%	57%	54%	48%	44%

From the data shown in Table 5 above, it appears that all schools of health sciences have been involved, to a large extent, in curriculum revision and have been involved in several activities. The schools of pharmacy and optometry had the highest percentage of response when it came to adding or deleting courses; the schools of podiatric and chiropractic medicine, in consolidating courses and in updating course content; the schools of veterinary medicine, in providing curricular flexibility; the schools of dentistry and nursing, in changing teaching strategies; and again the schools of nursing, in changing learning modes.

Instructional Design and Development

Another aspect of instructional technology the questionnaire attempted to look at was the involvement of the schools of health sciences in instructional design and development. As mentioned earlier, the basic principles of instructional development

include such activities as problem identification or needs assessment, task and learner analyses, specification of instructional objectives, development of measurement criteria, lesson planning or sequencing of instruction, program development, and evaluation.

According to the data (refer to Table 3), instructional design and development ranked second to curriculum revision, with 82 percent (or 849 out of the 1,039 responding schools) reporting some involvement in the design of instruction.

In response to the question regarding activities performed routinely as part of the instructional design process, 69 percent (of the 849 schools reporting involvement in instructional development) reported doing needs assessment; 50 percent did sequencing of instruction; 24 percent did fieldtesting; 79 percent did course revision; and 75 percent did some form of evaluation. Table 6 shows a breakdown of these activities, by type of discipline.

TABLE 6. PERCENT OF SCHOOLS REPORTING ACTIVITIES RELATED TO INSTRUCTIONAL DESIGN AND DEVELOPMENT

	N	determine needs	sequence instruction	field-test	course revision	educ. evaluation
Medicine	84	74%	54%	38%	71%	79%
Dentistry	47	68%	66%	34%	83%	85%
Nursing	204	70%	51%	19%	72%	77%
Osteopathy	9	89%	78%	44%	67%	67%
Vet. Medicine	20	60%	35%	25%	80%	70%
Pharmacy	59	59%	46%	19%	80%	61%
Optometry	12	75%	33%	33%	75%	58%
Dent.-Hygiene	89	53%	49%	19%	82%	72%
Allied Health	314	75%	48%	25%	84%	75%
Others	11	73%	18%	18%	63%	82%
TOTAL	849	69%	50%	24%	79%	75%

It is interesting to note that although course revision and evaluation were reported as the most common of those instructional design activities performed as a

matter of routine, field-testing was reported as least common. It can only be surmised that sources other than field tryouts of instructional materials (such as peer reviews or opinions of consultants) must have been used by these schools as bases for revising or evaluating their courses or programs.

Also noteworthy is the fact that not all the activities related to instructional design and development are performed routinely. The schools of medicine, dentistry, and nursing, as well as of podiatric and chiropractic medicine, for example, have done more evaluation than any other activities usually associated with instructional design; the schools of veterinary medicine, pharmacy, dental hygiene, and allied health have done more course revision; and the school of osteopathic medicine has done more needs assessment.

Media Production

Media production, in the context of this survey, refers to the development and production, either singly or in combination, of instructional materials such as slides, filmstrips, tape recordings, overhead transparencies, motion pictures, videotapes, and computer assisted instruction.

As will be recalled from Table 3, almost three-fourths of the responding schools of health sciences reported some involvement in media production. However, there seems to be no relation between media production, accessibility to a centralized production facility, and the availability of production equipment. While 72 percent of the responding schools said they had done some production within the last two years, only 66 percent reported having access to a centralized AV or TV facility; on the other hand, 81 percent reported having access to equipment for use in television, motion picture, and still picture production. It would appear that schools are producing instructional materials in spite of their not having access to a centralized production facility. Even more revealing is the fact that schools reporting availability of production equipment have not produced as much as would be

expected. Table 7 shows a breakdown, by type of discipline, of the schools involved in media production, and schools with centralized AV/TV facilities and production equipment for the in-house production of instructional materials.

TABLE 7. PERCENT OF SCHOOLS REPORTING INVOLVEMENT IN MEDIA PRODUCTION AND AVAILABILITY OF CENTRALIZED AV/TV FACILITY AND PRODUCTION EQUIPMENT

	N	Involved in media prod.	With centralized AV/TV facility	With available prod. equipment
Medicine	93	95%	84%	91%
Dentistry	51	100%	90%	92%
Nursing	249	71%	53%	80%
Osteopathy	10	80%	100%	100%
Vet. Medicine	20	90%	80%	95%
Pharmacy	66	82%	55%	73%
Optometry	12	92%	83%	100%
Dent. Hygiene	101	77%	82%	85%
Allied Health	425	60%	62%	76%
Others	12	83%	58%	91%
TOTAL	1,039	72%	66%	81%

The preceding table shows that there are more schools involved in media production than schools with centralized AV/TV facilities, as in the schools of medicine, dentistry, nursing, veterinary medicine, pharmacy, optometry, and podiatric and chiropractic medicine. However, this seeming discrepancy may not be too surprising, since the question asked did not specify the type of media they have produced.

However, the reverse is true as far as schools producing media and schools with available production equipment are concerned. From Table 7, again, it appears that production equipment in schools of health sciences is not being used as much as one would hope. Only the schools of medicine, dentistry, and pharmacy seem to have taken advantage of production equipment available in their schools.

In the general area of media production, an attempt was made to find out how much of this effort made use of the instructional development process that led to the production of systematically designed packages of instruction. As mentioned earlier, this process involves such activities as problem identification, task and learner analysis, specification of objectives, sequencing of instruction, course development, and program evaluation. The data show that while 72 percent of the schools have been involved at some time in media production (refer to Tables 3 and 7), only 60 percent or 627 of the 1,039 schools reported that they have produced (within the last two years) or are currently developing systematically designed packages for lecture supplements or independent study (see Tables 8 and 9).

Attempts were also made in the questionnaire to find out the subject areas in which systematically designed packages of instruction are being developed or produced. Prospective respondents were asked the number of materials their schools have produced or are currently developing in: basic sciences--the medical sciences considered preparatory to clinical sciences, e.g., anatomy, biochemistry, microbiology, pathology, and physiology; clinical sciences--medical study or practice based on actual treatment and observation of patients; subject or specialty areas--a part or branch of a subject requiring special experience and education, e.g., cardiology, pediatrics, and surgery in medicine; or pedodontics, periodontics, and orthodontics in dentistry; postgraduate education--any formalized education leading to another higher academic degree; continuing education--informal education and training such as refresher or non-credited courses taken by the health practitioner; and patient education--the training and education of the patient as they relate to his own health.

Of the 627 schools that reported having produced or being in the process of developing such materials, clinical sciences seems to be the area in which most of the instructional materials have been produced or developed. This is followed by basic sciences, subject or specialty areas, continuing education, patient education, and postgraduate education. A breakdown of the data is shown in the following two tables:

TABLE 8. PERCENT OF SCHOOLS THAT HAVE PRODUCED INSTRUCTIONAL MATERIALS IN SPECIFIC SUBJECTS WITHIN THE LAST TWO YEARS

	N schools involved in matls. development & production	clinical sciences	basic sciences	subject or specialty areas	continuing educ.	patient educ.	postgrad. educ.
Medicine	83	64%	66%	45%	39%	20%	14%
Dentistry	49	44%	63%	59%	31%	33%	12%
Nursing	146	34%	15%	59%	21%	14%	12%
Osteopathy	6	83%	100%	83%	50%	33%	0%
Vet. Medicine	18	78%	72%	44%	39%	17%	22%
Pharmacy	44	52%	66%	18%	32%	14%	5%
Optometry	10	60%	30%	20%	20%	30%	10%
Dent. Hyg.	62	58%	37%	40%	21%	10%	5%
Allied Hlth.	200	36%	44%	28%	13%	14%	8%
Others	9	100%	78%	56%	56%	33%	22%
TOTAL	627	47%	44%	41%	23%	19%	10%

TABLE 9. PERCENT OF SCHOOLS IN PROCESS OF DEVELOPING INSTRUCTIONAL MATERIALS IN SPECIFIC SUBJECTS WITHIN THE LAST TWO YEARS

	N schools involved in matls. development & production	clinical sciences	basic sciences	subject or specialty areas	continuing educ.	patient educ.	postgrad. educ.
Medicine	83	57%	59%	43%	37%	37%	14%
Dentistry	49	45%	47%	47%	24%	27%	10%
Nursing	146	16%	11%	33%	14%	11%	11%
Osteopathy	6	33%	50%	33%	33%	33%	0%
Vet. Medicine	18	56%	50%	33%	28%	6%	11%
Pharmacy	44	20%	27%	5%	16%	7%	2%
Optometry	10	60%	20%	20%	20%	30%	10%
Dent. Hyg.	62	23%	18%	18%	11%	5%	3%
Allied Hlth.	200	23%	26%	19%	9%	11%	4%
Others	9	67%	67%	44%	44%	33%	22%
TOTAL	627	30%	29%	27%	17%	15%	8%

Table 8 shows, in percentages, the subject areas in which instructional materials have been produced within the last two years; Table 9 gives the same type of information, but the percentages refer to instructional matetials currently being developed.

From the preceding two tables, it appears that although the responding schools tend to direct their efforts at both the production and the development of instructional materials along the same subject or teaching areas--i.e., in clinical sciences first and then in basic sciences, subject or specialty areas, etc.--there seems to be a decline in materials development, in general. As revealed in the same two tables, there are fewer schools currently developing instructional materials than schools that have produced instructional materials during the last two years.

Does sharing of instructional materials take place among schools that have produced media? From the data obtained, it was found that 63 percent (or 474 of the 748 schools involved in media production) shared their in-house produced materials with other schools and institutions or organizations, and the most common method of sharing reported was free loan (reported by 51 percent of the 474 schools sharing these materials); followed by reimbursement for cost of duplication (40 percent); sale (32 percent); and rental (24 percent).

Another question asked of the schools was whether they have used or adapted instructional materials developed commercially or by other schools or organizations. According to the data, 90 percent (or 937 of the responding schools) said they have, and they have used the materials mostly to supplement lectures (reported by 86 percent); as resource or reference materials (73 percent); for individualized learning (68 percent); and to replace lectures (22 percent).

Educational Evaluation

Educational evaluation is a process of systematically collecting information and using the information to make rational judgments about the effectiveness of a course or program. It can be formative, which is field-testing the work while it is

being developed and getting feedback on the basis of which revisions are made; or summative, which is terminal or outcome evaluation for overall assessment or impact. Some type of evaluation always takes place in determining the worth or effectiveness of any program or activity. Thus, it is very likely that schools reporting involvement in curriculum revision, instructional development, or media production could have also been engaged in some kind of formal or informal evaluation.

To find out whether the schools surveyed have been formally involved in evaluation as a process, a question to this effect was asked of the respondents. They were also asked if they had done formative evaluation (for revision purposes) or summative evaluation (for overall assessment or impact).

The data in Table 3 presented earlier showed that 64 percent, or 669 out of 1,039 schools, have been involved in evaluating a course, product, or program within the last two years. Of this number, 73 percent have done formative evaluation and 72 percent have done summative evaluation (see Table 10). Further analysis showed that these schools relied most frequently on peer groups for evaluations.

TABLE 10. NUMBER AND PERCENT OF SCHOOLS INVOLVED IN FORMATIVE AND SUMMATIVE EVALUATION (N=669)

Type of Evaluation	Number	Percent
Formative Evaluation	490	73%
Summative Evaluation	484	72%

Specific Variables Considered in Study

Budget. The question of budget is a sensitive issue, and only 41 percent (or 423 of the 1,039 schools) responded when asked about their school's budget for instructional development activities. The budget allocated for this purpose ranged

from about $500 to over $10,000, with more than half of the 423 schools reporting a current budget of over $10,000. Since there was no way of determining whether the remaining 59 percent not responding to this question had no budget specifically designated for instructional development activities or whether they simply chose not to respond to this question, the analysis regarding budget was limited to those that reported a dollar figure. Table 11 shows a breakdown of the schools reporting a dollar amount for instructional development activities, by type of discipline.

TABLE 11. NUMBER AND PERCENT OF SCHOOLS ALLOCATING BUDGET FOR INSTRUCTIONAL DEVELOPMENT ACTIVITIES

	Total N	Schools reporting $ amount	N w/budget	W/ less than $10,000	W/ $10,000 or more
Medicine	93	57%	53	8%	92%
Dentistry	51	67%	34	26%	74%
Nursing	249	35%	98	67%	33%
Osteopathy	10	50%	4	0%	100%
Vet. Medicine	20	70%	14	7%	93%
Pharmacy	66	50%	34	50%	50%
Optometry	12	50%	6	50%	50%
Dent. Hygiene	101	28%	29	65%	35%
Allied Health	425	34%	143	49%	51%
Others	12	66%	8	50%	50%
TOTAL	1,039	41%	423	45%	55%

The preceding table shows that among schools of medicine, dentistry, osteopathy, and veterinary medicine, there are more schools with budget allocations of at least $10,000 than schools with budgets of less than $10,000. On the other hand, among schools of nursing and dental hygiene, there are more schools with budget allocations of less than $10,000 than schools with $10,000 or more earmarked for instructional development activities. Further analysis also showed that schools reporting dollar amounts, in general, allocated most of their funds to media production.

Use of Consultants. Outside consultants, such as content specialists, instructional designers or developers, educational psychologists, researchers, etc., are often used by schools to help the faculty in their efforts at improving instruction. When asked whether their schools had used outside consultants to help in designing courses for instruction within the last two years, 59 percent of the 1,039 responding schools said they had, especially in the areas of curriculum revision and instructional development.

Academic Background of Faculty. On the subject of the staff's academic background and inservice training, 648 (or 62 percent of the 1,039 schools) reported that some of their faculty had graduate or undergraduate education with major emphasis on curriculum and instruction, instructional development, media production, or educational evaluation. About the same number of schools (633 or 61 percent) said that some of their faculty have taken inservice training or workshops in these areas. Further analysis showed that schools of nursing have the greatest number of faculty with graduate or undergraduate education in some aspects of instructional technology (78 percent), while the schools of pharmacy have the greatest number of faculty with short-term training relating to curriculum, instructional development, media production, or evaluation (80 percent).

Is there a relationship between academic background and training of the faculty and the school's involvement in instructional development activities? Contingency coefficients using a chi-square analysis showed little evidence that formal education or inservice training was an important factor in faculty involvement in instructional development, although it would appear that formal education has more impact than inservice training. Percentages reported for faculty education and training were collapsed into four categories for this analysis. Only two of the eight comparisons were significant at the .05 probability level (formal training in instructional development and formal training in educational evaluation). However, the contingency coefficients for those relationships are relatively low, which raises questions concerning the practicality of the findings. Tables 12 and 13 report the eight contingency coefficients and their levels of significance.

TABLE 12. CONTINGENCY COEFFICIENTS AND PROBABILITY LEVELS FOR COMPARING INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES AND FORMAL EDUCATION OF FACULTY

Formal Education Category	Contingency Coefficient with Involvement in Instructional Development Activities	Probability Level
Curriculum and Instruction	.10	.06
Instructional Design and Development.	.13	.01
Media Production	.11	.06
Educational Evaluation	.13	.01

TABLE 13. CONTINGENCY COEFFICIENTS AND PROBABILITY LEVELS FOR COMPARING INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES AND INSERVICE TRAINING OF FACULTY

Inservice Training Category	Contingency Coefficient with Involvement in Instructional Development Activities	Probability Level
Curriculum and Instruction	.04	.78
Instructional Design and Development	.11	.06
Media Production	.10	.17
Educational Evaluation	.10	.13

However, one must not conclude that faculty background and training are not important factors. The difficulties in measuring these variables could have in-

fluenced this finding. Nearly half of the responding schools failed to complete the portion of the questionnaire concerned with the academic background of the faculty. Whether these incomplete responses indicate no faculty preparation in instructional development or that the respondents chose to omit the item cannot be determined. Because of the large number failing to complete this item in the questionnaire, it must be concluded that the relationship is unknown at this time.

Existence of Biomedical Communications Programs on Campus. Some campuses have centralized resource centers that provide media services and assist the faculty and students in the effective application of instructional technology. The facilities vary in size, function, organizational structure, etc., and are known by several names--e.g., Biomedical Communications Program, Learning Resources Center, Educational Resources, and Audiovisual Services. When asked whether they have such an organized or centralized resource center at their school or on their campus, 374 (or 36 percent of the 1,039 schools responding) said they have. This does not imply that there are that many such programs; it merely tells us that 374 schools reported having access to a centralized resource center, which could imply two or more schools sharing the same center. (A later survey on the state of the art of Biomedical Communications Programs in the United States and Canada revealed the existence of over 200 such programs, although the official membership of the newly-formed Association of Biomedical Directors lists only about 100 programs in 1976.)

An attempt was made to find out if a relationship exists between schools with access to a centralized biomedical communications program on campus and school involvement in instructional development activities. The data, as presented in Table 14, show that there is a positive relationship, which is significant at the .01 level--i.e., schools with access to a formally organized structure, such as a biomedical communications program, are more involved in instructional development activities than schools without such centralized resource centers on their campuses.

TABLE 14. RESPONSE FREQUENCIES, CONTINGENCY COEFFICIENT, AND PROBABILITY LEVEL FOR COMPARING EXISTENCE OF BIOMEDICAL COMMUNICATIONS PROGRAM WITH INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES

	Existence of BC Programs		Contingency	Probability
	Yes	No	Coefficient	Level
Instructional Development Activities				
Yes	322	521	.209	.01
No	90	75		

Type of Institution. In relating type of institution to the schools' involvement in instructional development activities, a significant relationship (at the .01 level) was found with private and public schools or institutions (see Table 15). Public schools were more likely to be involved in instructional development activities than private schools.

TABLE 15. RESPONSE FREQUENCIES, CONTINGENCY COEFFICIENT, AND PROBABILITY LEVEL FOR COMPARING SCHOOL DESIGNATION--PUBLIC OR PRIVATE--WITH INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES

	School Designation		Contingency	Probability
	Public	Private	Coefficient	Level
Instructional Development Activities				
Yes	521	322	.122	.01
No	75	90		

Number of Schools on the Same Campus. There is also a signifant relationship (at the .01 level) between the number of schools on the same campus and the

individual school's involvement in instructional development activities--i.e., the more schools there are on the same campus, the more involved the individual schools are in instructional development activities (see Table 16).

TABLE 16. RESPONSE FREQUENCIES, CONTINGENCY COEFFICIENT, AND PROBABILITY LEVEL FOR COMPARING NUMBER OF SCHOOLS ON SAME CAMPUS WITH INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES

	Number of Schools						Contingency Coefficient	Probability Level
	1	2	3	4	5	6+		
Instructional Development Activities								
Yes	245	216	80	63	79	60	.205	.01
No	105	45	6	4	3	2		

Enrollment Size. Again, a significant relationship (at the .01 level) was found between enrollment size and the individual school's involvement in instructional development activities (see Table 17).

TABLE 17. RESPONSE FREQUENCIES, CONTINGENCY COEFFICIENT, AND PROBABILITY LEVEL FOR COMPARING ENROLLMENT SIZE (SMALL, MEDIUM, LARGE) WITH INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES

	Enrollment Size			Contingency Coefficient	Probability Level
	Small	Medium	Large		
Instructional Development Activities					
Yes	241	289	313	.203	.01
No	89	46	30		

Potential explanation of the three relationships just discussed (type of institution, number of schools on the same campus, and enrollment size) is that all three are related to funding potential, which would facilitate the opportunity to use instructional technology.

Relationship Among Variables

Student Self-Study. It has been assumed that when a school becomes involved in the design and development of instruction, the students will benefit from this effort. When asked what percent of their students had taken advantage of instruction provided in self-study format, 303 of the 681 schools that reported providing such instruction said that over half of their students had taken advantage of this type of approach. The other 377 schools offering self-study instruction reported that 5 to 50 percent of their students had been exposed to this type of instruction.

An attempt was made to find out whether there is any relationship between materials development and student involvement in self-study. Table 18 shows a significant relationship (at the .01 level)--i.e., of the 839 schools involved in instructional development, 608 or 72 percent have students involved in self-study. This is compared to 68 schools out of 168 (or 40 percent) not involved in materials development but having students involved in self-study type of instruction.

TABLE 18. RESPONSE FREQUENCIES, CONTINGENCY COEFFICIENT, AND PROBABILITY LEVEL FOR COMPARING SCHOOLS INVOLVED IN MATERIALS DEVELOPMENT AND SCHOOLS PROVIDING STUDENTS WITH SELF-STUDY INSTRUCTION

	Materials Development		Chi-Square	Contingency Coefficient	Probability Level
	Yes	No			
Students Involved					
Yes	608	68	63.48	.25	.01
No	231	100			

Another way of looking at the same data would indicate that, of the schools providing students with instruction in the self-study format, 90 percent are involved in the development of instructional materials.

Four other relationships were studied to give a more complete picture of the variables involved in student self-study. Table 19 presents a summary of these relationships. Variables measuring faculty involvement in instructional development activities and production of systematically designed packages of instruction are highly correlated with student instruction in self-study format. The variables relating to size and type of institution show a much lower relationship with student self-study. These results suggest a pattern of faculty involvement variables and a separate set of institutional variables.

TABLE 19. CONTINGENCY COEFFICIENTS BETWEEN STUDENT INSTRUCTION IN THE SELF-STUDY FORMAT AND SELECTED VARIABLES

Variables	Coefficient
Production of systematically designed packages of instruction (no, yes)*	.33
Staff involvement in instructional development activities (no, yes)	.30
Enrollment size (small, medium, large)	.19
Type of institution (private, public)	.08**

*The scaling of each variable is indicated in parentheses, with the direction of the relationship indicated by the last entry inside the parentheses. That is, institutions indicating "yes" tend to be more involved in instructional development activities.

**This correlation is significant at the .02 level. All other correlations discussed or presented in this Table are significant at the .001 level.

Staff Involvement. Staff involvement in instructional development activities was also found to be related to materials development, production of systematically designed packages of instruction, presence of faculty with graduate degrees in instructional technology, number of schools on the same campus, enrollment size, avail-

ability of o central AV/TV facility for media production, and type of institution (see Table 20).

TABLE 20. CONTINGENCY COEFFICIENTS BETWEEN STAFF INVOLVEMENT IN INSTRUCTIONAL DEVELOPMENT ACTIVITIES AND SELECTED VARIABLES

Selected Variables	Coefficient
Involvement in development of instructional materials (no, yes)*	.46
Production of systematically designed packages of instruction (no, yes)	.31
Presence of faculty with graduate degrees in instructional technology (no, yes)	.26
Number of schools on the same campus (1 to 6+)	.21
Enrollment size (small, medium, large)	.20
Availability of a central AV/TV for media production (no, yes)	.17
Type of institution (private, public)	.12

*The scaling of each variable is indicated in parentheses with the direction of the relationship indicated by the last entry inside the parentheses. That is, institutions indicating "yes" tend to be more involved in instructional development activities. The correlations are significant at the .001 level.

However, the variables measuring faculty activities are more highly related than the measures of institutional factors. This tendency--for faculty variables to have higher correlations than institutional variables--is similar but not as pronounced as that observed in the data presented in Table 19 (Student Instruction in Self-Study Format). From these data, one might suggest for future study a model which postulates that institutional variables have an influence on faculty variables which, in turn, influence student self-study. This model acknowledges that institutional variables have a direct impact on student self-study resulting from the direct influence on staff involvement.

Some might want to interpret the relationship between availability of facilities and faculty involvement in instructional development activities as evidence

that involved faculty can find budget allocations and provide facilities for instructional development. However, the correlation between enrollment size and faculty involvement indicates that, more likely than not, institutional resources rather than faculty involvement are the important factors. It is unlikely that involvement of the faculty in instructional development changes the size or type of institution.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study is to determine the extent to which schools of health sciences offering at least a baccalaureate degree are involved in the application of instructional technology. By means of a four-page questionnaire, the schools' involvement in curriculum revision, instructional design and development, media production and utilization, and educational evaluation within the last two years was investigated. Attempts were also made to find out the relationship between the extent of the schools' involvement in instructional technology and variables such as enrollment size, type of school (public or private), availability of production facilities and equipment, and the existence of a centralized unit or program on campus to serve the educational needs of the faculty and students.

Cooperation was solicited from the respective schools' associations and from the deans or directors of the schools of health sciences. After the survey instrument was field-tested, revised, cleared by the Office of Management and Budget (OMB), and printed, it was sent in August 1976 to 1,479 schools of health sciences, with a cover letter personally addressed to the individual designated by the respective dean or director to be the spokesman or respondent for the school. The response rate, after two followups, was 83 percent.

The data were then coded and entered into the computer. The INQUIRE® program for the IBM 370/158 was used to obtain frequency counts, percentages, and some correlations between certain variables. Analysis of the data revealed that 92 percent of the schools have been involved in curriculum revision, 82 percent in instructional development activities, 72 percent in media production, and 64 percent in educational evaluation within the last two years.

It appears that most of the schools have been involved in various forms of curriculum revision. Of those that reported such involvement, about a fourth said that they have done complete revision and about half reported having done partial revision of their entire program or curriculum by adding or deleting courses and by updating course content.

Of the 82 percent reporting some involvement in instructional design and development, over three-fourths said they did course revision and evaluation as part of their instructional design activities. Other activities performed routinely by those schools engaged in instructional design and development include determining needs (62 percent), sequencing instruction (50 percent), and field-testing or student try-outs (24 percent). When asked if their students had been provided instruction in self-study formats, about two-thirds of the schools said they had, and of this number, about half reported that over 50 percent of their students had taken advantage of this type of instruction.

Almost three-fourths of the schools reported some involvement in media production. There is evidence that production is not always through centralized production facilities. It appears that in some situations, production equipment is not always utilized. Although 72 percent reported some involvement in media production, only 60 percent reported having produced or being involved in developing systematically designed packages for lecture supplements and independent study, and most of their efforts have been directed toward the development or production of such materials in the clinical and basic sciences areas. It was also found that about two-thirds of the schools involved in media production shared their in-house produced materials with others, and that the most common method of sharing was on the basis of free loan.

The data also revealed that 90 percent of the schools used or adapted commercially produced materials or materials developed by other schools or organizations.

Of the 64 percent that reported involvement in educational evaluation, about three-fourths have done formative evaluation for revision purposes and summative evaluation for overall assessment or impact.

Only 41 percent responded to the question of budget for instructional development activities, and of these, over half reported having a current budget of $10,000 or more earmarked for these activities. The use of consultants, especially in the areas of curriculum revision and instructional development, was reported by 59 percent of the schools.

Close to two-thirds of the schools reported that their faculty had graduate or undergraduate education, as well as inservice training, in one or more areas of curriculum and instruction, instructional development, media production, or educational evaluation.

Relationships between selected variables were also investigated, and it was found that availability of production facilities and equipment, existence of a centralized resource center on campus, type of institution (public or private), number of schools on the same campus, budget allocation, and enrollment size were all related to the schools' involvement in instructional development activities. There was little evidence, however, that formal education or inservice training was an important factor in faculty development in these activities, although it would appear that formal education had more impact than inservice training.

Conclusions

On the basis of the data collected and within the limitations and framework of the study, the following conclusions seem justified.

1. Differing degrees of involvement in the application of instructional technology have been shown by the schools of health sciences sur-

veyed, specifically in the areas of curriculum revision, instructional design and development, media production and utilization, and educational evaluation.

2. There is evidence that the schools have been involved in the development and production of systematically designed packages of instruction, primarily in the clinical and basic science areas. There is also a fair number of schools sharing in-house produced materials with others, and an even larger number of schools using or adapting materials that have been commercially developed and produced.
3. The variables considered in this study fall into general categories--those that measure faculty involvement in instructional development and those that relate to institutional settings. It appears that faculty variables have higher correlations with instructional development than variables that deal with institutional settings.
4. Institutional variables, such as enrollment, budget allocation, number of schools on the same campus, type of institution (public or private), and availability of production facilities and equipment are all related to faculty involvement in instructional design activities and in instructional materials development. One might postulate that when the budget and facilities provide the opportunity, the faculty/staff become involved in instructional design and development of materials, and the students are then provided with instruction in the self-study format.
5. Since only one questionnaire was sent to each health science school, the data collected reflect base line information on what the respondents for these schools reported. In an effort to make it easy for the respondents to reply, the questionnaire, while able to gather pertinent information, could have also elicited undue subjectivity as far as the respondents' interpretation of the terminology and the degree of their

schools' involvement in instructional development activities are concerned. Alternative survey strategies could consider the instructional development activities of selected faculty, specific departments, or types of disciplines, or look into these activities through the perceptions or attitudes of the students.

Recommendations

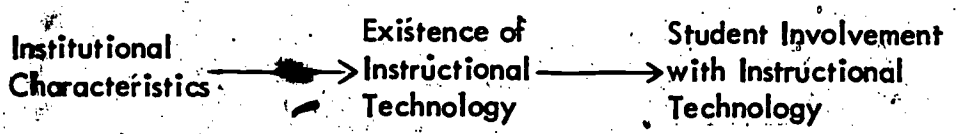
This survey was undertaken to determine the status of instructional technology as it is being applied in schools of health sciences. An up-to-date data base is needed for planning purposes and setting priorities on how the quality of instruction can be improved and facilitated. From the analysis of the data and findings of this survey, the following recommendations are given:

1. An in-depth study of the involvement of some schools in certain aspects of instructional technology (e.g., one on curriculum revision; another on instructional development, etc.) should be made by describing outstanding projects that have been undertaken and innovative practices that are workable and have been found effective.
2. Since there is evidence that media production and development take place in most schools of health sciences, the establishment of mechanisms for sharing among schools with common needs and goals, such as the development and distribution of instructional materials, should be encouraged. This will prevent unnecessary duplication of efforts by individual schools and, with shared resources, expertise, and budget, should improve the quality and increase the use of these materials.
3. The fact that a large majority (90 percent) of the schools use or adapt commercially produced materials, and since no attempt was made in this survey to ask the schools for the technical specifications, descriptions, and evaluation data for instructional materials they have developed

or produced, it is recommended that the project on the annotation and evaluation of instructional materials for possible inclusion in AVLINE or in some other catalog listings of specialized instructional materials for the profession be continued and expanded.

4. The relatively high response rate (83 percent) from a total population survey, the interest expressed by the responding schools in finding out the status of instructional technology in the schools of health sciences, and the high percentage of schools that reported involvement in some aspects of instructional technology would seem to justify the establishment of certain guidelines for facilitating the improvement of instruction--given a certain budget, resources, and expertise.
5. A national survey should be made periodically, perhaps every two years, to update the data base and implement continuous assessment.
6. A study should be undertaken to find out how faculty involvement in developing and extending the potential of instructional technology can be increased. Studies should also be conducted to determine not only the faculty's but also the students' attitudes toward the application of innovative methodologies for improving the quality of education.
7. Research and instructional strategies should consider the ultimate consumer--i.e., the student. Since more efficient student involvement is the goal of instructional technology, a major question which needs to be investigated is: To what degree do different variables predict student involvement in instructional technology? One level of investigation then could involve the different items indicating the presence of instructional technology and student involvement, such as: faculty training in instructional technology, instructional development activities, materials design and development, budget allocation for these activities, support services, etc. Another level of analysis would concern the relationships indica-

ting institutional characteristics and the existence of instructional technology. In this regard, factors which appear to determine whether instructional technology exists would therefore have to be investigated. The relationship of these two levels of analyses can best be illustrated by the following schematic:



APPENDICES

APPENDIX A

The Questionnaire

INSTRUCTIONAL TECHNOLOGY IN THE HEALTH SCIENCES

PURPOSE: This questionnaire is being sent to each school (medicine, dentistry, nursing, etc.) within a university or health science center to determine the extent to which individual schools of health sciences are involved in the application of instructional technology in their programs.

DIRECTIONS: Please answer the following questions to the best of your ability--in terms of the particular school you are affiliated with. When applicable, you may check more than one category.

1. Has your school been involved in curriculum revision within the last two years? ☐ Yes ☐ No

   If YES, please check any of the following that are applicable:

   ___ complete revision of entire school program or curriculum
   ___ partial revision of entire school program or curriculum
   ___ complete revision of individual courses or subject areas
   ___ partial revision of individual courses or subject areas
   ___ other (specify): _____

   Also if YES to question #1, please check any of the following activities that are in process or are completed:

   ___ addition or deletion of courses
   ___ consolidation of courses
   ___ provision for curriculum flexibility
   ___ updating course content
   ___ change in teaching strategies (e.g.; from lecture to individualized instruction)
   ___ change in learning modes (e.g., from classroom to small group or self-study)
   ___ other (specify): _____

2. Do any of your professional/technical staff or teaching faculty hold graduate degrees in any area of instructional technology? ☐ Yes ☐ No

   If YES, how many have masters or doctorate degrees? _____

   Of this number, what percent hold academic rank? _____ %
   what percent have academic tenure? _____ %

3. Have any of your professional/technical staff and teaching faculty been involved in instructional development activities within the last two years? ☐ Yes ☐ No

   If YES, about what percent of their time has been devoted to instructional development?

   _____ % of time spent by the teaching faculty--out of a total number of _____ teaching faculty.
   _____ % of time spent by professional/technical staff--out of a total number of _____ prof./tech. staff.

4. Has your school been involved in designing or developing instructional materials for use in your required curriculum within the last two years? ☐ Yes ☐ No

   If YES, please check any of the following activities that are being done routinely:

   ___ determine needs
   ___ sequence instruction
   ___ field-test to sample students
   ___ course revision
   ___ evaluation
   ___ other (specify): _____

5. Have your students been provided instruction in self-study format within your school within the last two years? ☐ Yes ☐ No

   If YES, about what percent of your students have taken advantage of this type of approach? _____ %

6. Has your school been involved in the production of audiovisual materials within the last two years? ☐ Yes ☐ No

   If YES, please give approximate number of your production staff:

   Number of full-time professional/technical staff: _____
   Number of part-time professional/technical staff: _____

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7. Does your school have a central AV and/or TV facility specifically for media production? ☐ Yes ☐ No

If YES, please give approximate square feet of space:

For AV Media Production	For TV Production
_____ sq. ft. present space	_____ sq. ft. present space
_____ sq. ft. needed within five years	_____ sq. ft. needed within five years

8. Does your school have production equipment for in-house production of instructional materials? ☐ Yes ☐ No

If YES, please give number of equipment available:

No. of Video Recorders		No. of Video Cameras		No. of M.P. Cameras		No. of Still Photo Equipment	
color	black/white	color	black/white	16mm	8mm	35mm cameras	duplicators
____	____	____	____	____	____	____	____

Please specify type and number of accessory production equipment available in your school:

	Specify Type of Equipment	Number
For video production (other than recorders & cameras):		
For motion picture production (other than cameras):		
For slide production (other than cameras & duplicators):		
Please specify type and number of production equipment other than those mentioned above (e.g., sound systems, CAI terminals, etc.) available in your school:		

9. Has your school produced or are producing instructionally designed packages for lecture supplements or for independent study? ☐ Yes ☐ No

If YES, please give number of and media format for instructional materials produced or currently in the development stage in any of the following categories:

Categories	# of Matls. Produced within last 2 years	Media Formats	# of Matls. Currently in development stage	Media Formats
basic sciences	____	____	____	____
clinical sciences	____	____	____	____
subject or specialty areas (e.g., pediatrics, periodontics)	____	____	____	____
postgraduate education (leading to a degree)	____	____	____	____
continuing education (refresher courses)	____	____	____	____
patient education	____	____	____	____
research/publication	____	____	____	____
other categories (specify): _____	____	____	____	____
_____	____	____	____	____

10. Are instructional materials developed in your school available to other schools and institutions or organizations? ☐ Yes ☐ No

If YES, how are they usually made available? (check one or more)

___ sale
___ rental
___ free loan
___ duplication cost
___ other (specify): _____

11. Does your school use or adapt instructional materials developed by other schools or commercial producers and distributors? ☐ Yes ☐ No

If YES, how are they used, generally? (check one or more)

___ replace traditional lectures
___ supplement lectures
___ for individualized learning
___ as resource or reference material
___ other (specify): _____

12. Does your school have projection and playback equipment available for use by students? ☐ Yes ☐ No

If YES, please state how many of the following equipment are available for student use:

___ 16mm motion picture projectors
___ super 8mm reel projectors
___ super 8mm cartridge projectors
___ regular 8mm reel projectors
___ regular 8mm cartridge projectors
___ videocassette players
___ videotape players
___ 2x2 slide projectors
___ slide/tape systems
___ filmstrip projectors
___ filmstrip cartridge projectors
___ cassette tape players
___ overhead projectors
___ opaque projectors
___ microfiche readers
___ CAI terminals
___ others (specify): _____

13. Has your school been involved in evaluating a course, product, or program within the last two years? ☐ Yes ☐ No

If YES, please check any of the following procedures usually performed in your school in evaluating a course, product, or program:

	If done for Revision Purposes	If done for Overall Assessment or Impact
Field-test to sample students	___	___
comments and suggestions from peers	___	___
opinions of outside consultants	___	___
other (specify): _____	___	___
_____	___	___

14. Please approximate your school's current budget for instructional development activities: $ _____

(Of this amount) about what percent is allocated to each of the following activities?

For curriculum revision	___ %
For instructional design	___ %
For media production	___ %
For educational evaluation	___ %
Other (specify): _____	___ %
	100 %

15. Does your school have a budget to support faculty release time for the following activities?

curriculum revision ___ Yes ___ No
instructional development ___ Yes ___ No
media production ___ Yes ___ No
educational evaluation ___ Yes ___ No

16. Does your school utilize or hire the services of outside consultants for any of the following activities?

curriculum revision: ___ Yes ___ No
instructional development: ___ Yes ___ No
media production: ___ Yes ___ No
educational evaluation: ___ Yes ___ No

17. About what percent of your teaching faculty and professional/technical staff have formal education (graduate/undergraduate) and/or inservice training (workshops/seminars) in the following areas?

	% of Entire Staff with Formal Education	% of Entire Staff with Inservice Training
curriculum and instruction	___%	___%
instructional development	___%	___%
media production	___%	___%
educational evaluation	___%	___%

18. Does your school or university have a biomedical communications program (or any such formal organizational structure) that provides media services and assists the faculty and students in the effective application of instructional technology? ☐ Yes ☐ No

If YES, would your school or university be willing to participate in an in-depth study of biomedical communications programs in the United States? ☐ Yes ☐ No

Again, if YES, please state name and title of person to contact about your biomedical communications program:

Name: _____ Title: _____

SPACE FOR FURTHER EXPLANATION OR CLARIFICATION REGARDING SOME OF YOUR RESPONSES:

Name of Respondent: _____
Title: _____
Department: _____
School: _____
Address: _____
_____
Phone: _____ Date: _____

Please return completed form to:

Instructional Technology Project
Educational Training & Consultation Branch
National Medical Audiovisual Center (Annex)
Station K
Atlanta, Georgia 30324

APPENDIX B

Letter to the Executive Secretary or President of the Schools' National Associations

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH

February 12, 1976

NATIONAL LIBRARY OF MEDICINE
NATIONAL
MEDICAL AUDIOVISUAL CENTER (ANNEX)
STATION K
ATLANTA, GEORGIA 30324

The National Medical Audiovisual Center is planning to conduct a questionnaire survey to determine the state of the art regarding the application of instructional technology and the organization and management of biomedical communications programs in schools of health sciences in the United States. Data from this survey will result in an important working document and in a clearinghouse of information, not only for NMAC, but also for you--as a national schools' association--and for all schools of health sciences in determining priorities, planning programs, and providing guidelines for the application of educational techniques and procedures that can maximally and effectively facilitate learning.

This letter is to inform you of our plans and to request your endorsement and support of this project. As the national organization for the schools you represent, you will, of course, be appraised of the progress of the survey through interim and final reports that will result from the survey. If you have any questions, comments, or suggestions regarding this project, please do not hesitate to let us know.

Your help and cooperation will determine, to a large extent, the eventual success of this worthwhile endeavor.

Thank you.

Sincerely yours,

George E. Mitchell, D.M.D.
Director
National Medical Audiovisual Center

APPENDIX C

Letter to the Dean or Director of the Schools of Health Sciences

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH

August 1, 1976

NATIONAL LIBRARY OF MEDICINE
NATIONAL
MEDICAL AUDIOVISUAL CENTER (ANNEX)
STATION K
ATLANTA, GEORGIA 30324

The National Medical Audiovisual Center, in cooperation with the national associations of medical, dental, nursing, and allied health schools, is planning to conduct a survey to determine the state of instructional technology as it is being applied in the schools of health professions in the United States. Data from this survey will result in an important working document and in a clearinghouse of information for NMAC and the schools of health sciences in determining priorities, planning programs, and providing guidelines for the application of educational techniques and procedures that can help the schools in planning their programs.

In view of the diversity of the type of schools to be surveyed and the degree of their involvement in educational technology, it is necessary to conduct the survey in two steps. The first, intended for all schools of health professions offering at least a baccalaureate degree, will attempt to determine the extent to which these schools are involved in the application of instructional technology to their programs. After the first survey, a second questionnaire will be sent to the respondents who indicated they have organized biomedical communications programs in order to find out the structure, scope, facilities, personnel, and budget of their programs. Individual responses will, of course, be kept confidential. Only summary information will be shared.

In order to lessen the burden on the responding school, we intend to send only one questionnaire to each health science school for the first survey on instructional technology. We are therefore requesting you to send us the name of the person who is most familiar with the overall application of instructional technology to your curriculum, such as the associate dean for instruction, director of educational services, or some other appropriate official in your school. For the second survey, one questionnaire will also be sent—but only to those schools which have indicated, from the first survey, that they have organized biomedical communications programs.

Your endorsement of the project and cooperation in providing assistance to this much needed state-of-the-art survey will, in large measure, determine the eventual success of this project. We are looking forward to hearing from you at your earliest convenience. Again, thank you for your help and cooperation.

Sincerely yours,

George E. Mitchell

George E. Mitchell, D.M.D., M.P.H.
Director

enc: self-addressed postcard

APPENDIX D

Stamped, Self-Addressed, Return Postcard

NAME OF FACULTY ON OUR STAFF
TO RECEIVE QUESTIONNAIRE:

TITLE: _____

SCHOOL: _____

ADDRESS: _____

_____

_____

TELEPHONE: _____

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE
NATIONAL MEDICAL AUDIOVISUAL CENTER (ANNEX)
STATION K
ATLANTA, GEORGIA 30324

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

U.S.MAIL

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF HEW
HEW 399

Instructional Technology Project
Educational Training & Consultation Branch
National Medical Audiovisual Center (Annex)
Station K
Atlanta, Georgia 30324

APPENDIX E

Cover Letter to Prospective Respondents

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH

NATIONAL LIBRARY OF MEDICINE
NATIONAL
MEDICAL AUDIOVISUAL CENTER (ANNEX)
STATION K
ATLANTA, GEORGIA 30324

September 1, 1976

The National Medical Audiovisual Center is conducting a questionnaire survey to determine the state of instructional technology as it is being applied in the schools of health professions in the United States. This project has the endorsement and support of your national association.

Only one questionnaire is being sent to each health science school, and your Dean (Director) has given us your name as the prospective respondent for your school. You may want to consult with other staff members about certain questions on the form; however, we would like you to assume the responsibility for completing and returning the questionnaire before September 20 to:

Instructional Technology Project
Educational Training and Consultation Branch
National Medical Audiovisual Center (Annex)
Station K
Atlanta, Georgia 30324

Your responses will be held in confidence and will not be released to other institutions. Only information on a collective basis will be reported and disseminated. Data from this survey will result in an important working document and in a clearinghouse of information not only for NMAC but also for the schools of health sciences in determining priorities, planning programs, and providing guidelines for the application of educational techniques and procedures that can maximally and effectively facilitate learning. A copy of the final report will be sent to all the schools that participated in the survey.

Your cooperation in providing assistance in determining the state of the art of instructional technology will determine, in large measure, the eventual success of this project. If you have any suggestions or comments regarding this survey beyond those requested by the response sections of the attached questionnaire, please feel free to do so on the "Comments" Section or on the back of the questionnaire.

We thank you for taking the time to assist us in this effort to determine the extent to which schools of health sciences are involved in the application of instructional technology to their programs. Your cooperation is very much appreciated.

Sincerely yours,

Virginia G. Sturwold

Virginia G. Sturwold, Ed.D.
Project Officer

enclosures

APPENDIX F

First Follow-Up Letter

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH

October 1, 1976

NATIONAL LIBRARY OF MEDICINE
NATIONAL
MEDICAL AUDIOVISUAL CENTER (ANNEX)
STATION K
ATLANTA, GEORGIA 30324

Last month, we sent you a questionnaire in our effort to determine the state of the art regarding the application of instructional technology in schools of health sciences. Since we have not as yet heard from you, we thought you might have overlooked the survey form enclosed with our letter. In order for us to complete the survey as scheduled, we would appreciate your taking time out to respond to the questionnaire--if you have not yet done so.

The information you will give us regarding your school's involvement in educational technology will result in a profile of what is going on in schools of health professions as far as instructional development, curriculum revision, media production, and educational evaluation are concerned. The data will result in a final report, which will be disseminated to all schools who participated in the survey. This will enable both our agency and the schools of health sciences to plan needed programs more realistically in terms of the effective use of media and resources to facilitate learning.

We would like to hear from you at your earliest convenience. However, if our correspondence crossed in the mail, we would like to thank you for your time in helping us with the survey.

Sincerely yours,

Virginia B. Sturwold

Virginia B. Sturwold, Ed.D.
Project Officer

APPENDIX G

Second Follow-Up Letter

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH

NATIONAL LIBRARY OF MEDICINE
NATIONAL
MEDICAL AUDIOVISUAL CENTER (ANNEX)
STATION K
ATLANTA, GEORGIA 30324

November 1, 1976

Two months ago, we sent you a questionnaire in our effort to determine the state of the art regarding the application of instructional technology in schools of health sciences. Since we have not as yet heard from you, we thought you might have overlooked the survey form enclosed with our letter. In order for us to complete the survey as scheduled, we would appreciate your taking time out to respond to the questionnaire--if you have not yet done so.

In the event the questionnaire was misplaced, we are enclosing another copy of the survey form. It is important that your school be included in this survey. We are therefore most anxious to receive your response if we are to determine the state of the art of instructional technology as it is being applied in schools of health professions. The data from the survey will result in a final report which will be sent to all the schools who participated.

We are now in the process of coding the responses that have reached our office. In order for us to meet the scheduled deadline for the completion of this project, we would appreciate hearing from you at your very earliest convenience.

Thank you.

Sincerely yours,

Virginia G. Sturwold

Virginia G. Sturwold, Ed.D.
Project Officer

Enclosure