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ABSTRACT

Under the sponsorship of the Carnegie Corporation and the Ford Foundation, a study was instituted to examine research and development in the educational materials industry. Using the open-ended interview method, data was collected from executives of major book publishers and their subsidiaries, and producers of materials other than books. Interviews were designed to uncover information concerning the respondent's perceptions of what constitutes research and development for the industry, the actual practices and procedures which constitute the research and development process for his company, and his perception of the company's role in the educational process. A provocative work paper was also sent to some carefully selected publishers for their comments and corrections. Sixteen annotated replies were obtained. This data was analyzed to reveal the dimensions of the research and development process in theory and practice. No accurate definition of research and development was arrived at that could be applied universally to the educational materials industry. Two dimensions felt to be useful when examining research and development were the locus of control and the degree of technological complexity. A bibliography is appended along with a list of participating companies. (JY)

RESEARCH AND DEVELOPMENT

IN THE

EDUCATIONAL MATERIALS INDUSTRIES

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This study was conducted under the sponsorship of the Ford Foundation and the Carnegie Corporation of New York.

PREFACE

The recent and rapid entrance of machine-based technologies into the fields of teaching and learning (education) has produced the same kinds of reactions among many educators that marked the introduction of new machine-based technologies to the military during and after World War II and in the business community during this same period. The new educational technologies are perceived by many practitioners as substitutes for or in conflict with the established technologies of mass teaching and learning, on the one hand, and as holding out hope for helping to achieve difficult educational goals, such as individualized instruction, on the other. The conflict between old and new technological alternatives for the educational dollar is producing a predictable amount of heat, propaganda, obfuscation, "hard sell," mutual suspicion, and stereotypical misunderstanding between proponents of the alternatives.

The history of resistance to change in technology in business and the military during the past twenty years is being repeated in the field of education. What can be learned from the military and business experience? The military had to develop and apply an additional new technology to cope with the many new alternatives made available by modern physical science. It had to develop an evaluation technology, a way for making operational or output comparisons between alternative systems and a way of costing these alternatives. Cost/benefit or cost/effectiveness techniques were generated, primarily in the field of economics, to aid this technology.

The attention paid to this important contribution, however, has tended to hide the development of a possibly even more important new technology, arising from an interdisciplinary, hardheaded, "learn as you go" group of

innovators, the system-testers or evaluators. These relatively unsung technologists, working in boards, ad hoc committees, weapon systems evaluation groups, military and industrial research and development laboratories and in field-testing installations, provide the stream of hard data, expert judgment, and operational feasibility information needed to support the value requirements of the cost/effectiveness technology.

To call this new evaluation technology "Research and Development" is greatly to oversimplify the situation and quite possibly to confuse it. What seems to be going on is a kind of "pre-R & D" or search, as opposed to research-search for a framework or plan for evaluation which describes the boundaries of a system, the R & D needed to develop the system, the costs and feasibility of alternative systems, both political and technical, how feedback from field-testing can be generated and utilized, how the new information is to be communicated, how practitioners are expected to change their behavior, and a thousand and one similar considerations. This search activity is not conducted by traditional research methods, although it may lead to the design of a traditional research study or studies or to a research program. Possibly the most important aspect of a search plan is the provision for "lead time," to permit the results of analysis and research to influence the next set of alternatives and choices. An orderly procedure for setting goals, assessing progress, and revising goals as a function of feedback is part of the search plan. In short, what the military learned to do, mostly by trial and error, was to evaluate alternatives and to make choices utilizing many different methods and procedures, ranging from the "quick and dirty" to the most elaborate of experimental designs. For a period, the military tried to rely on individual scientists from the various

traditional disciplines to conduct both the search and the research and development phases. It discovered, through agonizing trial and error, that "system scientists," operations researchers," or "interdisciplinary searchers" are needed for system evaluation, individuals who are able to assume the multiple perspectives of scientist, theoretician, practitioner, developer, and customer in judging alternatives and making choices. Our system of higher education is not aimed at producing such interdisciplinarians, so the military solution has often been to create boards or groups made up of individuals representing various relevant perspectives and to utilize the consensus of such boards as the operational prediction and definition of effectiveness.

This history of the evolution of evaluation in the military and in the business world is being repeated in the field of technology applied to education. Like the weather, everyone is talking about evaluation of educational alternatives, but hardly anyone is doing evaluation in a way that changes behavior, attitudes, beliefs, and choices.

Is the military and business experience applicable in the field of education? We think so. So we have taken some first steps and asked some first questions. An immediate question was how new technological alternatives are identified in the educational materials industry. An examination of the choice behavior of practitioners in relation to old and new technological alternatives in teaching and learning seemed to be a good place to start in order to provide a baseline of information about the "customer."

This report is one of two studies arising from discussions at a meeting convened by the Carnegie Corporation of New York in January, 1967, to explore the problem of technology in education and its impact on the producers of educational materials, on the schools, and on the Federal Government. A distinguished group was assembled, representing major commercial producers of

educational materials, and staff members from the Ford Foundation and from the Carnegie Corporation of New York. The meeting led to a request to the Institute for Educational Development from the Ford Foundation and the Carnegie Corporation to conduct studies that would examine more closely two of the issues raised, namely: "Research and Development in the Educational Materials Industry," and "Selection of Educational Materials in the United States Public Schools."

The experiences, alternatives, and choices involved in the conduct of these two studies make fascinating case histories of the trial and error learning process described in connection with the military experience. Although these studies are descriptive rather than evaluative, they present many of the hard search or framework problems of an evaluation enterprise. About half way through one of the studies, for example, a line of investigation was stopped and the whole study was completely redesigned.

We at IED are proud of these reports. We hope that the framework for thinking about research and development in the educational materials industry and the new factual information uncovered in the selection of educational materials study will prove helpful to both educators and to producers of educational materials in understanding the impact of machine-based technologies on educational practices.

John L. Kennedy, Vice President
Institute for Educational Development

June, 1969

FOREWORD

This study was made possible by the cooperation of many persons and institutions. It is impossible to name and thank all of them here.

The Carnegie Corporation, together with a small group of executives in the educational products industries, asked some of the first questions that led to the study. The Ford Foundation joined Carnegie in asking IED to undertake the work and in providing funds.

American Educational Publishers Institute made its staff available for repeated and valuable consultation, and assistance was extended also by American Book Publishers Council and Electronic Industries Association.

In all, more than 65 corporations provided key executives for interviews and other assistance. Many of these persons are prominent citizens whose time for such matters is exceedingly scarce. All responded cheerfully and many of them enthusiastically.

Two distinguished editors emeriti, Mr. Charles Madison (formerly of Holt, Rinehart & Winston, Inc.) and Mr. James M. Reid (formerly of Harcourt, Brace & World, Inc.), supplied wisdom and guidance for the study in its early stages. Kenneth E. Baranski, also an educational publisher, acted as full-time consultant to IED during the early part of the study.

Dr. Neal Gross (Harvard University) and Dr. John Riley (Equitable Life Assurance Society) provided advice, as senior consultants, primarily on the design for the study. Dr. Bertram Koslin (Princeton University) acted as consultant in preparation of instruments, processing of data, and study design.

Of the IED staff, Dr. Nancy A. Bord served as Study Director, with assistance from Lucy Friedenson and Carol Aslanian. The senior officers of IED supervised the conduct of the study.

CONTENTS

INTRODUCTION

For the past two years the Institute for Educational Development (IED) has been concerned with an investigation of research and development in the educational materials industries.

A great deal has been learned in the course of our inquiry. However, what has been learned is not entirely what IED or the foundations which supported the inquiry might have expected. For example, a satisfactory conception of what constitutes research and development has only recently been evolved. A framework for analysis which might have served as a guide for data collection has been generated in the final phases of the investigation.

Research has proven to be a somewhat elusive concept, particularly in the multi-faceted, diversified, and dynamic context of the educational materials industries. Standard definitions of what constitutes research seemed to be either too general or too specific to be useful and appropriate for defining the scope of our inquiry. Development, though it seems to be a less confusing concept than research, also has yet to be defined adequately and its components analyzed and explicated. Furthermore, there are questions as to the boundaries between research and development. Whether research and development should be treated as aspects of a single process or as separate and distinct processes is one of those unsettled questions.

In addition, the issue of universality is unresolved. Is there or should there be one, grand conception of research and development to be used as a criterion against which all activities called research and development could be measured? More than one conception might prove useful, perhaps, as a measure for different kinds of products, for different kinds of investigators, perhaps

in different settings. Is research and development in an industrial-commercial context really different from research and development conducted in universities? Is research and development, say, in the drug industry (a prospective source of products related to learning) to be measured by the same standards as research and development, say, in the educational film industry? These difficult questions have even more difficult epistemological questions at their roots.

The role which educational materials play in the teaching-learning process has also yet to be fully explored. It has been argued to considerable effect that the creative teacher can use almost any materials as effective teaching tools and, on the other hand, that the most carefully designed materials, incorporating the most sophisticated instructional technologies, may not be used most advantageously. Also, since schools are considered to be a principal agent of socialization, the content of instructional materials has assumed social significance. Throughout American history, ethnic and religious groups have been especially sensitive to their portrayal in educational materials.

The investigations into the materials industries were barely underway, when it became evident that there was wide variation in materials producers' perceptions of their own role in the educational enterprise. Likewise it became clear that the publics served also entertained a variety of perceptions concerning the role of producers.

An argument that the processes and products of technology could profoundly alter, reform, or "save" public education in the United States was advanced by many educators and laymen during the early and mid-1960's. An optimism regarding educational technology was popular both in the professional

literature of education and in the public statements of corporate and government spokesmen. Many corporations, not previously involved in the production of educational materials, acquired publishing or equipment producing subsidiaries or established special divisions for the development and production of educational materials. Much of this activity was stimulated by the passage of federal education legislation which included provisions for funds to purchase textbooks, audiovisual equipment, and other instructional materials. The promise of multi-billion dollar markets within a few years further encouraged both the expansion of activities by established companies and the creation of new enterprises. The term "knowledge industry" gained common use to describe the various corporate entities which comprised this phenomenon.

Within the past year, however, a number of observers have noted that both the economic and educational expectations for instructional technology seem to have been somewhat extravagant. The difficulties of transferring techniques and operating styles from defense-aerospace and communications industries to educational materials production seem to have been similarly underrated. The lucrative markets previously forecast have not yet materialized, and federal government expenditures for the purchase of many categories of instructional materials have declined.

The interval during which this study was conducted spans a time period which includes both the era of optimism concerning the application of technology to education and the more recent era during which that optimism seems to be undergoing reconsideration.

Since this was not a conventional research study, this report is not a conventional research report. The aim at the outset was to do a baseline

study with avoidance of considerations of public policy. We were commissioned by the sponsors to produce an exploratory description of certain kinds of activities in certain industries, and that work might suggest a need for further exploration.

This report explains the methods used and presents some of the data gathered over a period of a year in attempting to make such a description. The context for that attempt is set forth also. Since the end of that period, largely at its own expense, IED has encouraged speculative study and discussion on the part of members of its own staff in an effort to build a conceptual framework to support the ideas loosely associated with the phrase research and development in the early stages of the project. Such a framework, for obvious reasons, would have made data collection far more efficient and its absence led to many difficulties in comparing research and development, as it is known and defined within one industry, with activities called by the same name in other industries, or in universities, or in government departments and agencies.

Hence, this report also presents a conceptual scheme as a marker to those who may follow the rough trail which we have broken. That emphasizes the judgment that, by all odds, the most important contribution of this study is in the full discovery of the recondite and resistant nature of the meanings variously attached to the words research and development.

PART I

Chronology of Project Activities

The first part of this report includes six sections. Taken together, they represent a chronology of IED's activities in conducting the inquiry into research and development in the educational materials industry. The first section describes some aspects of the environment from which the investigation emerged. The five subsequent sections describe the activities which comprised the various phases of the project.

Background to the Project

In commenting upon this study more than a year ago, Nils Y. Wessell, then president of IED and now president of the Alfred P. Sloan Foundation, observed:

> "A current, common, and quite dubious supposition holds that the worlds of business and education are foreign to each other, that they move in different orbits, and are inhabited by different kinds of beings. In our view, one of the most interesting things about this study is the joinder of forces from these supposedly disparate communities to try to get better understanding of an important, somewhat mysterious, and vexing set of problems. We wonder whether, five years ago, such cooperation would have been possible."

The climate for ideas in the period which preceded the initiation of this project worked an important influence on the way in which it was conducted. During 1964, 1965 and 1966, many speeches and many articles expressed the view that dramatic changes in the substance and techniques of American education were about to occur. It was widely held that the procedures and technology of the defense-aerospace, electronics, and communications industries were transferable to a variety of other social institutions and especially to education.

Our educational system occupies a special position in American society. Its institutions are among the most visible, if not always the most permeable, and are also among those with which many individuals have direct contact. They

have been accorded a unique status in our cultural myths. On the one hand they have long been thought to be "above politics" and on the other have been considered the principal remedial institutions for a wide variety of social problems. Since it was believed that education could help solve a wide range of problems, education was also held responsible for the persistence of those problems.

In the mid-1960's educational institutions also seemed to be among the country's most vulnerable institutions. Schools were criticized and attacked from many sources. Criticisms from teachers and administrators, and from parents who had close contact with the schools, were supplemented by the mass media and special interest groups as well as by politicians, business leaders, and people in universities. Every group tended to blame every other group for the alleged failings of the educational system.

Many educators appeared ready to accept any scheme that promised to reform their enterprise and restore the reputation of their institutions. The application of technology to education seemed particularly suited to this role. Technology had come to mean progress thus, by association, it was good. Thus, also, the application of technology would improve educational practices and programs. Those educators and critics who publicly opposed this view were liable to be labeled reactionary.

Belief in the potency of technology and its handmaiden, research and development, extended not only to those in the formal education "establishment" but also to those in government, foundations, business, and the universities with professional concern for education, to all of the groups, in fact, which comprise the alleged establishment of education.

The application of technology to education also appealed to congressmen and to state legislators. It was not difficult, therefore, to attract votes for legislation supporting research and development and the purchase of technologically sophisticated equipment and materials.

The availability of funds directly benefited many individuals and groups with personal and professional interests in fostering the application of technology to education. With increased appropriations and new or expanded programs government officials acquired greater responsibilities and bigger organizations. Researchers in universities and in non-profit and profit-making research and development firms were able to enlarge their institutions and their professional reputations. Some of the commercial producers of educational materials expanded their operations and their sales staffs. Other producers of audiovisual, photographic, and communications equipment sought to adapt their products for classroom use.

Many new organizations and institutions which focused on the applications of technology to education were established. A new sub-profession known as educational technology undertook to organize itself.

Magazines and journals dealing solely with educational technology were also established as a part of this phenomenon. The Division of Audiovisual Instruction of the National Educational Association markedly increased its membership. Many new job titles and job descriptions appeared and local school budgets began to reflect the increased use of technology.

Within this framework the concept and assumptions for the study of research and development in the educational materials industries were formed.

Technology was regarded by many as a panacea for education and by extension as a cure for many of the problems of society. It was expected that the technological expertise generated in other segments of the economy could be translated more or less readily to education. A corollary of this view was that research and development incorporating the principles and products of the new technology would result in dramatically different and innovative educational materials for classrooms.

Thus a question such as the extent to which educational materials producers were making use of research and development methods might yield up clues concerning the extent to which they were assisting in the application of technology to education through new materials. Another question involved the extent to which purchasing practices in local school districts facilitated the purchase of these newer materials. Implicit in this view was the belief that new things held a promise of improvement since old things did not seem to be working very well. And if the new things could be field-tested in advance, and if the feedback from testing could be built into the design, then high hopes were in order. Also implicit in this perspective was the belief that innovative materials designed as systems would lead to environmental approaches to learning and instruction which might bring changes in the entire structure and results of the educational process.

That was the atmosphere in which the ideas for this study came into being.

In January, 1967 a meeting was held between foundation representatives and executives of ten of the leading educational materials producing companies.

At the meeting it was urged that a series of studies should be supported so as to get initial descriptions of the activities of companies producing educational materials. Descriptions were needed also for the practices of schools and of school districts in purchasing materials. Perhaps these studies would point the way to other inquiries, and perhaps eventually a national commission might be assembled to consider questions related to public policy. The Institute for Educational Development was invited to submit suggestions and budgets and eventually was granted support for the conduct of the two studies.

Phase I: March-October, 1967: Initiation of the Project

The study of research and development in the educational materials industries was officially begun in March, 1967. At that time IED prepared a memorandum for the sponsoring foundations describing the subject of the study, outlining IED's approach and detailing a budget for the project. The project was then scheduled for completion by January, 1968.

A preliminary series of interviews was held in April and May with those who had attended the foundation-sponsored meeting in January. From these initial interviews it was expected that information would be obtained which would be useful in constructing an interview schedule, and perhaps in gaining an overview of the problems and boundaries of the inquiry. Those who participated in these initial interviews were asked to recommend persons to be interviewed in the more formal phase of the study which was to follow.

Recruitment of the consultants and the staff for the study team was completed by August, 1967. In July and August, the methodological consultant and the study team began constructing drafts of interview protocols to guide the questioning of the company executives. Interviewing of materials producers began in September and continued throughout October.

Phase II: November, 1967-February, 1968: Data Collection and the First Report

The decision to rely primarily upon interview methods for data collection was reached very early in the study, and from the first consideration of the subject it was clear to IED's staff that data-gathering would entail formidable problems.

Current information on industrial research and development practices related to proprietary products was known to be confined almost wholly within individual companies. Presumably some of the most valuable information would deal with policies and decisions and would be known in an authoritative way only to people at policy and decision levels, that is, to executives.

A few, outside consultants probably would have important information, but in practically every case these people would be bound tightly by non-disclosure contracts, if not by ethical constraints. Here and there perhaps an ex-officer, retired or relocated, would know how things used to be in his former company. But to extract a lot of information from many companies appeared to mean direct approaches aimed at winning cooperation from people inside the corporations.

Documentary sources were found to contain precious little information on this subject, which many companies treat as a highly classified area. The connection between future products and future earnings is all too close and vital to firms in highly competitive industries to permit looseness with information on those activities from which new products and "lead time" are derived. Moreover, in a business dependent upon educators as customers every company

would have reason to fear hostile or biased judgments upon the character or sufficiency of its research and development.

Yet without the suggestions and encouragement of leading materials producers the inquiry might never have been initiated. And their full backing for the purposes of the study had been pledged.

In view of such considerations, it was decided to ask dozens of companies for cooperation and to give assurances of confidentiality as to sources of information. Open-end interviews would be used and, where necessary, several interviews would be sought at various levels within a single company. That might help also with the problem of getting perspectives in depth on complex companies.

Thus, during the second phase of the study, the interviewing of publishers which had begun in the early fall continued.

Companies were classified by industries, and interviewing was planned one industry at a time. Publishing was treated as one industry, although within that industry many types of companies had been identified. The second industrial group consisted of about a dozen major corporations all of which had entered the educational materials field through recent acquisition of established materials producers or through formation of new subsidiaries. A third industry group was described as independent producers of audiovisual equipment. A few audiovisual equipment subsidiaries of major corporations were also represented in the third group. Most of the interviewing was conducted during this phase of the study. Two persons were added to the project staff to assist with interviewing and report writing. The interview format underwent revisions

corresponding to the classes of respondents. Additional questions, for example, were included to accommodate the special characteristics of the major corporations, and other questions originally designed for interviews with publishers were deleted or modified.

In accordance with expectations there was a great deal of variation among the interviews. These were conducted by five staff members who operated usually in teams of two. The interviewers differed in age, experience, style and in the extent to which they could maintain a certain amount of control of the interview situation. The interviewers were not instructed to abide strictly by the prepared interview guide; they were urged instead to cover as much of it as possible under open-end circumstances and within the time made available to them by busy executives.

The respondents also varied in style. Those interviewed ranged from corporation presidents to middle managers in specific departments with production responsibilities. The respondents varied in the amount of knowledge they had and/or were willing to impart about the research and development activities of their companies. There was also a wide range of variation in their level of sophistication with regard to research and development processes.

Interviews varied in length from twenty minutes to three hours. In nearly every situation the respondents proved cooperative and showed serious interest. In a few cases it seemed to the interviewers that they were not speaking with the most appropriate person in a particular company, and for that reason and also to gain more than one perspective, several interviews were arranged in numerous companies.

The interview guides had been planned and constructed by the consultants. They began with broad questions designed to gain rapport, minimize defensiveness, and give the respondent an opportunity to organize his replies.

The format was as follows:

A. General questions related to research and development practices in the industry as a whole, e.g., how product needs are established, products developed, field-tested, and evaluated; difficulties encountered in conducting research and development; perceptions of the responsibilities of producers, the federal government, foundations, the educational and academic communities.

B. Questions concerning specific practices of the producer interviewed, e.g., how a given producer deviates from the general practices, and where he feels his company's strengths and weaknesses lie.

C. Questions concerning trends in the industry, and more specifically, trends in research and development, e.g.: The interviewee's perceptions of the effects of acquisitions and mergers on both independent companies and acquired companies; his perceptions of the effects of increased federal funds, and his opinions about trends in teacher training and about changes in

attitudes toward innovation and research and development on the part of parents and teachers.

D. Specific questions about the costs of research and development and obstacles to research and development, e.g., budget and staff allocations for research and development.

Despite this format, the interviewing process actually proceeded in somewhat unsystematic ways. A description in reportorial format was the object of the process. The transcripts of the interviews were necessarily impressionistic and often were not organized so as to permit direct and strict comparisons among responses. The extreme variability in the open-end interview situations and in responses given made systematic analysis of the transcripts difficult.

Notwithstanding such difficulties analysis of interview data proceeded according to plan. Responses in the first round of interviews of major corporations and their subsidiaries or divisions and non-book materials producers were initially analyzed by question. Questions which treated the same general theme were then grouped together, and the key questions which defined characteristic patterns of responses for that theme were identified. Responses on these questions were then combined into indices for each company along each theme. Three major dimensions which were identified were: (1) perceptions of what constitutes research and development for the company or industry, (2) the actual practices and procedures which constitute the research and development process for the company, (3) perceptions of the company's role in the educational process.

Intragroup and intergroup comparisons among the different categories of respondents could then be made on the basis of these indices.

The defining questions for each of the dimensions are listed below.

A. Perception of Research and Development

Can you define research and development as it is understood in the learning industry?

What is your model for research and development?

What procedures or methods would you include in a model of research and development?

B. Research and Development Practices

What are the relationships between divisions (or subsidiaries) with respect to research and development?

What products, if any, are excluded from research and development? Why?

Is there a difference between research and development practices for different kinds of products? Between software and hardware?

What percentage of your budget is allocated to research and development? For educational products exclusively? For multi-purpose products which may be adapted for educational use?

What percent of your staff is involved in research and development?

Do you hire consultants to work on research and development?

Do you make use of the research and development of your suppliers?

C. Perceptions of Role in Educational Process:

Are you involved in teacher training? Will you become involved? Where does the responsibility lie for: (1) research and development for instructional

materials; (2) estimating the future needs of education; (3) product testing; (4) teacher training; (5) developing educational objectives; (6) introducing innovative materials?

The models of research and development were analyzed in terms of seven dimensions: level of abstraction of components, generality of application, source mode, comprehensiveness, dynamism, and complexity of the process described in terms of number of components and kinds of components.

Quantitative measures of research and development practices obtained from the interviews were assessed by their proportionate and absolute percentages of total resource allocation for research and development in those cases in which information was available for making such comparisons.

Qualitative assessments about research and development practices were made in terms of analytical schema of styles and orientations.

Role in the educational process was judged by relative activity-passivity, range, and scope.

All data were arrayed on matrices according to respondent category. This provided the materials on which the descriptions and summary comparisons were based.

A second information-gathering device was employed in this phase of the study to supplement the interviews with publishers. A document termed a "work paper" was prepared purporting to describe research and development activities among several kinds of educational publishers. The essay was supplemented by a series of ten case studies of the research and development activities connected with actual products. The case studies had been prepared by our consultants and staff and by several persons working in publishing firms.

The work paper was sent to publishers for their comments and corrections. Since the work paper had deliberately been designed to be provocative, it was hoped that the responses to some of the statements would present an accurate view of the publishers' attitudes toward various aspects of research and development activities.

An elaborate scheme was devised to select the publishers to whom the work paper would be sent. In fact, the process of selecting the respondents to the work paper was the most systematic part of the data-gathering activities which comprised the second phase of the study.

In the early fall, the consultants had designed and completed a matrix which categorized 77 publishing companies along four dimension.

On the basis of four dimensions, 13 categories were defined, yielding 108 possible types of companies.

(1) Type of Publishing Activity:

El-hi Texts (elementary to high school)

College Texts

Reference Works (multi-volume encyclopedias only)

Testing Materials

(2) Type of Ownership:

Corporate (independent and public)

Private (privately owned)

Subsidiary (a firm acquired by another firm)

(3) Size:

Large (gross sales greater than $30 million)

Medium (gross sales $5-$30 million)

Small (gross sales less than $5 million)

(4) Style of Activity:

Innovative

Traditional

Follower-Imitative

In instances in which a company carried on multiple activities, e.g., published college texts and tests, the company was rated twice on the assumption that, for the purposes of the study, it had two or more separate departments or divisions which could contribute independent data for the study via the work paper.

Thirty publishers were included in the sample. The sample was stratified by prominent product-type and included 18 school, seven college, three reference, and two standardized test publishers. However, since companies often span more than one category the final sample actually included 24 el-hi, 20 college, 10 reference and four standardized test publishers.

The selection process began in the category containing the fewest number of publishers (tests), and proceeded to that containing the greatest (school). Once a publisher had been chosen, he became ineligible in the following categories if the company happened to span more than one. For each category of publishing activity, the greatest diversity in ownership, size, and style of activity was the prime objective in selecting the sample. Greatest priority was given to style if a decision between size and style or ownership and style was necessary. When a choice had to be made between two or more similar classifications, the one containing the greatest number of publishers was chosen.

From the sample of 30, seven publishers did not return an annotated draft. Of the 23 companies returning copies, seven companies did not provide

any comments or evaluations which in some cases was meant to indicate full approval of the work paper; this left 16 annotated responses.

The work papers were sent out in early December and returned by the beginning of January. The first year of the investigation was drawing to a close. A report on the data which had been collected, including the work paper responses was prepared during January and February, 1968. A total of 65 companies had been contacted during the first and second phases of the inquiry. (See Appendix.) A number of companies had been surveyed by interview and had also received the work paper. A few companies had only received the work paper.

A first report on the study was submitted to the sponsoring organizations in February, 1968. But much of the work of the study remained to be done.

Phase III: March-June, 1968:
Re-examination of the Problem

The period from March through June, 1968 was a time for reassessment and re-examination. The IED staff decided that another attempt would be made to try to fill some of the gaps in our knowledge.

The technique used in this phase of the study was that of roundtable discussion groups. In late March two groups of representatives of materials producing companies met at IED for day-long sessions. The participants were selected to represent a mix of companies and types of products. Questions to guide the discussion were prepared, focusing on defining the roles and appropriate activities of materials producers in the conduct of research and development.

The two sessions were very different in tone, even though there was some overlap among the participants. (See Appendix.) Again the information collected was highly impressionistic and represented different levels of knowledge and sophistication on the part of the participants. A wide range of opinion on the roles and responsibilities of the materials industries was also expressed.

After the roundtable sessions a moratorium was declared on the collection of additional data. It seemed necessary to reexamine the progress of the inquiry to date, without the distractions of the furious activity entailed in data collection. Reflection on and discussion of the data gathered in the first phases led the staff to the decision that the information could be re-worked and presented in a different form, less pretentious and more relevant than the original report. Additional time and money were granted by the sponsoring agencies for review of the data and revisions of the report.

Phase IV: July, 1968 - December, 1968: Conceptualization

Throughout the summer of 1968, an IED team worked on revisions of the report. By October, the plans to review the previously collected data and revise the original report had been discarded. Instead, the decision was to start over again with the generation of a conceptual framework to guide data collection and analysis.

The assumptions which underlay the first three phases of the study were closely related to the orientation and approach of those phases. Thus, since a major change had occurred in orientation and approach, the earlier assumptions could no longer be sustained. Furthermore, difficult definitional problems could not be ignored.

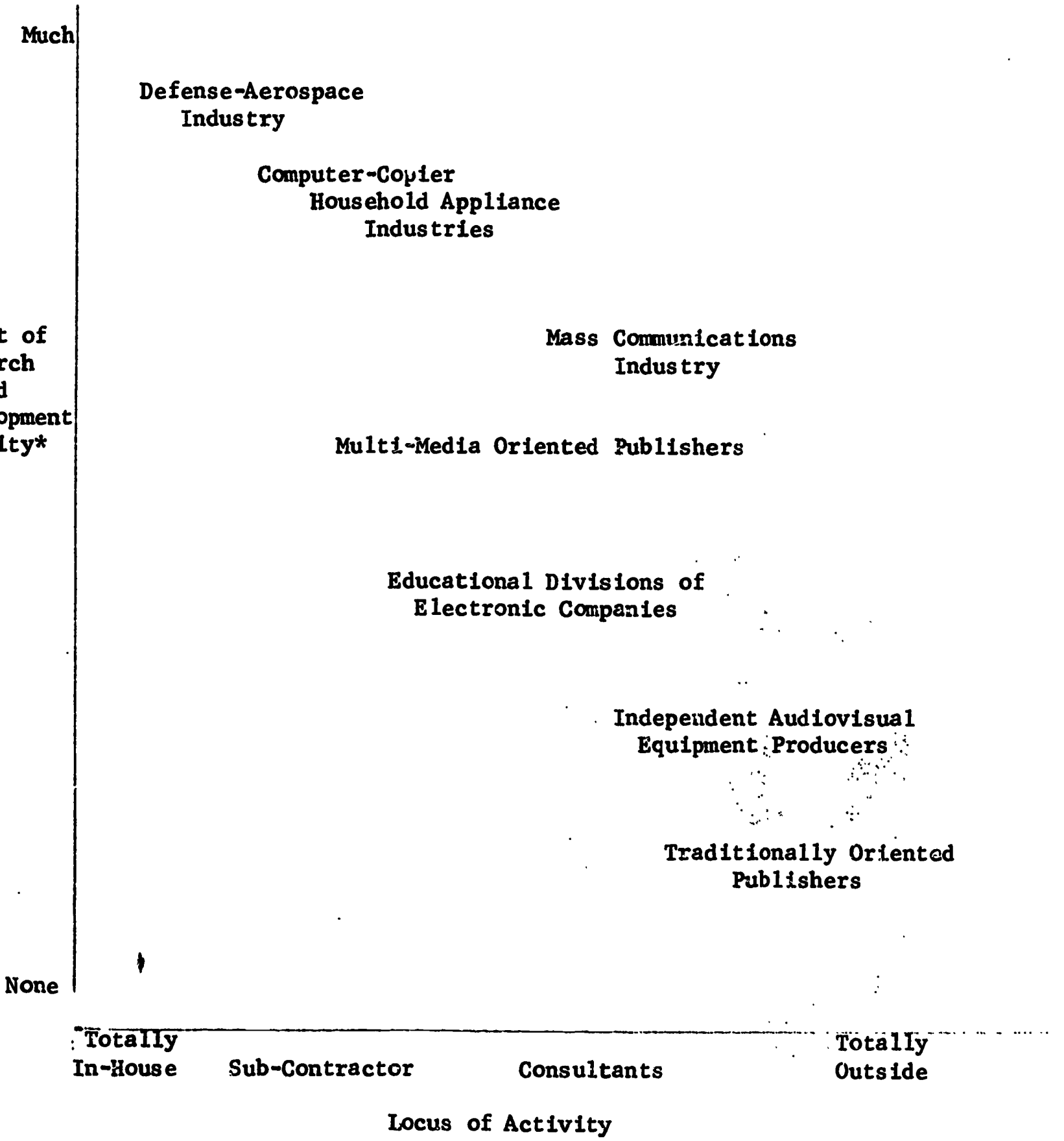
The search for an appropriate conceptual framework started from the earlier attempt to superimpose systematization upon the data in the original report. Figure I, a modification of a diagram from the original report, attempts to illustrate possible distinctions in research and development in eight types of industries, according to locus and amount of activity.

An additional refinement suggesting possible bases for differentiation of research and development styles was added, as shown in Figure II.

In this categorization eight types of research and development are defined according to their scope, time, perspective and approach. The scope of research and development activities may be described as encompassing a total system or a component of a larger system. The time frame in which research and development activities are conducted may either be long or short range. Short range time perspectives are those which have immediate or near-future

FIGURE I

Amounts and Locus of Research and Development Activities in Various Industries



*Measured by percentages of money and manpower allocated for R&D plus model of R&D activities described by respondents.

FIGURE II

A Paradigm of Research and Development Styles

Style	Typical Organizational Environmental	Dominant Characteristics		
		Scope	Time Perspective	Approach
I	R & D Lab	systemic	long range	multi-disciplinary
II	University Lab	systemic	long range	single discipline
III	Large Defense-Aerospace	systemic	short range	multi-disciplinary
IV	Drug Industry	systemic	short range	single discipline
V	Small Defense-Aerospace	component	long range	multi-disciplinary
VI	Federal Government	component	long range	single discipline
VII	Electronics Industry	component	short range	multi-disciplinary
VIII	Local Government	component	short range	single discipline

commercial applications as their objective. Finally, the approach employed in conducting research and development may be single or multi-disciplinary. From these three dimensions, eight possible types have been identified and the typical organizational environment for each specified.

From this hypothetical differentiation of research and development activities among industries, it was a logical next step to begin to define various styles or types of research and development activities within the educational materials industry. A typology of this sort was the major accomplishment of the fourth phase of the study. The various research and development styles extrapolated from the interview data are presented in Figure III. Some characteristics of each type are also included. (This diagram will be discussed in greater detail in Part III of this report.)

FIGURE III

A Paradigm of Research and Development Styles
in the Educational Materials Industries

R & D Style	R & D Objective	Prevalence	Typical Organizational Environment	Time Frame	Costs
I	Product Improvement	Most Prevalent	Publishers (all sizes)	2-3 years	Relatively Low
II	Product Adaptation	Moderately Prevalent	Equipment Producers (all sizes)	6 months-4 years	Varies quite low for hardware; quite high if new software needed
III	Product Initiation	Least Prevalent	Small single idea firm; large mixed media publishers; large diversified corporations	2-10 years	Very high; difficult to calculate

Phase V: January, 1969-June, 1969:
Refinement of Concepts

Merely defining a set of styles of research and development activities which seemed to be appropriate to the educational materials industries did not seem to be a completely satisfactory solution to the problem of conceptualization. What still remained to be explored were the nature of the research and development process itself and the nature of the materials industries and their products. Even approximate answers to these kinds of questions would seem to require the collection of additional data. Both the official time and the available funds for the investigation had long since been exhausted. Nevertheless, those who had been involved most intimately and most continuously in the project contined to search for an elusive second dimension for their categorization scheme, as well as a key to de-mystifying the research and development process.

A fresh and satisfying solution appeared in the early spring of 1969, shortly before it was decided to call an arbitrary halt to the project. The dimension to complete the conceptual scheme is one which differentiates among types of educational materials, according to the locus of control over the range of their application. In Figure IV, several types of instructional materials are located according to this dimension and in hypothesized correlation of this dimension and the dimension of technological complexity. A more complete discussion of the concept of locus of control will be presented in the next part of the report.

Even though the formal phases of this inquiry have been terminated, those who have been involved, particularly in its latter stages, have not ended their work. Now that the conceptual base has been laid, they hope for an opportunity continue the study.

PART II

Summary of Data Gathered in Phases I and II

This section summarizes the data which were gathered from persons employed in the educational materials industries in the course of Phases I and II of the study. The principal method used was the interview. The data are arranged according to the various industries studied.

The data are not strictly comparable, for different interview guides were found to be appropriate for respondents in major corporations with education divisions or subdivisions than for respondents in companies producing non-book educational materials. For the third category of respondents, textbook publishers, a less structured interviewing form was employed and an additional instrument was used.

To simplify presentation, the responses to the interview questions set forth in Part I have been concentrated into three general categories: (1) perceptions of the research and development process; (2) research and development activities carried on in the companies;* (3) and perceptions of industry's role in the educational process.

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*In this study we are concerned with research and development activities carried on by educational materials producers to achieve <u>educational goals</u> rather than engineering or production goals.

Textbook Publishers

Despite the phenomena described and the trends noted in the preceding section, textbooks remain the principal instructional tool in American classrooms today. Hence, any examination of research and development practices in the educational materials industry must begin with a presentation of book publishers' perceptions of what constitutes research and development in their industry.

From both the work paper respondents' comments and the responses to the unstructured interviews in the first stage of the study, it is possible to describe some attributes of educational publishers' research and development practices.

The educational publishers in our sample all seem to agree that what constitutes research and development in the production of textbooks is not either formally or substantively the same kind of research and development which is used in the defense-aerospace industry. Although we were extremely careful not to introduce a particular conception of research and development into the interviews and the work paper, many respondents in all parts of the educational materials industry spontaneously took the conception of research and development associated with the defense-aerospace industry as their frame of reference and point of departure.

The kinds of practices described as comprising research and development activities by particular company respondents seemed to be associated with and

differ according to the kinds of materials which they produced. Thus, for college texts, most respondents indicated that they relied upon whatever research the author himself had done prior to writing, that in fact, production of a college text involved mainly editorial work and manufacturing. As far as post-publication research, testing, and validation of materials, the publishers in our sample did not feel that this was relevant at the college level. For college materials, then, the publishers in our sample seemed to feel that there was no necessity for them to undertake research and that "this was not their function." They seemed to agree that the reputation of the author or authors was more important to their market than whether or not the publishing house had done any research in that area or had tested the materials in classrooms.

In the case of elementary and high school text preparation, the picture becomes somewhat more complicated. Respondents both in the interviews and on the work paper noted that different practices were sometimes employed, even within the same company, depending upon the subject matter and other characteristics of the book in question. Also, in the case of elementary and high school text publication, there was little consensus on what constituted research and development and whose responsibility it was.

A few publishers felt that it was a part of their function to undertake or support basic research in learning theory and a few others also felt that their staff members should keep abreast of current research and attempt to incorporate its relevant findings into new materials. On the part of those publishers who felt that more research and development was necessary at the

elementary and high school levels, the most emphasis was placed on field-testing of materials. A number of companies indicated that they included this in their research and development activities. There were differences of opinion on whether or not this was an important factor in the market success of a product. Many of our respondents felt that teachers were not interested in testing or validation claims, while there were a few who thought that this could be a positive feature depending upon the age and schooling of the teachers and the attitudes of parents in the area in which they taught.

In comments on the work paper, a number of publishers especially noted that one must make distinctions between the subject matter of the textbook when talking about research and development activities. For they felt that teaching and learning in some subject areas is more easily tested and the influence of materials in those areas is more easily ascertained. In terms of pre-publication research activities, many publishers in our sample noted that the prevalence of study groups both outside and within publishing had made some contribution, but that consultants and in-house experts still continue to be the primary source of research on a specific topic.

Reference books and standardized tests were the other major categories of materials with which the study was concerned. Test publishers, many of whose staff members are professional psychologists by training, have a highly structured and sophisticated psychometric model for research and for testing and validation. For these reasons some of our respondents who were essentially test publishers protested the inclusion of their organizations in the study.

Publishers of reference books presented several different patterns. Indeed, consideration of the research and development activities which characterize reference book producers was one of the relatively few occasions in the study at which there seemed to be a direct and strong correlation between the reputed orientation of the publisher and the number and kinds of activities he cited as comprising research and development.

In addition to describing the practices which comprise research and development in their companies, responses gleaned from the interviews and the work papers allow us to make some generalizations concerning these publishers' views of their role in the educational process. On the subject of teacher training by publishers, there was a clear split between the large, diversified, innovative publishers and smaller, more traditional publishers. The former tended to have teacher training programs while the latter did not and regarded teacher training as the function solely of teacher training institutions.

A number of the respondents representing large, diversified, and at least partially innovative companies, noted the special function of educational publishers as a bridge. They saw a bridge of research and development between the wants of their customers in the schools and the products developed in response to those wants. They did not see themselves as doers of research and development leading to innovative materials in a substantive area for the benefit of the schools. However, their opportunities and ability to perform the latter function would seem to be somewhat limited. Many of those interviewed seemed to doubt that educators in general are concerned with research and

development and questioned the desire and willingness of educators to use innovative materials.

A strong business orientation characterized a great many of the answers, although this may be partly due to our respondents' positions in the upper echelons of their organizations. Analyzing the lists of activities which were described as components of the research and development process for different kinds of materials, one may detect without probing deeply, a strong feeling among publishers that only those research and development activities that can be translated into immediate sales are really important and properly their responsibility. In sum, much of what comprises research and development in educational publishing may be termed indirect market research.

Until this point, in summarizing the responses of publishers to the work paper and to the interviews, we have not differentiated between companies with different ownership patterns. In fact we found that this was not a defining characteristic for different patterns of response. Subsidiary companies of major corporations exhibit a range of responses similar to those of privately and corporately owned companies. There are small, medium and large companies of each ownership type with innovative and traditional orientations. In other words, responses have tended to cluster primarily according to product type.

Despite the fact that one or two of the companies with the largest resource bases had ventured into formal pre-publication research efforts, it does not appear that the major portion of the educational publishing

industry, if our sample can be taken as representative, has or intends to alter its basic patterns of research and development activities in the near future, even given the external stimulus of federal funds and expanding federal research programs. With regard to the latter, most respondents both to the work paper and to the interviews, either were not well informed about the programs or felt that they would be of relatively little value to educational publishing.

The picture which seems to emerge of research and development in educational publishing is one characterized by some ambivalence. All of the publishers in our sample who seemed to regard research and development in the "defense-aerospace" sense as having positive value recognized that they were not and did not intend to do this kind of research and development and questioned its appropriateness to their work.

Educational publishing had evolved its own "rules of the game," they felt, and with one or two exceptions was not likely to undertake major modifications in its production practices unless it proved to itself that it was more profitable to do so or less profitable not to do so.

The handful of companies which deviate from this model typically are either very small and specialized or very large and diversified. Indeed, one of the atypical companies had itself acquired three other educational products firms in the past year. On the one hand the small specialized firms with a reputation for expertise in one field have more latitude for experimentation without fear of losing sales. On the other, large and expanding companies have sufficient resources and diversity to take risks in areas such as research and

development which may itself be innovative or be related to "innovative" products.

Producers of Non-Book Materials

A second category included in our study were those who produced educational materials other than books. These materials include film projectors and film strips, overhead projectors and transparencies, multi-media packages and instructional systems, as well as manipulative devices and some supplementary printed materials.

Executives of 17 companies were interviewed by staff members during the course of the study. All but six of these producers, or about 65% of the sample, are either divisions or subsidiaries of corporations. Five are subsidiaries or divisions of publishing companies; two major publishing firms, included in the previous discussion, are parent companies for four of them (owning two each); the other is part of a corporation not otherwise included in the study. Four of the non-book materials producers are divisions or subsidiaries of electronics firms, two of which manufacture photographic equipment, and two of which manufacture other electronic equipment. Two other companies are subsidiaries or divisions of firms involved in other aspects of mass communications.

Since these interviews were much more structured and more systematic than the initial interviews with publishers, it is possible to examine the responses somewhat less impressionistically than was the case in the former section. Although every question was not asked of every respondent, patterns are discernible and categories of responses can be defined.

Three general aspects of the postures of these companies toward re-

search and development have been defined: (1) their perceptions of what activities constitute research and development for their industry; (2) their specific research and development practices; and (3) their perceptions of their role in the educational process.

Unlike the publishers previously described, the responses do tend to cluster not only according to whether a producer is a subsidiary or division of a corporation, but also according to the dominant product or activity of the parent company. In other words, not only do "independents" manifest different response patterns from subsidiaries, but subsidiaries of publishers tend to differ from subsidiaries of electronics firms.

The research and development orientations and activities of "independent," non-book producers are the least complex and easiest to characterize. Four of the six acknowledged that there was no such thing as research and development in their industry. Interestingly, these respondents, too, seemed to have the "defense-aerospace" model of what constituted research and development as their frame of reference. But, they tended to be more straightforward about not employing it, even though it might have seemed more appropriate to the kinds of materials they produced than to textbooks.

The two other independent producers referred to some sort of market research either formal or informal at some stage of materials development as a component of research and development, although only one of these respondents indicated that his company did any of this. Only one respondent of this group mentioned field-testing. The most common response from this group concerning their perceptions and practices of research and development was, "There is none; we use intuition and decide what we think will sell." Not

surprisingly, this group does not claim for itself, nor seem to believe that it should have, a role in the educational process other than providing equipment, based on principles developed in other contexts, which its salesmen or clients tell them will be profitable.

Of the five non-book materials producers who are subsidiaries or divisions of publishing companies, four represent variations on a theme and one is a deviant case not only in terms of this group but in terms of the study as a whole. The four which are representative of different degrees of a single theme may be seen as a link between the aforementioned "independents" and the subsidiaries of electronics and mass communications corporations. At one end of the chain linking these groups, a publishing subsidiary, of a company not otherwise included in the study, is quite closely akin to the independents according to self-described practices of research and development.

The other three companies which are publishing subsidiaries may be divided according to the orientations of their parent company. Those two which belong to a large, growing, diversified company which has a traditional orientation, for the most part, tend to have a traditional orientation, too. They describe research and development activities as "hiring reputable consultants," and this is what they indicate they do. One publishing subsidiary of a major, diversified corporation with a more innovative orientation and a less restrictive definition of research and development includes some evaluation and field-testing among its repertory of activities. These four companies are similar, though, in disclaiming any other than a supplier role in the educational process.

One non-book materials producer has been noted as a deviant case. Not only was a complete and sophisticated model of research and development described by the interviewee, but illustrations were presented which demonstrated that this was, in fact, the process which the company used. Although focusing on components rather than systems, evidence was presented that the company did fundamental research in the scientific sense as well as research into ways of applying these results to specific products and extensive field-testing and validation of materials. Further, this company also seemed to have a less passive view of its role in the educational process, seeing its function as that of bringing the most satisfactory new techniques to the classroom through its products.

The four electronics company subsidiaries seemed to be very much customer-oriented. They were similar in emphasizing feedback from clients as a prime component of what they considered to be research and development. They all stated that they made use of any research which their parent company may have done to make what they considered a better product. They indicated that their criteria were not necessarily the same as those professional educators would use to evaluate products. They perceived their clientele as being interested in price and practicality, in that order. And they tended to share the view of the independents that they were merely materials suppliers with no intrinsic role in the educational process.

The two companies which are subsidiaries or divisions of corporations involved in mass media seemed to have similar practices and general views of their role in the educational process, but they differ sharply with regard

to the models which underline their definitions and with regard to their aspirations. One, associated with a small communications firm, is satisfied with its present "clientele orientation" and its relatively unstructured system of "getting feedback from the external world." The spokesman for the other, a subsidiary of a major communications corporation, and before its acquisition a successful company in its own right, expressed frustration at not being able to call upon his parent company's resources in order to do more in the way of research. He expressed a desire to do pre-production research rather than wait and see what was selling as a guide to future production. Yet, despite the differing orientations, both companies actually perform similar activities under the label research and development. Also, both agree that their role is not one of basic innovation in education unless the educational establishment sets new objectives and asks for specific products to implement those objectives. If teacher training practices may be taken as a crude index of the kind of involvement these companies have in education, 14 of the respondents said that their companies did some teacher training, but primarily as product promotion.

The non-book educational materials producers as a group seem to be very much sales-oriented. Some individuals in a few of the companies expressed a wish that they could do more in the way of research; but, on the whole, these companies and those who lead them appear to be relatively satisfied with their role and do not seem likely to change their present practices. They do admit, however, that research and development patterns in their field are changing rapidly.

Corporate Giants

Ten major corporations were included in our study: Columbia Broadcasting System, Inc, Cowles Communications Inc., General Learning Corporation, General Telephone and Electronics Corporation, International Business Machines Corporation, Litton Industries, Inc., Raytheon Company, Radio Corporation of America, Westinghouse Electric Corporation, and Xerox Corporation. In addition to 11 interviews with executives of the ten parent companies, officers of 12 subsidiaries or divisions producing educational materials were interviewed, for a total of 23 interviews summarized hereafter. Seven of the divisions or subsidiaries were also included in the summaries presented in previous sections, six among the publishers, and one in the section on non-book materials producers.

In analyzing the responses, comparisons can be made: (1) among the parent companies; (2) between parent companies and their divisions and subsidiaries; and (3) among subsidiaries and divisions.

Concerning perceptions of what constitutes the research and development process, major corporation representatives, in general, presented more sophisticated, better articulated, and more detailed models of research and development than any other group in the study. This is not surprising given the dominant activities of the major corporations involved, many of whom were "defense-aerospace" industries, only recently part of the educational materials industry through their divisions or subsidiaries. The perceptions of what constitutes research and development for mass communications corporations were less likely to adhere to the "defense-aerospace" models than were those of companies manufacturing, for example, household products or office equipment.

Comparing the perceptions of research and development presented by the parent company with those presented by divisions or subsidiaries, it was found that the kind of organizational relationship of the division or subsidiary to the parent company was a characteristic differentiating patterns of responses. Sub-units of major corporations which are divisions of a parent company and an integral part of it have perceptions of what constitutes research and development which are quite close to those of the parent company. Subsidiaries which have been acquired by the parent company and were independent concerns prior to their acquisition tend to have perceptions of research and development activities markedly discrepant to those of the parent companies.

Among the subsidiaries and divisions themselves the same breakdown holds true. Divisions of the major corporations tend to have different perceptions of research and development from those of acquired subsidiaries of major corporations. These differences among the kinds of perceptions which the various groups have of research and development concern both the range of activities they include in research and how and under whose auspices they were performed.

The descriptions of actual research and development activities given by major corporation respondents corresponded in very few instances to the elaborate models they had introduced. In fact, only three educational materials divisions seemed likely to be able to approximate the models in the near future. It is difficult to describe their actual practices since none of them at that time had produced a product available on the market.

Research and development activities within major corporations cover a wide range. The computer and copying machine manufacturers, for example, seem to be at one end of a continuum with regard to the commitment of resources (in both a proportionate and absolute sense) to research and development specifically for educational materials. Other companies may spend more and devote more man-hours to research and development for other kinds of products, which may incidentally have educational ramifications and potential educational use, but that work is not specifically geared to educational materials production.

Another distinction to be noted, in further complication of the picture of research and development activities within these companies and their divisions, is that the patterns of activity may vary for different products. The patterns of activities of subsidiaries are easier to discern but, as has been pointed out, they are not so likely to reflect their parent company's approach or pattern of behavior.

Electronics companies and parent companies in the field of mass communications are less likely to do as much research directly relevant to educational materials or even as much post-production field-testing and evaluation as parent companies involved in manufacturing computers and copying machines. Companies noted for their products in the area of household appliances seem to fall somewhere in between the electronics firms and the computer-copying group.

One of the parent corporations of one of these divisions has a subsidiary also included in the study. That subsidiary's perceptions and

practices of research and development, as indicated both by interview responses and allusions made to it in other interviews, prove to be different, at least at the time of the study, from both those of the parent company and its potentially innovative division, and more like those of other publishing subsidiaries. This example seems to reinforce our generalization regarding parent-sub-unit relationships as a significant differentiating characteristic.

Perception of their role in the educational process is another dimension along which the spokesmen for major corporations, which are relative newcomers to the educational materials industry, differ both from publishing houses and producers of non-book materials. The parent company representatives strongly feel, according to their interview responses, that industry has the primary responsibility for testing and evaluating products before they are on the market as well as for creating innovative products. They tend to agree in general with both publishers and non-book materials producers that educational objectives should be set elsewhere, in the educational community or by parents and teachers together. But corporation spokesmen feel that, in the absence of specified objectives, they have a responsibility to produce what they consider the best materials, according to their own educational philosophies.

As before, responses of sub-units of the major corporations tended to break down according to intra-organizational arrangements, with divisions responding closely to the parent company pattern and publishing subsidiaries appearing to be more similar to each other than to divisions or their parent company.

On other aspects of involvement in the educational process, all of the companies that had produced materials said that they did some "teacher training." These companies, for the most part, tended to be more sanguine about university and government sponsored research efforts; about half of them indicated that they believed this research might ultimately have some use for them. Finally, respondents of the parent companies were more positive than any other category in the study that there would be major changes in the methods by which educational materials were produced in the next few years, and that they would take part in directing those changes.

The patterns of differentiation which have been noted in this section may be at least partially accounted for by examining the interaction of a number of intra-organizational or intra-industry variables. Among the parent corporations, for example, (1) the dominant activity or product through which a corporation attained its strength, plus (2) the characteristics of its leadership, may be salient factors that color its perceptions of research and development, its research and development activities, and its perceptions of its own role in the educational process. If its major activities or products have necessitated that the company build an in-house capability in research, the people in the company tend to consider research as part of the process by which a division of this corporation produces educational materials. If its leadership is strongly research oriented and concerned about field-testing and evaluation, these are likely to be important components of its process.

For subsidiaries, however, as has been noted, the pattern which emerges is quite different. Subsidiaries have been independent, functioning organiza-

tions prior to acquisition. Hence superimposition upon them of the parent company's research and development definition and practices is not an automatic process. Depending upon the subsidiary's self-image, and its pre-acquisition position in the industry, it seems to be more or less able and more or less inclined to resist parent company control, if not in form, at least substantively. A relatively prestigious and financially successful publishing company, for example, is less likely to adopt its parent company's research practices and patterns than an acquired company whose position in its own field is weaker in terms of both reputation and profit.

It seems evident that many of the parent companies had assumed that there would be a close correspondence between their own research perceptions and practices and those of their subsidiaries. Disillusionment with the subsidiaries has set in, in some cases. A number of parent company respondents expressed frustration at this inability to introduce any changes into the acquired companies. Indeed, one parent company attempted to alter the image and behavior of its publishing acquisition by major personnel changes in the upper echelons. Interestingly, from our interviews with the individuals involved it seems that the president, "especially selected" for the subsidiary, after taking office has become a strong proponent of maintaining the company's autonomy within the corporation and of retaining its former identity as well as its "traditional publishing" research and development patterns. Thus, even a change in leadership may not be a means of guaranteeing greater compatibility between parent and subsidiary research and development patterns.

The practice which some other companies have followed of establishing educational materials divisions within the parent company instead of, or in addition to, acquiring subsidiaries has yielded quite a different kind of parent-sub-unit relationship. Parent company control of practices, processes and approaches is more likely to be accepted in divisions which have no history, tradition, or past autonomous identity, and no independent power resources (such as money and prestige) in the present. Thus, if parent companies exercise influence over the recruitment and staffing patterns of every level of the new divisions, it would seem likely that they could assure a division more compatible with the parent company's objectives and practices.

PART III

A Conceptual Scheme for a Study of Research and Development in the Educational Materials Industries

An investigation of the research and development activities in the educational materials industries, or any inquiry, requires a framework to direct the collection of data and to structure its analysis.

The initial insights for our conceptual scheme emerged from the attempt to superimpose an analytical orientation on the interview data which had been collected in the first three phases of the study. This intellectual exercise revealed that fundamental conceptual and definitional problems has not been sufficiently resolved during the data collection phases. The first task was to begin to define the characteristics of research and development, and of research and development in the educational materials industries. The latter proved to be the easier of the two. Extrapolating from the information we had about the materials industries, it was possible to define three major styles of research and development. Figure III presents a summary of these types.

The most prevalent style of research and development in the educational materials industries seemed to be that of product improvement. This style and the activities which comprised it seemed to be most characteristic of publishing houses, though other materials producers also engaged in these activities. Basically, product improvement involves obtaining feedback on existing products, incorporating new materials or equipment, or reorganzing existing

materials or equipment to produce an "improved" product. This style may also include "field-testing" or market research on the new and/or the old products. Each of these activities may be conducted with varying degrees of rigor. Some companies may have extensive networks of testing schools and large and experienced staffs to conduct these activities. Other, smaller companies may rely on the "expert opinions" of a few salesmen. However, product improvement is likely not to be extremely time consuming, its costs and potential payoffs can be projected, and it is a relatively low risk procedure for highly competitive companies.

Product adaptation is also a frequently encountered mode of research and development activities in the educational materials industries. Equipment manufacturers and corporations in the fields of electronics, photography, communications, and information processing have made extensive use of this style of research and development in entering the educational materials market. The product adaptation model implies the modification of already developed equipment originally intended for other uses.

A wide range of time spans and costs may characterize product adaptation. Depending largely upon the kind of product and the degree of modification necessary to make it suitable to school use, product adaptation may take little time and cost little or it may take a great deal of time and have high costs. Product adaptation is also a much more risky venture than product improvement. Even if the companies have supported market research studies, there is the possibility that the size and scope of the market may have been overestimated. Product adaptation will also take longer and cost more if the equipment adapted

requires the development of new software materials in order to be used.

The third style of research and development activities discerned in the educational materials industries has as its objective the development of completely new products. Product initiation involves the longest time frame, has the highest costs, and is the riskiest of the three styles which have been defined. Product initiation does not mean, of course, that a company starts completely anew, and may result from an imaginative arrangement of existing components to produce a new system along with development of new components.

All three styles can be performed either in-house or by outside consultants. Product adaptation is most likely to occur in-house, however. All three can be either multi-disciplinary or focus on a single discipline, and all three can be oriented to a component or to an entire system. Thus, these three styles, which define types of research and development activities within an industry according to objectives, differ from the typology presented in Figure II (page 25) which defines research and development styles among various industries on the basis of time, approach and focus.

Product initiation activities are more likely to occur in very small companies or in very large diversified companies. Since these activities tend to be risky, long-range, and expensive, they require an organizational environment with sufficient slack to tolerate activities unlikely to have immediate payoffs. In other words the companies have to be able to sustain failures. Large diversified companies usually satisfy these requirements. In these companies the kinds of products and the inclinations and orientations of top

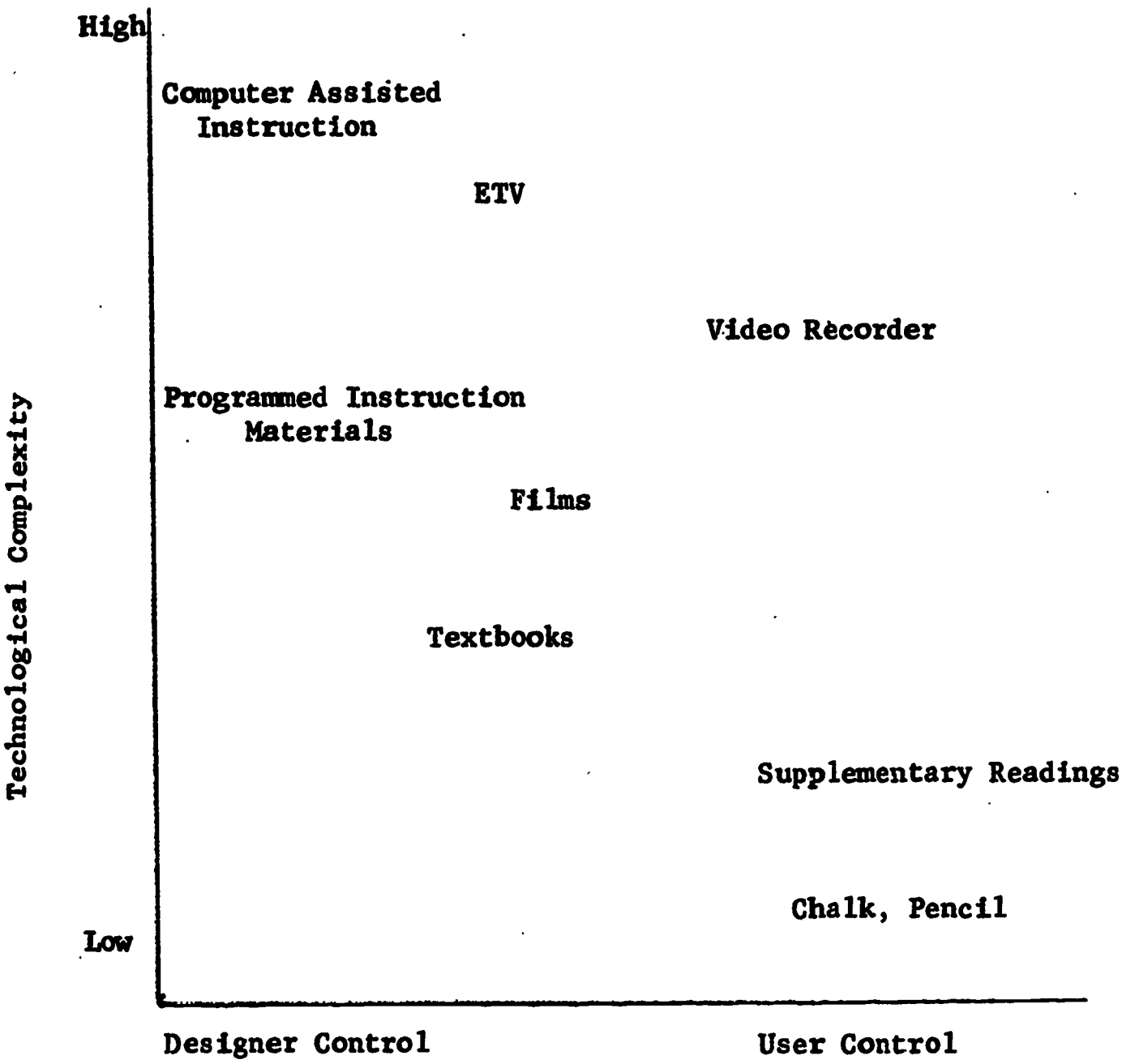
management will probably influence which research and development style is employed. Obviously, most companies, if they have more than one product line, are likely to have mixed patterns of research and development styles.

Small companies, with a single product line, are also possible environments for product initiation. However, such companies need sufficient working capital based on a guaranteed market in order to generate the slack necessary for product initiation. Another possibility for companies of all sizes is that of serendipitous innovation which produces new products. However, this happens relatively infrequently and it is hardly prudent for a competitive company to depend upon serendipity as the basis of its research and development style.

From the discussion of types of research and development activities which seem to characterize the educational materials industries (this paradigm has already been found to have applicability outside the educational materials industries), it appears that the type of product is an important factor influencing the research and development style of a particular company. In fact, type of product was the first basis of differentiation used to distinguish among research and development styles. In the last phase of the investigation, attention was again focused on kinds of products, but at a higher level of abstraction than in the previous phases of the inquiry. Figure IV shows two dimensions which are considered significant bases for differentiation among various types of educational materials.

FIGURE IV

A Two Dimensional Scheme for Differentiation of Instructional Materials



The dimension of technological complexity seems to be self-explanatory. Selected types of instructional materials are arrayed along it. Programmed instruction materials are placed near the middle of the continuum of technological complexity because they require extensive field-testing and revision.

The second dimension of the scheme of Figure IV is that of locus of control. This dimension applies to the distinctions which can be made concerning the amount of latitude available to the user in defining the use of the substance or materials. Another way of expressing this distinction is in terms of how much uniformity or diversity is permissible in its use or how much the materials per se structure the teaching-learning situation. It seemed that this was a crucial dimension along which to differentiate instructional materials, since it may help to define the level of education output which might be expected as a result of the use of the various types of materials.

Several types of materials are arrayed in two dimensional space according to technological complexity and locus of control in Figure IV. These spatial arrangements are meant to be suggestive rather than authoritative and indicate the general plan of the schema.

Figure V represents the synthesis of the conceptualizations relating to styles of research and development activities within the educational materials industries and the conceptualization of types of instructional materials. Various examples of specific materials are placed in what are considered appropriate categories.

FIGURE V

Selected Instructional Materials Differentiated by
Research and Development Styles and Locus of Control

R & D
Styles

Product Improvement	Textbooks	Films	Supplementary Readings
Product Adaptation	CAI Language Labs	ETV	Video Recorder
Product Initiation	Individually Programmed Instruction		
	Designer Control	Teacher Control	User Control

Locus of Control

Although the third dimension, technological complexity, is not represented in Figure V, it is involved in the formulation which seems to emerge from these exercises in conceptualization. It would appear that issues related to the nature of the research and development activities conducted by educational materials producers were not salient prior to the relatively recent attempts to apply technology to education through the medium of instructional materials. One likely reason that these issues were not raised in any important way was that instructional materials which antedate the "discovery" of technology were primarily user controlled rather than designer controlled. Since there appears to be some correlation between the technological complexity of materials and control by the designer, programmer or writer, questions such as the premises on which the designer, programmer, or writer has based the materials assume some real social significance.

PART IV

Conclusions and Recommendations

At the end of Phase II of the study, in February, 1968, a report was presented to the sponsoring foundations. In his preface IED's President Wessell underlined the limitations of the project to that point:

> "From the moment of its conception the study was looked upon as a beginning: in the sense, first of all, that serious inquiry on this subject had not been attempted previously; and then in the hopeful sense that other investigations and practitioners would soon expand and improve our work. In explaining their ideas in early conversations, officials of the sponsoring foundations said they hoped this could serve as a <u>baseline</u> study.
>
> "So be it. Much remains to be done to gain understanding of the practicing arts and sciences known as research and development, and few directions for inquiry offer more promising prospects for improving education. We would like to emphasize that this is only an initial probe into a large and rapidly changing field of human activity."

Ten conclusions were cited in that report. Soon thereafter IED asked the foundations for an extension of time and for a small amount of additional funds to permit revision of the report. Despite IED's own dissatisfactions with the work of the study to that date, a Summary of Major Conclusions, as it appeared in that early report, is found still to be relevant and is presented as follows:

1. There is no monolithic pattern or uniform set of practices characterizing research and development in the educational materials industries.
2. Regardless of the kinds of materials he makes, or of his own R & D practices, the educational producer tends to think of the defense-aerospace model as representing genuine research and development.
3. Despite the clarity of this model in minds of materials producers, they have great difficulty in defining what constitutes research and development within each of their own industries.
4. Most of what constitutes research and development in the educational materials industries is either formal or informal market research.
5. Publishers' concepts of what constitutes research and development vary with the type of book, the nature of the organization, and sometimes with the course or subject. College books receive the least research and development effort on the part of the publisher, and tests and reference books the most.
6. For non-book materials producers the most important factors affecting their practices are: whether they are "independent" or subsidiaries; and, in the latter case, what kind of company their parent is.
7. Major corporations have not transferred parent models and styles of research and development to acquired subsidiaries; divisions formed within major corporations are more likely to follow parent company patterns.
8. With very few exceptions, company officials' perceptions of their role in the educational enterprise are quite limited and relatively passive.
9. Restricted and passive role perceptions seem to limit the possibilities that the educational materials industries will act as a mechanism for the diffusion of technological innovation into formal education.
10. The absence of agreement on educational goals is a key dilemma for the materials industries as well as for their clientele.

By the time the study reached Phase III, at the start of its second year, some of the high expectations for educational technology seemed to be lowering. The much heralded experiments, pilot projects, and demonstrations which had been lavishly funded by government, foundations, and private industry in the mid-1960's did not seem to be yielding the predicted results. Government spending for educational materials had been curtailed, the rage for acquisition had cooled, and venture capital for new materials producing enterprises was increasingly difficult to obtain. In this changed environment it was easier to look realistically and analytically at the educational materials industries than at the outset of the project.

The descriptions in this report of IED's activities and of the conceptual framework which was ultimately developed may not reflect the degree of difficulty involved in making the transition between orientations and approaches. Similarly, the amount of time and effort involved in generating an analytical model may not be adequately depicted. The third and fourth phases of the study were particularly trying ones for those at IED involved in the conduct of the inquiry and for the organization as a whole. Yet that was the period which produced the conceptual scheme presented in pages 50-57 and depicted in Figures I-V, which in our opinion are the chief contributions of this study to future investigations in this field.

We conclude that the problems of research into research and development involve some of the most intricate and complex of all social phenomena.

The somewhat less than conclusive results of this study should not deter foundations and other funding agencies from continuing to support research

into these subject areas. Quite the contrary. The principal utility of this inquiry for those outside IED may lie in the recognition, and for some the discovery, of how much is not known about the basic components of processes such as research and development; how much is taken for granted; and how much fundamental investigation remains to be done.

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APPENDIX A

Companies Participating in Phases I and II of IED Project on

Research and Development in the Educational Materials Industries

Addison-Wesley Publishing Company **

American Book Company **

Appleton-Century-Crofts

Bell & Howell Company

Benziger Brothers, Inc. *

Bobbs-Merrill Company, Inc. *

Cambosco Scientific Company, Inc.

Columbia Broadcasting System, Inc.

Cowles Communications, Inc. *

Cowles Education Corporation *

Crowell-Collier & Macmillan, Inc. **

Creative Playthings

Curtis Publishing Company and Curtis Audiovisual Materials

Doubleday & Company, Inc. *

Educational Development Laboratories, Inc.

Educational Testing Service *

Fairchild Industrial Products

Follett Publishing Company *

General Electronic Laboratories, Inc.

General Learning Corporation

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* Work paper only
** Work paper and interview

General Telephone and Electronics Corporation

Ginn & Company

Grolier Education Corporation **

Harcourt, Brace & World, Inc.

Harper & Row, Publishers *

D. C. Heath & Company

Hickok Teaching System, Inc.

Holt, Rinehart & Winston, Inc.

Houghton Mifflin Company **

Instructo Corporation

International Business Machines Corporation

J. B. Lippincott Company *

Little, Brown and Company *

Litton Industries, Inc.

McGraw-Hill Book Company **

Noble & Noble, Publishers, Inc. *

W. W. Norton & Company, Inc. **

The Odyssey Press, Inc. *

Oxford University Press, Inc. *

Pitman Publishing Corporation *

Potters Photographic Application

Prentice-Hall, Inc. *

Radio Corporation of America

Rand McNally & Company **

Random House, Inc. **

---

* Work paper only
** Work paper and interview

Raytheon Education Corporation

Reader's Digest Association, Inc.

William H. Sadlier, Inc. *

Schenkman Publishing Co., Inc. *

Scholastic Book Services **

Science Research Associates, Inc. *

Scott, Foresman & Company

Sylvania Electric Products, Inc.

Silver Burdett Company *

Society for Visual Education

South-Western Publishing Company *

Teachers Publishing Corporation

Tecnifax

Text-Film Division (McGraw-Hill Book Company)

Tweedy Transparencies

D. Van Nostrand Co., Inc. *

Westinghouse Learning Corp.

John Wiley & Sons, Inc.

Harold Wilson Corporation

Xerox Corporation *

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* Work paper only
** Work paper and interview

APPENDIX B

Participants in Roundtable Discussions in Phase III

ROUNDTABLE PROGRAM
MARCH 25, 1968

William D. Boutwell
Editor, Vice President
Scholastic Book Services

R. Louis Bright
Associate Commissioner for Research
U. S. Office of Education

William Spaulding
Consultant
Education Division
Houghton Mifflin Company

Lawrence V. Willey, Jr.
Vice President for Development
Science Research Associates, Inc.

ROUNDTABLE PROGRAM
MARCH 27, 1968

Grant M. Bennion
President
Ginn & Company

Lee Deighton
Chairman of the Board
The Macmillan Company

Roger E. Egan
President
The L. W. Singer Company, Inc.

Robert W. Locke
Senior Vice President
McGraw-Hill Book Company

Donald Prince
Vice President & General Manager
Education Division
Rand McNally & Company

Ross D. Sackett
President
Holt, Rinehart & Winston, Inc.

Theodore Waller
President
Grolier Education Corporation

BOTH MARCH 25 and MARCH 27 PROGRAMS

Glen Heathers
Learning Research and Development Center
University of Pittsburgh

Charles Koepke
Departmental Manager, Program Management
Xerox Corporation

George Mathiesen
General Executive
Westinghouse Learning Corporation

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