REPORT TO THE

HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

Administration Of The Science Education Project "Man: A Course Of Study" (MACOS)

National Science Foundation

In this report GAO examines National Science Foundation policies, procedures, and practices for developing, evaluating, and implementing precollege science education projects and their specific application to MACOS. A number of recommendations are made to insure that Foundation officials and recipients of its funds follow sound business practices in administering science education projects.

The Congress may wish to tighten project administrative controls by requiring the Foundation to report on income produced from science education projects which it authorizes its grantees and contractors to use. The Congress could then consider such income when reviewing Foundation appropriation requests.

MWD-76-26 906580 OCT. 14, 1975

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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The Honorable Olin E. Teague
Chairman, Committee on Science and Technology
House of Representatives

H 3500

Dear Mr. Chairman:

In accordance with your March 13, 1975, request, we have reviewed (1) the development, evaluation, and implementation of the National Science Foundation-supported science education project "Man: A Course of Study" and (2) the relationships between the Foundation and the project's developer (Education Development Center, Inc.) and publisher (Curriculum Development Associates, Inc.). As agreed, we obtained the views of the Foundation and the two private firms on our findings and their comments are considered in the report.

As a result of our findings, we are making a number of recommendations to the Foundation's Director to improve the general administration of precollege science education activities. In addition, we are recommending that the Chairman, National Endowment for the Humanities, review the Endowment's authority for a questionable grant it made to the Education Development Center and determine if the funds should be recovered.

We believe the contents of this report would be of interest to committees and to other Members of Congress. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House and Senate Committees on Government Operations not later than 60 days after the date of the report, and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report. We will be in touch with your office in the near future to arrange for distribution of the report to the agencies involved and to the four Committees to set in motion the requirements of section 236.

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Sincerely yours,

Elmer B. Staats

Comptroller General
of the United States

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ABBREVIATIONS

CDA	Curriculum Development Associates, Inc.
EDC	Education Development Center, Inc.
GAO	General Accounting Office
MACOS	"Man: A Course of Study"
OMB	Office of Management and Budget

COMPTROLLER GENERAL'S REPORT
TO THE HOUSE COMMITTEE
ON SCIENCE AND TECHNOLOGY

ADMINISTRATION OF THE
SCIENCE EDUCATION PROJECT
"MAN: A COURSE OF STUDY"
(MACOS)
National Science Foundation

1/ 95

D I G E S T

"Man: A Course of Study," published in 1970, is a social studies course (generally for grade five) developed with National Science Foundation support totaling over $7.4 million.

GAO's study of that project suggests that administration of precollege curriculum projects could be improved to insure that sound business practices are followed by Foundation officials and recipients of project funds.

Some projects produce income, such as royalties, which the Foundation may authorize project grantees or contractors to use, but such earnings and use are not reported to the Congress. The Congress may wish the Foundation to determine the significance of such income, and require a report of receipts and expenditures for use in considering the Foundation's annual appropriation request. (See pp. 44 and 48.)

GAO recommendations to strengthen management of Foundation projects include:

--Ascertaining if a competitive process is feasible and effective for developing educational products. (See pp. 4 and 10.)

--Establishing procedures so that files are documented to show (1) disposition of project evaluators' comments and (2) reasons for supporting or not supporting project implementation proposals. (See pp. 8, 10, 39, and 42.)

--Requiring documentation to support reasons given by grantees or contractors in selecting a publisher to market education materials developed with Foundation support and insuring that publisher interest in marketing such materials is redetermined when

conditions change that could affect publisher selection. (See pp. 22 and 30.)

--Reviewing all contracts and subcontracts for marketing educational materials. (See pp. 25 and 30.)

--Conducting a review of the "Man: A Course of Study" developer's royalty fund transactions, evaluating the review results in considering the need for more frequent audits of the royalty fund, and more closely examining that developer's income reports to help monitor the royalty fund. (See pp. 44, 46, and 48.)

The Foundation has no guidelines for evaluating the effectiveness of educational products it supports or formal procedures for determining any adverse impact on human subjects using the materials. (See pp. 11 and 15.)

The Foundation funded an extensive evaluation of the project before commercial distribution; however, evaluation claims of significant learning gains for children taking the course were questionable because of limitations in the evaluation design. (See p. 11.)

GAO in another study is considering evaluation of Foundation-supported education projects but in the interim recommends that the Foundation's Director:

--Establish procedures for selecting peer reviewers of proposals for curriculum development to insure that views of intended users, such as school administrators and teachers, are obtained. (See p. 10.)

--Review the need for establishing procedures to safeguard human subjects involved in its educational activities. (See p. 17.)

The Foundation agreed with GAO's recommendations. (See pp. 10, 17, 31, 42, 48, and 55.)

GAO identified one questionable transaction between the Foundation and the project developer and another involving the developer, the publisher, and the National Endowment for the Humanities. GAO recommends review of the transactions and necessary adjustments. (See pp. 27, 31, 46, and 48.)

Tear Sheet

CHAPTER 1

INTRODUCTION

Pursuant to a March 13, 1975, request of the Chairman, House Committee on Science and Technology, and subsequent agreements with his office, we reviewed aspects of the development, evaluation, and implementation of the National Science Foundation-supported science curriculum development project "Man: A Course of Study" (MACOS). We considered the:

--Foundation's policies and procedures for (1) developing, evaluating, and implementing science education projects at the precollege level and for (2) disposing of royalty income from the projects.

--Extent of competition involved in the development and marketing of MACOS.

--Propriety of a professional services agreement between the MACOS developer and publisher.

--Determination of the rate for royalty payment to the Foundation resulting from MACOS sales and the disposition of MACOS royalties due the Government, and generally examined the MACOS developer's royalty pool used to account for royalties received from all Foundation-supported science education projects. A financial audit was not performed due to time constraints.

--Foundation's policy concerning endorsing science education materials developed with its support.

--Evaluations of MACOS during development.

--Foundation's policy and procedures for protecting human subjects involved in its science education activities.

--Background data on the MACOS developer and publisher and their relationships to the Foundation.

MACOS is a Foundation-supported social studies course (generally for grade five) developed by the Education

Development Center, Inc. (EDC), 1/ a nonprofit corporation engaged in educational research and development located in Massachusetts. The MACOS materials were published in 1970 and are being disseminated under contract with EDC by Curriculum Development Associates, Inc. (CDA), a commercial corporation for developing and publishing education curriculums, located in Washington, D.C.

MACOS uses studies of selected animal groups and the Netsilik Eskimos--a simple human society--to explore the roots of human social behavior. According to EDC, MACOS emphasizes the biological continuity from animals to humans and the distinctiveness and diversity of the human cultural heritage. Course materials include films, filmstrips, slides, records, booklets, charts, games, and displays. CDA estimated that MACOS materials were being used in about 1,700 schools in 47 States.

The development of MACOS was supported under the National Science Foundation Act of 1950 (42 U.S.C. 1861 et seq.), as amended, which authorized the Foundation to initiate and support (1) basic scientific research and (2) programs to increase research potential through contracts or other forms of assistance, such as grants.

The Foundation's science education activities, administered by its science education directorate, consist primarily of grant and fellowship programs intended to improve education for professional careers in science- and technology-based fields, improve scientific literacy, and increase the efficiency and effectiveness of educational processes. Over the last 10 years (fiscal years 1966-75), these activities have received over $1 billion in funding.

The Foundation identified 53 precollege-level curriculum projects--including MACOS--under the science education activities for which it provided about $196 million in funds during fiscal years 1956-75. EDC received about $4.8 million during fiscal years 1963-70 for developing a social studies curriculum program that eventually evolved into MACOS. Various grantees received over $2.3 million for implementing the materials during fiscal years 1967-75 and about $326,000 for postevaluation of MACOS between 1970, when it was published, and June 30, 1975.

1/Formerly Educational Services Incorporated.

The science education directorate, headed by the Assistant Director for Science Education, consists of the following units.

1. Office of Experimental Projects and Programs--concerned with discovering new methods for improving science education and the testing and evaluation of the methods and with developing and administering highly experimental activities.

2. Division of Pre-College Education in Science--responsible for developing and implementing means to improve science instruction for kindergarten through the 12th grade, raising the Nation's science literacy level, and improving the instructional process.

3. Division of Higher Education--generally the same as precollege division except that it is concerned with post-secondary academic levels and continuing education programs for career scientists and engineers.

The MACOS project is administered by the precollege division, which contains a materials and instruction development section and an instructional improvement implementation section. Within each section program managers are responsible for administering project grants and contracts. We primarily reviewed the policies, procedures, and practices at the precollege level for supporting the development, evaluation, and implementation of science education projects and the application of these policies, procedures, and practices to MACOS.

CHAPTER 2

DEVELOPMENT OF MACOS

Foundation officials identify broad educational needs and express these needs to the education and scientific communities through program announcements. In response to these announcements, unsolicited proposals for projects to meet these needs are submitted to the Foundation. The proposals for product development are received throughout the year and generally do not compete with other proposals.

Product development proposals are usually sent outside the Foundation to peer reviewers, who are requested to review them and comment on their merits. For the MACOS program, however, Foundation officials could not furnish us with documentation showing the disposition of many of the peer reviewers' comments. Also, most peer reviewers were affiliated with colleges and universities and few (3 out of 35) were potential users of the materials, such as elementary school administrators and teachers.

PROCEDURES FOR AWARDING PRECOLLEGE SCIENCE EDUCATION DEVELOPMENT PROJECTS

No formal procedures exist for assessing educational needs. Instead, Foundation officials identify broad needs through informal means, such as conferences, Advisory Committee 1/ meetings, ideas from experts in the field, and internal expertise; through proposals received; and through a variety of projects focused on problem and needs assessment. The broad needs are subsequently expressed to the education and scientific communities by a number of mechanisms, including professional journal articles, books, and project reports or by special announcements and program announcements by the Foundation.

The program announcements for the development of educational materials are circulated to individuals that

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1/The Advisory Committee for Science Education is to provide advice and recommendations concerning education activities to the Director of the Foundation, through the Assistant Director for Science Education. The Committee consists of from 9 to 12 members, who are appointed by the Director for 1-year terms and are normally not reappointed for more than 3 consecutive terms.

request them each year. According to a Foundation official, this is done to keep the number of proposals received to manageable proportions. Approximately 2,000 program announcements for the development of educational materials are distributed yearly. However, other Foundation publications that describe the science education activities and reference the documents that interested persons may request are much more widely distributed.

The announcements are included in the Foundation's guide for preparing proposals and operating projects for materials and instruction development. The announcement guide defines the eligible academic grade levels, organizations, and fields for which the Foundation will accept proposals. These factors have remained basically unchanged over the years.

In the materials and instruction development guide for fiscal year 1975 proposals, (1) projects were to cover grades kindergarten through 12, (2) the eligible organizations generally included colleges and universities on behalf of their staff members and nonprofit organizations, such as professional, scientific, and educational associations or societies; research institutes and laboratories; and education consortia, and (3) the eligible fields included mathematical, physical, biological, medical, engineering, and social sciences and the history and philosophy of science.

The announcement guide also outlines the broad categories the Foundation will consider supporting in awarding projects. These categories have changed as educational needs have changed. Some categories included in the fiscal year 1975 guide were:

--Committee and conference studies designed to identify problems in a given field and to formulate guidelines for the evolution of modern instructional programs.

--Projects to develop models of outside-the-classroom instruction.

--Projects to develop modes of instruction realistically approaching the needs of non-academically-oriented students.

--Projects to develop model courses or course sequences using many types of learning and teaching aids.

The Foundation recognized that these were not the only activities worthy of support, but merely examples of broad categories of activities for which support was appropriate. Also noted in the fiscal year 1975 guide were broad areas, such as developing materials relating science and technology to environmental and societal problems, to which the Foundation would give high-priority consideration.

The precollege materials and instruction development guide is a public indication of the Foundation's areas of interest, but the Foundation does not consider it a solicitation. As a result, proposals received by the Foundation for developing educational materials are generally unsolicited. There is no deadline for the receipt of these proposals, which are received throughout the year and generally do not compete with other proposals. According to a Foundation official, the science education directorate accepts unsolicited proposals because it prefers to identify broad needs and rely on scientific and educational experts to propose specific ways of meeting those needs. This also allows proposers more freedom to develop their own ideas.

When a preliminary proposal for developing educational materials is received, the Foundation determines whether the proposal is potentially supportable. This initial determination is generally made by the Foundation's program managers. If the proposal lacks some basic required information (such as budget data and objectives), it is returned to the proposer for completion; if it does not meet all the basic requirements (such as eligible organizations and fields), the proposer is discouraged from submitting a formal proposal.

Once the proposal is determined by the Foundation as being potentially supportable, it is usually subject to a mail review in which outside peer reviewers are requested to examine it and comment on its merits. The Foundation usually also sends the reviewers a letter noting the factors to be considered in reviewing the proposals. Such factors include scientific merit, the feasibility and effectiveness of the proposed procedures, competency of the investigators, reasonableness of the budget, potential for community impact, and commitment of non-Foundation sources as sponsors. The outside peer reviewers are primarily scientists and educators competent in the fields involved in the proposals.

Upon receiving the reviewers' comments, the Foundation's program staff assesses them and their impact on

a proposal and may negotiate both substantive and financial aspects of the proposal with the proposer. Generally, a summary of pertinent reviewers' comments is provided to the proposer for his consideration. When the proposer and Foundation staff reach agreement, a recommendation for support is prepared. The Foundation makes the final decision as to whether a proposal will be funded.

Proposals that the Foundation's program staff have determined will not be supported may be withdrawn by the proposer. The Foundation provides the opportunity to withdraw based mainly on the proposers' assumption that a denial could be detrimental to them in submitting future proposals. Denied proposals are signed off at the division level after being reviewed and assessed by the program managers and section head of the precollege materials and instruction development section.

Approvals of support require the signature of the Assistant Director for Science Education after the program managers, the section head, and the division director have reviewed and commented on the proposals. Awards involving expenditures of at least $500,000 in a single year or at least $2,000,000 in total must also be approved by the National Science Board. Projects are generally funded annually, and renewals requesting additional support are also usually subject to peer review.

HISTORY OF MACOS DEVELOPMENT

During 1963-69, the Foundation awarded EDC three grants for the development of a Social Studies Curriculum Program. Two of the grants, totaling about $195,000, were for producing a series of anthropological films. The third grant, which was amended 14 times and totaled $4.6 million, included working further on the films and developing curriculum materials for elementary and high school segments of the program. MACOS evolved from the program's elementary segment.

The Social Studies Curriculum Program was conceived at a 1962 conference sponsored by EDC, the American Council of Learned Societies, and the Ford and Sloan Foundations. Conference participants noted that much material taught in social studies and the humanities was primarily history, and they explored possibilities for a substantial curriculum revision in these areas. The program was intended to produce an integrated curriculum in social studies and the humanities for grades kindergarten through 12.

Under the three Foundation grants awarded in 1963, EDC was to produce a series of anthropological films that were to form a central part of six social studies units for grades one to six. In 1965, EDC received additional funding for developing curriculum units for other educational levels.

By the beginning of 1966, the elementary segment evolved into MACOS. A junior high segment, not funded by the Foundation, was to cover Greek and Roman civilization and to contrast 18th-19th century England and America. The work at the senior high level was eventually limited to developing a 10th grade course on the impact of technology and science in 19th century England. The Foundation discontinued support for that course in 1968 because the developer had trouble developing the project materials.

PEER EVALUATION OF EDC'S PROPOSALS FOR FUNDS

In May 1963, EDC submitted to the Foundation a proposal that consolidated four earlier proposals seeking support of film making for its elementary school social science program. Foundation officials obtained peer review comments on the earlier film proposals but not on the consolidated proposal, because most of the information included in the latter proposal had also been presented in the earlier ones. EDC submitted five more proposals to the Foundation as amendments to the consolidated proposal; peer review comments were not obtained on two of them. One authorized EDC to make course materials available to schools; in this instance Foundation officials believed a peer review was unnecessary. The other involved teacher training and evaluation; Foundation officials could not explain why peer review comments were not obtained in this instance.

According to a Foundation official, the Foundation considers all reviewer comments and communicates them to the grantee either in a written summary or by telephone. Concerning EDC's project, most reviewers recommended project approval; several constructive criticisms concerned course content and the evaluation plan. For example, three reviewers commented as follows.

1. "The Eskimo film is also excellent, but the problems of using the Eskimo way of life in grammer school has not been faced. If a unit actually indicated how Eskimos lived including promiscuity and cannibalism, no school board

in the country would allow the material to be presented."

2. "I am less impressed with the expected outcomes of such new curricula. What impact will these courses have on 5th and 10th grades other than the imparting of information on baboons, Eskimos, and Darwin? How will students be different and better for having been exposed to this material?"

3. "The rationale of the evaluation program * * * does not satisfy, especially because it does not specify evaluation in the only terms that make educational sense--in comparison to something."

Foundation records did not indicate, and the program manager did not know, what disposition was made of these and other comments.

Mix of peer reviewers

In total, 35 peer reviewers were selected by the Foundation to comment on the proposals which evolved into the MACOS project. Most of the reviewers, who were from the disciplines of anthropology, education, sociology, social psychology, and economics, were affiliated with colleges and universities. Of the 35, 3 were from potential user groups, such as State education agencies and elementary and secondary schools.

CONCLUSIONS

The Foundation generally receives unsolicited proposals for developing educational materials that do not compete with other proposals. As much competition as practicable should be obtained to promote efficient and economical procurement. The Foundation should review the science education needs to identify specific areas that lend themselves to competitive procedures, such as formal requests for proposals.

The Foundation's program manager for MACOS advised us that all peer review comments were considered; thus, we cannot say that the project would have been any different had the comments been formally considered. However, because peer evaluation is an important part of the Foundation's grant evaluation procedure, we believe that the extent of consideration and ultimate disposition of the peer comments should be documented. The Foundation, in

obtaining peer evaluation of proposed educational materials, should especially obtain the views of the intended users in the educational community.

RECOMMENDATIONS

We recommend that the Director of the Foundation:

--Experiment with using competitive devices, such as formal requests for proposals, to ascertain if a competitive process is feasible and effective for developing educational products.

--Establish procedures to insure that the evaluation and disposition of peer review comments are documented in the project files.

--Establish procedures for selecting peer reviewers to insure that the views of intended users, such as school administrators and teachers, are obtained.

AGENCY COMMENTS

By letter dated September 15, 1975, the Foundation agreed with our recommendations and stated that actions needed to implement them are being taken. (See app. II.)

CHAPTER 3

EVALUATION OF MACOS

Evaluation is the principal way the Foundation, the project group, and the educator can determine whether the completed project has successfully achieved its objective--improving science education. The Foundation has no formal guidelines specifying the types of testing and evaluations to be performed on educational materials developed with its support.

EDC comprehensively evaluated MACOS. Based upon its tests, EDC claimed that students participating in its evaluation program achieved significant learning gains. However, the significance of pre- to post-test gains attributable to MACOS was questionable because of limitations in EDC's evaluation design. Furthermore, a reduction in the sample that could have greatly affected test outcomes was not adequately explained in EDC's evaluation report.

The Foundation has adopted the Department of Health, Education, and Welfare's policy for protecting the rights and welfare of human subjects involved in its supported activities, but it does not apply the policy to its educational activities.

TYPES OF TESTING AND EVALUATIONS OF MACOS

During the initial phases of MACOS development, EDC proposed and conducted evaluations. Using field test results, these evaluations were primarily designed to provide a basis for revising course materials. In school year 1965-66, EDC recorded student and EDC observer reactions to course materials in local classrooms in which MACOS was taught by EDC teachers. In the following school year, 20 teachers not associated with project development used MACOS in their classrooms, and the materials and sequence of presentation were evaluated and about 50 students were interviewed to determine their reactions to the course. Based upon these studies, the course materials were modified.

Further extensive testing of MACOS for revision purposes was conducted during 1967-69. The evaluation consisted of interviews with students and teachers, observation of classroom activities, objective check lists of classroom environments, and objective tests of content and concept learning. Objective data was statistically analyzed and subjective data clinically analyzed. Over 3,000 students from 162 urban

and suburban classrooms 1/ across the country were included in the evaluation. Pre- and post-tests containing multiple choice and open-ended items on information, concepts, and attitudes were administered. In 19 classrooms, 137 students and their teachers were selected for interviews to determine their reactions to the course.

In addition, EDC staff made 109 observations in 29 classrooms to see the course in action and to evaluate teaching styles. Teachers evaluated the course through questionnaires; 70 were returned. In 14 classrooms from 5 school systems, 350 non-MACOS students and 4 of their teachers were observed and interviewed; however, this was done only for 1968-69 and was not used to support the learning gain claims demonstrated by pre-test, post-test results.

SIGNIFICANCE OF LEARNING GAINS

MACOS has two major sections, Man and Other Animals and the Netsilik unit. EDC claimed that, based on its studies of participating students, children taking both sections of the course made significant learning gains. According to a project evaluator, the same students were involved in the pre- and post-testing (using the same test) for the curriculum evaluations. In this connection, among EDC's major findings on Man and Other Animals were that (1) learning gains were not associated with the students' intelligence or previous knowledge in the area and (2) those students with poor academic background, found so often in the inner city, gained in learning and mastery over the ideas and concepts as much as those whose beginning positions were much stronger. These claims were reiterated by CDA, the publisher for MACOS, in its brochure advertising the course. Concerning the Netsilik unit, EDC qualified its claim for students with poor academic background, concluding that test gains were greatest for those students of highest intelligence quotient and least for those of lowest.

Evaluation experts state that, when a one-group, pre-test, post-test design is used, resulting changes cannot be ascribed to the program being evaluated. Thus, attributing significant gains to the project curriculum is questionable because the maturing of the student, differences among teachers, and the "testing" effect (that is, students taking a test for a second time usually do better than those taking it for the first time) may have contributed to the gains.

1/Included 14 school systems in 1967-68 and 6 in 1968-69.

In acknowledging such factors, project evaluators admitted that they had not determined the impact of such effects on their evaluation.

Furthermore, a test standard--that is, an expected level of achievement--had not been established before the field tests. Without such a standard, measuring the relative importance of participants' gains is difficult. As one alternative, a comparison with other students or classes using other social studies curriculums (and related standardized tests which were available) could have partially measured the significance of gains.

Project evaluators stated that, despite such factors as the absence of a control sample, in their judgment statistically significant learning gains were related to the MACOS program. However, because of the lack of evaluation data, tested learning gains realized by the participating students cannot be shown to be the result of the MACOS program. We believe the statistical significance of the learning gains was obvious. For example, our analysis showed that (because of the high numbers of students tested), for a statistically significant learning gain to have occurred, students would have had to increase their pre-test scores only by less than one more question answered correctly (0.57) on the post-test, or from 34.4 correct answers (see the following table) to about 35. This strengthens our belief that a pre-established test standard or objective was needed to measure the relative importance of the results of the MACOS testing.

EDC, after testing the Man and Other Animals unit, stated that students with poor academic backgrounds, found so often in the inner city, gained as much learning and mastery over the ideas and concepts as those whose beginning positions were much stronger. However, EDC did not demonstrate that inner city students gained as much as students from other systems. Our analysis of available EDC summary data showed that, while inner city students did gain, their gains were less than the gains of suburban and other urban students. This analysis is presented in the following table.

Type of school	Number of students	Results (mean) Number of items	Pre-test correct answers	Post-test correct answers	Gain
Inner city	439	65	31.1	39.8	8.7
Suburban and other urban	1,207	65	35.7	46.1	10.4
Total	1,646	65	34.4	44.4	10.0

COMPLETENESS

In its evaluation report, EDC claimed that, for test year 1967-68, 2,182 students participated in the field test of both sections of the MACOS materials. However, results were reported for only 1,646 students for the Man and Other Animals segment and 782 students for the Netsilik unit. Among reasons cited by project evaluators for the differences in numbers was the fact that participating students were unable to complete both sections of the course in one school year. We believe that this fact, and the other reasons for the differences, should have been adequately reported (through the evaluation report) to educators considering purchasing the product. The importance of such data was shown by EDC's statement that its materials could not succeed without the Netsilik segment and that teachers should make sure that the segment received its full share of time during the school year.

FOLLOWUP EVALUATION

In 1970, the Foundation awarded the Washington School of Psychiatry $14,000 to undertake a feasibility study to identify evaluation approaches for MACOS. Antioch College was awarded $49,400 in fiscal year 1972 and $262,600 in fiscal year 1974 to make a comparative followup evaluation of MACOS resulting from the feasibility study. The evaluation will include a standardized social studies test; a pre- and post-test, to be given to both MACOS and non-MACOS students, that will include some MACOS and non-MACOS specifics; and classroom observations with followup interviews. The evaluation--scheduled for completion in January 1977, approximately 6 years after MACOS publication--is intended to provide answers to the following questions:

--What do students who take MACOS learn?

--What do they retain?

--Is what MACOS students learn different from what non-MACOS students learn?

PROTECTING HUMAN SUBJECTS

In December 1971, the Department of Health, Education, and Welfare issued "The Institutional Guide to DHEW Policy on Protection of Human Subjects" to safeguard the rights and welfare of human subjects involved in activites supported by its grants or contracts. Persons who may need protecting included patients, donors of organs, and students in educational training supported by the Department. The injuries to be protected against were broadly defined as physical, psychological, sociological, and others. The institution requesting Department support was expected to apply the policy to protect human subjects involved in the planned activity. According to a Department official, the policy was issued under the general authority of the Public Health Service Act and was not a statutory requirement.

MACOS was published before the Foundation voluntarily adopted the Department's policy in October 1973. Officials of the Foundation's precollege educational directorate and Office of General Counsel indicated that they were uncertain about the policy's intended application to the Foundation's science education activities. The Foundation's Deputy General Counsel subsequently reviewed the Foundation's statement on human subjects as published in its grants administration manual and determined that it was not intended to be applied to its educational activities. Her interpretation follows:

> "Paragraph 272 of the NSF [National Science Foundation] Grant Administration Manual (NSF 73-26, Oct. 1973) states that the safeguarding of the rights and welfare of human subjects involved in activities supported by NSF grants is the responsibility of the grantee institution. The paragraph goes on to state in effect that pending publication of NSF guidelines, grantees are expected to follow the DHEW [Department of Health, Education, and Welfare] policies on the protection of human subjects, i.e. the regulations published by DHEW in May 1974. Paragraph 272 is so worded, however, as not to actually require NSF grantees to follow the DHEW publications but rather to only suggest that they consider doing so."
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> "* * * Furthermore, a close reading of the May 1974 final DHEW regulations on human subjects in general and tne proposed November 1973 DHEW regulations specifically covering children indicate quite clearly that the intent of the regulations

is to cover medical, behavioral and similar types of laboratory research (examples given in the guidelines include drug research and research on diseases peculiar to children). Consequently, grants such as these made by the NSF Education Directorate for the development of instructional materials were not intended to be covered by Paragraph 272 of NSF Grant Administration Manual, and grantees under such * * * grants are not expected to follow the DHEW regulations."

The Foundation guidelines as proposed in paragraph 272 of its grant administration manual were not issued. Also, paragraph 272 refers grantees to the Department's December 1971 policy for guidance in applying the policy and not the Department's May 1974 regulations as cited by the Foundation's Deputy General Counsel.

The Department's policy became a regulation (45 C.F.R. 46) in May 1974. The regulations were issued under 5 U.S.C. 301, which provides general authority to the head of an executive department to issue regulations for governing his department, and were applicable to all Department grants and contracts supporting research, development, and related activities in which human subjects were involved, except those awarded by its Office of Education and National Institute of Education unless specifically adopted by them. The regulations were not adopted by these constituent agencies; however, their officials advised us that a policy for protecting human subjects had been and was being applied to their educational activities. We did not make further inquiries at these agencies to determine the extent of use of the policy or its effectiveness in protecting human subjects.

CONCLUSIONS

EDC conducted a comprehensive evaluation of MACOS. However, the significance of pre- to post-test gains attributable to MACOS was questionable because of limitations in EDC's evaluation design. Furthermore, EDC's reporting of test results was incomplete because it did not adequately report factors which could have significantly affected evaluation outcomes.

EDC's evaluations did not compare achievement of MACOS and non-MACOS students; however, planned evaluations will provide such data. This data would be useful to educational

users in selecting educational products and would perhaps have greater impact if available when the product is originally marketed.

The Department's regulations for protecting human subjects are applicable only to its activities--adoption by other Government entities is voluntary. The Department's educational units--the Office of Education and the National Institute of Education--are exempt from the regulations but apply a policy for protecting human subjects to their educational activities. Although the Foundation has adopted the Department's policy, it does not apply the policy to its educational activities and has no formal procedures for safeguarding human subjects involved in those activities.

RECOMMENDATION

We recommend that the Director of the Foundation review the need for establishing procedures to safeguard human subjects involved in the Foundation's educational activities.

We are considering the effectiveness of education product evaluations in a separate review of nine other Foundation-sponsored science education projects. That review will provide a more appropriate basis for any suggestions for improving the Foundation's educational product evaluation.

AGENCY COMMENTS

The Foundation agreed with our recommendation and said it would review the need for procedures to protect human subjects under its educational programs. The Foundation commented that its nonapplication of the Department of Health, Education, and Welfare's policy for protecting human subjects to Foundation educational activities was in accord with Department thinking. The Foundation commented, however, that there are instances where the Office of Education and the National Institute of Education apply the policy (not the regulations) to their educational activities but not usually to their curriculum development grants.

As previously stated, we did not determine the extent that the Office of Education and National Institute of Education were using the policy for protecting human subjects; however, their officials advised us that they consider the protection of human subjects in reviewing all grants and contracts for educational activities.

The Foundation stated it was withholding comment on the effectiveness of educational evaluation because we are considering evaluation of Foundation-supported educational materials in another study. The Foundation offered the following brief comments on our review of the MACOS evaluation, which it had previously discussed informally with us.

The Foundation commented that it differed with us as to the significance of formative evaluation (testing performed on educational materials during development to determine needed revisions) as opposed to summative evaluation (testing of final educational materials to determine if objectives have been met). Foundation officials believe the MACOS evaluation should not have been expected to account for the critical issues we raised, such as student maturation, because the evaluation was formative. We believe that the question of formative versus summative is not relevant to the issue; namely, did the MACOS evaluation support its claims of significant learning gains? Regardless of the type of evaluation, we believe claims should not be made that are not supported by the evaluation.

The Foundation noted that our conclusions on the MACOS evaluation were reached after analyzing 1 of 78 findings in EDC's evaluation report. The majority of test results for MACOS reported by EDC were based upon subjective testing (interviews with students and teachers, and observations of classroom activities). We recognize the importance of subjective testing as a mechanism in obtaining students' and teachers' opinions of materials being developed. It produces results, however, which are based on personal interpretations of responses from participants being tested.

In a proposal submitted to the Foundation by the evaluators presently performing the post-evaluation of MACOS, the following comments were made about the subjective testing performed during MACOS development:

> "* * * There was heavy dependence made on the comments of children and teachers obtained through interviews to signal the effects of the curriculum on children's intellectual and psycho-social development. Protocols were interpreted from the frame of reference of the theories and beliefs underlying the curriculum. The protocols or transcripts provided from which interpretations were made and inferences drawn, are in some instances subject to quite other interpretations and inferences than those of * * * [the evaluators]. * * *in some

> cases, at least, the significance of the utterances of students is in the eye of the beholder, not necessarily in the mental state or development of the student. This is an inherent limitation of non-experimental methodology.
>
> "The ways in which data are analyzed and interpreted, in some cases, or in which the basis of their selection for analysis or presentation was made, leave one unable to assess the implications of the data in any objectively definable sense. * * * One gets a sense of intensive ex post facto hunting for examples that are consistent with the theoretical, ideological, and design beliefs and hopes of the authors.
>
> "* * * There is an equally strong impression that the ex post facto interpretations were derived directly from initial theory and conceptualizations, although it is difficult to demonstrate such a connection with confidence.
>
> "While innumerable instances are given by * * * [the evaluators] of failures or shortcomings of the course * * *, it is difficult to discern a consistent scheme for deciding whether the course is doing better or worse. It appears that an answer inevitably would be '. . .it all depends.'"

As a result of the inherent difficulties in trying to interpret results from subjective testing, we analyzed the claims made by EDC from the objective testing performed which were more widely distributed to the intended users of MACOS through a publishing brochure. However, we found that, for these claims, the significance of pre- to post-test gains attributable to MACOS was questionable because of limitations in EDC's evaluation design. That is, EDC did not account for some factors that could have a significant effect on the test results, such as maturing of the student, the "testing" effect resulting from taking the same test a second time, and differences among teachers.

Although we only reviewed the claims made by EDC as a result of the pre- and post-testing that were widely distributed, it would appear that all claims made by EDC as a result of the pre- to post-testing are questionable because of the testing factors EDC did not account for. For example, one claim make by EDC in its evaluation report was that on overall vocabulary competence, a 30-percent increase,

from an average 40 percent to an average 70 percent level of knowledge, was found. However, what percent of the increase was attributable to maturing of the students (such as from television, environment, and other classes in school) and from taking the same test a second time cannot be determined since EDC did not account for these factors.

The Foundation commented that it and the MACOS evaluators do not agree with our interpretation of one objective test claim made in the evaluation report and publisher's brochure. The specific finding they were referring to was in relationship to the EDC claim on the Man and Other Animals unit that:

> "Those students with poor academic background, found so often in the center city, gained in learning and mastery over the ideas and concepts as much as those whose beginning positions were much stronger."

The MACOS evaluators, during our initial discussions with them, referred us to a table in EDC's evaluation report to support this claim. Our evaluation of this claim is presented on pages 13 and 14. However, during our recent discussions with the MACOS evaluators and Foundation officials, they said that we oversimplified the claim by placing too much emphasis on the center city (inner city) portion of the claim.

The MACOS evaluators stated that, although the claim reads "found so often in the center city," they never meant for the claim to be interpreted as a comparison between center city students and students from other school systems. They stated that the comparison was meant to be between students with poor academic backgrounds and students whose beginning positions were much stronger. However, regardless of what was intended, the claim as was actually presented to potential users could, we believe, cause a reader to assume that a center city comparison was made and that those students would gain as much as students whose beginning positions were much stronger.

CHAPTER 4

OBTAINING A COMMERCIAL PUBLISHER FOR MACOS

The Foundation's policy for distributing educational products stresses the need for competition in publisher selection. In accordance with this policy, EDC initially offered MACOS to all interested publishers. After some conditions had changed that could have influenced publisher interest, the Foundation did not require EDC to redetermine publisher interest. This may have reduced the extent of competition in selecting a publisher. Also, EDC's reasons for selecting CDA as the MACOS publisher, as submitted to the Foundation for approval, were not totally supported.

The Foundation chose not to review an EDC contract with the MACOS publisher, CDA, providing services essential for marketing MACOS; thus, the Foundation lost control of funds accruing under the contract from sales of MACOS. EDC and CDA used funds from this contract to support another EDC project by obtaining matching funds from the National Endowment for the Humanities. The Endowment arguably did not have the statutory authority to match these moneys.

GENERAL PROCESS FOR OBTAINING A COMMERCIAL PUBLISHER

The Foundation's February 14, 1969, document "Policies for the Distribution of Publications and Other Materials Developed Under the Science Education Programs of the National Science Foundation," which provides guidance for the distribution of education materials developed with its funds, included the following:

> "Policy must * * * achieve maximum educational benefits for all potential users. Educational benefits will take precedence over all other considerations, including possible generation of income.
>
> "* * * public and private interests must be safeguarded. [An example of public interest is the continuing availability of the education materials.] * * * In the private sector, the concern is avoidance, insofar as practical, of interference with normal commercial practices * * *. For instance, there should be open competition among * * * organizations for distribution rights to project materials. Agreements with distributors should provide for price levels consistent with the existing competitive price structure. In the

case of commercial organizations royalties and other conditions should be adjusted to allow a reasonable but not undue profit."

* * * * *

"* * * The grantee, as owner of the materials, may negotiate and enter into contracts with distributors. The steps leading to negotiation as well as the negotiations are monitored by NSF [National Science Foundation], and resulting contracts are subject to NSF approval. * * *"

* * * * *

"The financial interest of NSF * * * in all materials shall be in proportion to financial support by NSF of the materials or projects * * *."

When the grantee and the Foundation agree that the educational materials developed are to be printed and published commercially, the grantee develops a plan for obtaining a publisher that the Foundation must approve. The plan generally consists of the grantee's notification, usually in trade journals and through a mailing list, to prospective publishers that the materials are available for publishing. The grantee then holds a conference with interested publishers and solicits formal requests to publish the materials.

The grantee is responsible for evaluating the proposals received and submitting the selection and reasons for it to the Foundation for approval. The grantees are provided with the Foundation's document on the broad policies for distributing materials. However, the Foundation has no specific written criteria, such as defining expected publisher capability and reasonable profit, for grantees to consider in selecting a publisher. When the Foundation's approval is obtained, the grantee negotiates a contract with the publisher which is subject to review and approval by the Foundation, although the Foundation does not become a formal party to the contract.

AWARD OF PUBLISHING CONTRACT

Beginning in 1967, EDC tried to obtain a commercial publisher for MACOS and complied with the Foundation's requirements for selecting a publisher by advising publishers that MACOS was available for publication, through such means as advertisements in trade journals, and by setting up a bidders' conference.

During 1967, EDC contacted over 50 publishers and met separately with 43 that indicated some interest in MACOS; however, no publisher was willing to market MACOS. The publisher reaction to MACOS was unfavorable apparently because the

--special concepts were unconventional,

--special training was required for teachers,

--project materials were innovative, and

--films and other materials were costly.

Because no commercial publishers willing to market MACOS could be found, in June 1969 the Foundation authorized EDC to commercially publish and distribute the materials in an effort to demonstrate the commercial feasibility and profitability of marketing MACOS. EDC had sales of about $578,000 at cost during a 17-month period.

In the spring of 1969, the Foundation decided to accept a low royalty rate to help obtain a commercial publisher for MACOS and to keep from adding further cost to the expensive MACOS materials. The Foundation royalty rates were: (1) 3 percent for text materials, (2) 5 percent for four Man and Other Animals Super 8 films, and (3) 2-1/2 percent for six Netsilik Eskimo Super 8 films. 1/ Officials of the Foundation and EDC acknowledged that the Foundation's rates were low.

Although the low royalty rate was designed to attract a commercial publisher and some trial sales results were available to demonstrate a demand for MACOS, the Foundation did not require EDC to formally advertise this change or to convene another publishers' conference. Broad dissemination of the royalty rates and the sales results might have increased the competition for a MACOS publisher.

Eventually five commercial publishers showed serious interest in publishing MACOS; however, one--Initial Teaching Alphabet--did not submit a proposal. The other four submitted proposals on the following dates:

1/In addition, the National Film Board of Canada, a joint producer of the Netsilik films, received a 5-percent royalty for these films, and five commercial film rights holders received royalty rates ranging from nothing to 30 percent, or an average rate of about 19 percent.

International Learning Corp., Fort Lauderdale, Fla.	June 25, 1969
KDI Instructional System, Inc., Columbus, Ohio	December 1969
Westinghouse Learning Corp., New York, N.Y.	January 30, 1970
CDA, Inc., Washington, D.C.	February 23, 1970

According to the MACOS project director, the five publishers were provided with the predetermined royalty rate, so it was not a factor in the negotiations.

Monitoring publisher selection

International Learning and KDI were initially eliminated from the competition, although EDC's records do not document the reasons for the decisions. Also, EDC's basis for selecting CDA over Westinghouse Learning in March 1970, as submitted to the Foundation for approval, was not totally supported. EDC's four selection criteria provided the Foundation and our evaluation thereof follow.

--The first criteria was the ability to perform the mechanics of publication. EDC advised the Foundation that both finalists had this ability, but an EDC official told us that Westinghouse Learning had more publishing experience.

--The second criteria was financial capability. EDC did not determine the financial capability of either finalist before selecting CDA.

--The other two criteria concerned dissemination plans and teacher training. EDC informed the Foundation that, although each finalist had these capabilities, CDA had (1) shown greater interest in considering alternative dissemination designs and (2) better staff capability to implement teacher training requirements. However, EDC could not provide documentation to support these conclusions.

According to an EDC official, the decision to select CDA was ultimately based on EDC's confidence in the people of that organization. However, this was not one of the specific criteria EDC communicated to the Foundation to justify selecting CDA.

Moreover, we were advised that a part-time EDC employee, instrumental in developing EDC's MACOS dissemination plans, also assisted CDA in formulating its MACOS dissemination strategy. Further, the responsible EDC official advised us that this individual's favorable assessment of CDA's capabilities was one of the factors considered in selecting CDA as publisher. Such a situation may have given CDA an advantage over other interested publishers and should have been disclosed to the Foundation. Details of this situation are included in appendix I.

PROFESSIONAL SERVICES CONTRACT BETWEEN EDC AND CDA

In seeking a publisher, EDC considered the requirement for teacher training in the use of the MACOS materials as a necessary part of any publishing agreement. Concurrent with the signing of the MACOS publication contract on July 20, 1970, EDC and CDA entered into a separate contract, referred to as a professional services contract, in which they agreed that the following services would be provided:

> "1. During the term of CDA's license to publish said materials, EDC agrees to use its best efforts to assist CDA in its dissemination efforts including the utilization of its staff and resources in activities of the following type:
> a. liaison with schools and school systems, college and university pre-service training programs and with appropriate private and governmental agencies concerned with curriculum and staff development
> b. identification of present or prospective users of the Work and leadership teachers trained in summer institutes
> c. assistance in the development of teacher-training programs (both in-service and pre-service)
> d. joint development of a communications and information exchange among educational institutions using the Work
> e. revision, modification or supplementation of the Work
> f. continuing research and evaluation of the extent to which the Work is accomplishing its objectives
> g. these and other efforts to be undertaken shall be determined by EDC in consultation with CDA.

2. It is understood and agreed that the above will be undertaken solely within the limit of funds made available by CDA to EDC as hereinafter set forth."

To finance these services, the professional services contract provided for CDA to pay EDC half of its promotion-dissemination budget. The budget amount was to at least equal that of the normal commercial practice for disseminating multimedia educational materials. According to EDC and CDA officials, the service reimbursement rate was actually established at 15 percent of gross receipts from MACOS materials sales.

Before finalizing the contract, EDC advised the Foundation of the proposed contract, the services to be provided therein (except for provision "g," which was added later), and the general reimbursement provisions (not the 15-percent rate). The Foundation apparently agreed in principle to the arrangement but chose not to formally review the contract.

Foundation grant administration requirements in effect when MACOS was being developed and published, and applicable to EDC under its grant, provided that the Foundation must approve any contract or subcontract, including any amendment thereto, before it was signed. In this respect, the Foundation's July 1969 publication, "Grants for Education in Science," stated:

"* * * Such approval will be based on a determination that the contract or subcontract contains the provisions required to protect the grantee's and the Government's interest, including the right of audit of expenditures and income associated with the contract. * * *"

Current Foundation grant administration procedures also contain these requirements.

The Foundation should have reviewed and approved the professional services contract to insure adequate protection of the Government's interest. In addition, (1) the teacher training services to be provided were viewed by EDC as essential to marketing MACOS and (2) the contract was a somewhat innovative arrangement in which the Foundation had only limited experience.

Implementation of the contract

During July 1970 through December 1974, CDA's cash receipts from the sale of MACOS project films and materials

totaled about $2.6 million, of which about $387,000 accrued to EDC under the professional services contract. As of May 6, 1975, EDC had spent about $314,000, of which about $119,000 was used for activities related to the MACOS project, such as:

--Evaluating CDA's teacher education and dissemination program for MACOS.

--Developing procedures and materials to be used in MACOS teacher training workshops.

--Developing a film on the modern Netsilik Eskimos.

The remaining funds EDC expended--$195,000--were used for the following purposes not formally related to MACOS.

People and technology project

In June 1970, the National Endowment for the Humanities 1/ granted EDC $600,000 to develop "People and Technology," a social studies project to produce educational materials for grades five through seven. At that time the Endowment advised EDC that it would provide additional matching funds for the project if donations could be obtained by EDC from nongovernmental sources.

In this respect 20 U.S.C. 959 et seq. provides for the Endowment to accept and match restricted gifts. However, the Endowment's publication "Gifts and Matching Background Information for Institutions and Organizations" provides:

> "The Endowment will not match a restricted gift from the institution conducting the project for which the gift is intended, nor from persons or other institutions involved in the project; the Endowment will not match a restricted gift from Federal funds nor from current or pending recipients of Endowment grants."

The Endowment's General Counsel advised us that the limitation on receiving restricted gifts from the institution conducting a project or others involved in the project was adopted because of the belief that such moneys would not constitute a gift in law.

1/Part of the National Foundation on the Arts and the Humanities, a Federal agency created to promote activities to support and disseminate knowledge in these disciplines.

In September 1972 EDC and CDA determined that EDC's assistance in marketing MACOS was no longer needed and that funds accrued under the professional services contract could be used for other purposes. They informally agreed that CDA would pledge funds so accrued to the Endowment for matching purposes for the People and Technology project.

Between October 1972 and December 1974, CDA pledged $205,000 of the professional services contract funds to the Endowment as a restricted gift for the People and Technology project. As of June 30, 1975, CDA had made payments of $175,000 which were matched by the Endowment, resulting in a return of $350,000 to EDC, and a pledge of $30,000 was outstanding.

We question whether the sums remitted by CDA to the Endowment under the informal amendments to the professional services contract with EDC were within the Endowment's matching authority. CDA claims that it waived EDC's obligation to perform under the services contract to the extent that moneys therefrom were paid to the Endowment. According to CDA, EDC did not waive the right to receive those moneys and CDA was always obligated to pay them to EDC or to the Endowment for the People and Technology project. EDC maintains that these moneys were obligated only if both parties agreed on a dissemination plan each year. The contract, however, does not condition CDA's payment obligation upon such an agreement and contains an arbitration clause to deal with any disputes.

Since the "gifts" were made by CDA discharging its obligation to EDC under the services contract and in effect the moneys were simply returned to the party to which they would otherwise have been payable, no bona fide gift occurred. These moneys were therefore arguably outside of those categories of funds permitted to be received for matching by the Endowment pursuant to 20 U.S.C. 959. Alternatively, since EDC had the legal right to these moneys, it could be suggested that EDC actually made the "gifts" through CDA. However, restricted gifts from grantees conducting the project for which the gift is intended cannot be accepted for matching under the provisions of the Endowment's publication (previously cited on page 27). The transaction was thus arguably improper under this view as well.

EDC maintains that the funds were matched by the Endowment with full knowledge of their source on the basis of an October 6, 1972, letter from CDA to the Endowment which offered the pledge of funds for the People and Technology project. The letter stated:

"* * * Our understanding and agreement provided that in addition to normal royalties on the film and print materials * * *, we would provide EDC for its use an unspecified sum of money each year for continuing review and development of the MAN program (particularly in the areas of teacher education and evaluation). * * *"

* * * * *

"* * * we are pledging to the National Endowment For The Humanities a contribution in the amount of $100,000 for support of the 'People and Technology' unit now under development at EDC. This grant is in lieu of a like amount which would be made under the previously mentioned agreement for EDC services in connection with the MAN program. * * *"

The Endowment's General Counsel said that, in considering CDA's October 6, 1972, offer, he interpreted it to mean CDA was not obligated to pay the intended "gift" funds to EDC were they not paid to the Endowment. He stated that (1) the Endowment did not review the EDC-CDA professional services agreement and (2) the Endowment's concern was to insure that CDA would not receive future special consideration from EDC when People and Technology was offered for publication.

"Diversity in the School Community"

EDC used over $20,000 of the professional services funds to produce a film entitled "Innovations Perils" for an Office of Education-funded project entitled "Diversity in the School Community." The project filmed actual sequences of schools having trouble introducing educational change. The films were to be used for teacher training. "Innovations Perils" documented a range of positions and values surrounding a controversy that developed when MACOS was introduced in the Phoenix, Arizona, school system. The film is used by the Office of Education's program; it was not formally part of the MACOS project.

RELATIONSHIPS BETWEEN THE FOUNDATION, EDC, AND CDA

We were requested to review the relationships between the Foundation, EDC, and CDA. We determined the three parties to be grantor, grantee, and commercial publisher, respectively. In making this determination, we (1) reviewed

EDC's annual reports, minutes of board meetings, and personnel files and CDA's listings of officers and stockholders and (2) compared a listing of EDC and CDA officials to the Foundation's employment termination records dating back to about 1970 and its employment records for personnel on board on May 31, 1975. We found no indications of so-called "interlocking directorates" between the Foundation, EDC, and CDA or other questionable personnel relationships except for that discussed on page 25. Details of this review are included in appendix I.

CONCLUSIONS

The Foundation should monitor the selection of publishers more closely to insure that all competitors are informed of vital information, such as predetermined royalty rates, that could influence (1) a competitor's decision to submit a proposal and (2) proposal contents. Closer monitoring should include a detailed review of proposals to insure that reasons for publisher selection are valid and documented.

The Foundation should be particularly vigilant in monitoring publishing arrangements where low royalty rates and other non-routine arrangements, such as the professional services contract, are permitted, to insure adequate protection of the Government's interest. In this respect, the Foundation should have reviewed the professional services contract since it provided for teacher training services considered essential to marketing MACOS. Had the Foundation reviewed and approved the professional services contract, it could have provided for the disposition of the accrued income after services under the contract were deemed no longer necessary.

The $175,000 remitted by CDA to the Endowment under the informal amendments to the services contract arguably was not donated as a matter of law and does not constitute a gift.

RECOMMENDATIONS

We recommend that the Director of the Foundation strengthen procedures for selecting publishers of educational materials to insure that:

--Publisher interest in marketing educational materials is redetermined when conditions which could affect that interest change.

--Documentation to support the reasons for publisher selection is required.

--All contracts and subcontracts for marketing educational materials are reviewed and approved.

We recommend that the Chairman, National Endowment for the Humanities, review the Endowment's transactions with EDC and CDA to determine (1) whether the funds given by CDA for the People and Technology project represented a legal gift within the authority of the Endowment to match 1/ and (2) if not, whether the matching funds the Endowment gave to EDC should be recovered.

AGENCY COMMENTS

The Foundation agreed with our recommendations and stated that changes needed to implement them are being developed. In addition, it provided the following comments.

According to the Foundation, our report implies the need for its direct involvement in the operations of its grantees and contractors. The Foundation cited as an example the statement in chapter 4 that it has no specific criteria for grantees to consider in selecting a publisher. The Foundation recognized the need to improve administration of its curriculum development programs, but believed it should be primarily involved in establishing policy to guide grantees and contractors to carry out programs.

We agree that providing policy guidance to grantees and contractors is a primary Foundation role; however, that role needs to be supplemented with adequate management controls to insure that grantees and contractors are following sound business practices. For example, our review showed that the reasons EDC gave the Foundation for selection of CDA to publish MACOS were not totally supported. Further, the selection of a publisher for a Foundation-supported curriculum is a major project milestone in which both the Foundation and the developer should consider specific needs to disseminate the curriculum before the developer selects a publisher and the Foundation approves it.

The Foundation also commented that the question of whether it should have reviewed and approved the professional

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1/A July 14, 1975, Endowment request for an opinion from the Comptroller General under 31 U.S.C. 74 as to its authority to match CDA's outstanding pledge of $30,000 for People and Technology (see page 28) is pending.

services contract between EDC and CDA under the scope of its July 1969 publication "Grants for Education in Science" is a matter of interpretation, which the Foundation believed it handled correctly.

The July 1969 publication stated under the caption "Contracts and Subcontracts Under a Grant" that:

> "If it is necessary to enter into contracts or subcontracts, particularly for commercial production of materials, the Foundation must be apprised in advance of the considerations and procedures which are planned for the selection of the contractor. All appropriate and interested concerns should have an opportunity to submit a proposal, and selection should be based on such considerations as suitability of contract conditions, quality, distribution and price. The Foundation must approve any contract or subcontract before it is signed. Such approval will be based on a determination that the contract or subcontract contains the provisions required to protect the grantee's and the Government's interest, including the right of audit of expenditures and income associated with the contract. The Foundation must also approve any amendment to any such contract or subcontract including those to be made after termination of the grant." (Underscoring added.)

The language of the July 1969 publication appears to clearly require that the Foundation approve any contracts or subcontracts under a grant. Nevertheless, regardless of interpretation, sound business practice would seemingly have dictated that the professional services contract--which provided services considered vital by the MACOS developer for successful use of MACOS--should have been reviewed and approved by the Foundation. Such arguments, however, appear academic because the Foundation has agreed with our recommendation that it review and approve all contracts and subcontracts for marketing educational materials.

The Foundation commented that in chapter 4 we stated that the low royalty rate used for MACOS printed material might have improved the competition for a publisher. The Foundation, however, does not believe that the low royalty rate would have influenced publishers that once showed little interest in publishing MACOS to reconsider.

To comment on the effect of the low royalty rate in the publisher selection process for MACOS is rather speculative, although the two finalists for the MACOS publishing contract--

CDA and Westinghouse Learning Corporation--advised us that they would have considered a higher royalty rate were it not predetermined. In addition, EDC and Foundation officials advised us that the Foundation decided to accept a low royalty rate to help obtain a commercial publisher and to not add further cost to MACOS.

CHAPTER 5

IMPLEMENTATION OF MACOS

The Foundation's precollege instructional improvement implementation section makes awards for the implementation of major curriculum and course developments at the precollege level to strengthen school science and mathematics programs. However, the Foundation lacks definitive criteria concerning how long and to what extent precollege curriculums will be funded. Projects that have obtained a commercial publisher are eligible to compete for and have received Foundation implementation funding.

Proposals requesting implementation funds are subjected to a competitive review process in which the Foundation is assisted by ad hoc panelists in evaluating the proposals. Foundation officials place much weight on their own professional judgment in determining which proposals to fund. They, however, do not always document in the files their reasons for supporting or denying funding for proposals.

The Foundation, which requires a statement on all published materials developed with Foundation support acknowledging its support and stating that the views in the material are those of the author and not necessarily shared by the Foundation, has no routine procedure to insure that such a statement is in fact included.

PROCEDURES FOR AWARDING PRECOLLEGE IMPLEMENTATION PROJECTS

An annual competitive evaluation review is conducted to select proposals to receive funding for implementation projects. Proposals submitted, whether new or renewals, must compete with other proposals submitted that year. Both Foundation-supported and non-Foundation-supported curriculums are eligible for implementation support. The Foundation does not have definitive criteria concerning how many years and to what extent curriculums should be eligible for funding. Therefore, projects could conceivably be commercially marketed for a great number of years and still be eligible to compete for the Foundation's implementation funding. According to Foundation officials, implementation funding is provided for projects that have been commercially marketed for a number of years to provide for such things as teacher turnover and additional school systems adopting the curriculums.

Program announcements are sent annually to the education and scientific communities conveying the Foundation's guidelines for obtaining a precollege implementation award. The guidelines are distributed to all school systems with

enrollments of over 10,000, some 550 Federal coordinators at colleges and universities, individuals on the National Science Teachers' Association supervisors' mailing list, directors of current projects, individuals submitting proposals in the previous fiscal year, and individuals requesting the guidelines. According to Foundation officials, approximately 20,000 implementation announcements were distributed in fiscal year 1975. In addition, other Foundation publications describe the science education activities and reference the documents that interested persons may request.

Announcements in the Foundation's guide for preparing proposals and operating projects for instructional improvement implementation describe the precollege implementation program and invite proposals for projects to implement major curriculum and course developments at the precollege level in natural and social sciences and mathematics. The announcement guide also defines the eligible institutions, which are generally the same as those for the materials and instruction development section as stated on page 5.

The implementation announcement guide also outlines broad categories in which the Foundation will consider awarding projects. For example, in the fiscal year 1975 precollege instruction improvement implementation guide, some of the broad categories included familiarization with alternative curriculums or approaches, training of resource teams for long-term dissemination and maintenance, and installation in a significant segment of a school system. Also listed in the fiscal year 1975 implementation announcement guide are the target groups which will be affected by the implementation activities. These groups include:

--Leadership specialist projects, which are directed toward individuals who influence curriculum decisions, such as principals, supervisors, college faculty, superintendents, and curriculum directors. The projects are designed to provide information to school decisionmakers about new materials or to develop expertise so that leaders can organize more massive local implementation efforts.

--Teacher projects, which are designed to bring about classroom change or improvement through effective teacher use of new instructional materials or practices.

--School system projects, which are directed at bringing about specified curriculum or course changes in classrooms where schools and school systems are

willing to make commitments of funds, personnel, and other resources.

Proposals received are considered unsolicited and are evaluated in a competitive process for funding. A closing date is established for receipt of proposals. Proposals are initially grouped by the education directorate's program objectives (such as careers in science or scientific literacy). Within the program objective groupings, the proposals are grouped by type of activity (leadership specialists, teacher, or school system projects); grade levels (elementary and/or secondary); and curriculum, where possible, (such as MACOS). For example, one grouping for proposals may be literacy-school systems projects-elementary-MACOS.

In reviewing the proposals, the Foundation is assisted by advisory panels of scientists and educators drawn from colleges, universities, school systems, professional societies, and other nonprofit organizations or Federal agencies concerned with science education. Foundation staff match panelists' qualifications to proposal content. All proposals are read by two panels, each consisting of three individuals. The panelists rate the proposals on the following seven criteria: objectives (reasonable-unreasonable), need (great-little), plan (suitable-unsuitable), staff (strong-weak), commitment (adequate-inadequate), impact potential (substantial-insubstantial), evaluation design (significant-insignificant). The panelists rate each criterion on a scale of 1 to 7; one is unfavorable and seven highly favorable. As a result, the highest possible score an implementation proposal can receive is 294 (7 criteria x 7 the highest possible rating for each criterion x 6 panelists). Average panel scores range from 160 to 170.

After the panelists have studied several proposals and tentatively evaluated them, the panel discusses each proposal. After the discussion, a second rating (which may or may not be the same as the initial one) is made by each panelist. The second rating gives the panelists an opportunity to discuss the proposals and to possibly obtain and consider information that they may not have initially considered.

The recommendations of the panels are an important element in the Foundation's determination of which proposals to fund, but the final decision is made by the Foundation, after reviewing the proposals and the panel ratings and panelists' comments. The Foundation generally approves grants to proposals rated highest by the panels and denies grants to those rated lowest. Disposition of proposals

given intermediate ratings will be based on not only panel scores and comments, but also program balance with respect to disciplines, grade levels, curriculums, institutions, and geographic distribution.

Program managers' recommendations for grants and denials are reviewed and approved or disapproved, in turn, by the section head of the precollege instructional improvement implementation section, by the Division Director for Pre-College Education in Science, and by the Assistant Director for Science Education. Denied proposals are signed off at the division level and approvals require the signature of the Assistant Director for Science Education.

IMPLEMENTATION FUNDING

Our limited review of the Foundation's process for awarding precollege instructional improvement implementation grants showed that proposals are competitively evaluated separately by ad hoc panels and Foundation officials. According to Foundation officials, while the panelists aid and are the major ingredient in the evaluation process, the Foundation makes the final determination. We reviewed the panels' ratings of the implementation proposals the Foundation received for fiscal year 1975, for which recommended awards totaled about $11.8 million. Of the 621 proposals submitted, 306 were funded and 315 were not. Of the 315 not funded, 289 were denied, 8 withdrawn, 5 deferred for later action,1/ and 13 not eligible for support.

As previously noted, the highest panel score a proposal can receive is 294 and the average panel scores are reportedly between 160 and 170.

In analyzing the detailed breakdown of the panels' ratings, we scheduled, in intervals of 25, the panel scores for the 621 proposals. In some cases, for proposals receiving panels' ratings within the same range, many were funded while many others were not. For example, for the school system projects (projects compete within project categories), 37 proposals were rated by panels at between 151 and 175, yet 19 were funded and 18 were not. Thus, Foundation officials place much emphasis on their professional judgments in finally deciding which proposals to fund. The overall panels' ratings are presented in the following table.

1/We did not determine the final disposition of these proposals and for purposes of this report considered them not funded.

Project categories	Intervals of panels' ratings: Below 75	76 to 100	101 to 125	126 to 150	151 to 175	176 to 200	201 to 225	226 to 250	251 to 275	Total
	(Number of proposals)									
Leadership specialist:										
Funded	0	0	0	1	5	13	29	21	2	71
Not funded	0	1	5	7	30	20	13	5	0	81
Teacher-centered:										
Funded	0	1	2	1	8	35	43	15	3	a/108
Not funded	2	1	9	28	56	42	10	1	0	a/149
School system:										
Funded	0	0	0	1	19	45	42	18	1	126
Not funded	2	6	10	31	18	10	5	0	2	84
Total:										
Funded	0	1	2	3	32	93	114	54	6	a/305
Not funded	4	8	24	66	104	72	28	6	2	a/314

a/Totals do not reflect one teacher-centered project reviewed for 2 years funding and one not funded because it was ineligible for support. Panel scores were not reported for these two proposals.

Both Foundation-supported and non-Foundation-supported curriculums are eligible to receive Foundation implementation funding. For fiscal year 1975, Foundation-supported curriculums received 84 percent of the total obligations. We attempted to compare the percentages of Foundation-supported and non-Foundation-supported curriculums receiving support to the percentages of those groups requesting support, but according to Foundation officials, this information was not readily available.

MACOS implementation funding

During fiscal years 1967-75, the Foundation awarded over $2.3 million in MACOS implementation grants to various colleges, universities, and other nonprofit institutions, including EDC.

We identified the MACOS implementation proposals the Foundation received during fiscal year 1975 and noted that, of the 37 proposals received containing MACOS (either wholly or in part), 19 (or 51 percent) were funded and 18 (or 49 percent) were not. For the implementation proposals funded, the panel scores ranged from 175 to 237, and for those not funded, the scores ranged from 106 to 248.

We identified the fiscal year 1975 non-MACOS proposals that were not funded but received higher panel scores than proposals containing MACOS that were funded. Forty non-MACOS proposals were not funded but received higher panel scores, ranging from

176 to 229, than MACOS proposals that were funded. For example, during fiscal year 1975, for the category literacy-elementary-school system projects, seven non-MACOS proposals that were not funded received higher panel scores, ranging from 185 to 225, than a MACOS proposal that was funded and received a panel score of 182. According to Foundation officials, this situation also occurs for non-MACOS curriculum proposals, since the Foundation makes the final determination as to which proposals will be funded.

We selected three of the proposals having the greatest variance between panel scores and the score of the MACOS-funded proposal to obtain the Foundation's justifications for nonsupport. The justifications given by the Foundation's program managers for not funding the non-MACOS proposals were:

--The institution had submitted six proposals and four were funded.

--The number of teachers to be trained would have been too great and nothing indicated that teachers wanted to use or schools would purchase the materials.

--The Foundation decided only a certain sum of money would be spent on implementation funds for this specific curriculum in the school system project category and the ceiling had been reached with proposals considered to be more worthy of support.

For the last example, the Foundation had established a funding level of between $150,000 to $200,000 for this curriculum in the school system projects category. As a result, this proposal requesting $26,299 to implement the curriculum in a specific school system was not funded because other proposals for this curriculum were determined by the Foundation to be more worthy of support, were selected for funding, and already exceeded the funding ceiling by $15,000.

Foundation proposal files had documentation justifying the reasons for the denial of one of the proposals and a Foundation program manager gave us the reasons for the denial of the other two. Program managers are not required to file written justifications explaining why proposals were or were not funded. In some instances program managers may prepare a diary note for the file explaining why a proposal was not funded. But written justifications for denials are generally prepared only for those proposals in which the proposer requested such a justification. For these requests, the program manager prepares a standard form for the files noting the reasons for denial. The requestor receives this information by telephone.

EDC curriculums funding

EDC curriculums have been a major recipient of Foundation implementation funding over the years. For example, for fiscal years 1974 and 1975, EDC curriculums received approximately 21 percent of the Foundation's total implementation funds. Because before fiscal year 1974 the Foundation did not have data readily available for total precollege implementation funding (Foundation-supported and non-Foundation-supported curriculums), we reviewed the implementation funding for the Foundation's 53 major curriculums for which data was available. Seven of those 53 curriculums were EDC developed. EDC curriculums have received 25, 21, 22, 19, 16, 15, and 22 percent (an average of 19 percent) of the total Foundation implementation funding for the 53 curriculums for fiscal years 1967-73, respectively.

ACKNOWLEDGMENT OF SUPPORT

Since as early as 1955, the Foundation has requested an acknowledgment of its financial support to be included on all published materials developed with its funds. Not until late 1972 or early 1973 did the Foundation also require a disclaimer statement. The Foundation included in its October 1973 grant administration manual the following requirement of an acknowledgment of support statement and a disclaimer statement.

> "An acknowledgment of NSF [National Science Foundation] support must be made in connection with the publication of any material based on, or developed under, a project supported by NSF, along the following lines: 'This (material) was prepared with the support of National Science Foundation Grant No. ___.' Any opinions, findings, conclusions, or recommendations expressed in such a publication are those of the author(s) and do not necessarily reflect the views of NSF. Any curricular materials * * * must contain a statement along those lines. * * *"

According to Foundation officials, a disclaimer statement was required to eliminate any implication that the Foundation endorses products just because it supported their preparation. Also, the Foundation did not want to project the image that it was controlling the design and development of educational materials.

The MACOS materials did not include a disclaimer statement because the Foundation did not formally adopt this procedure until after signing the MACOS publication's contract in July 1970.

According to Foundation officials, they do not review all education materials developed with Foundation support before their publication and have no routine procedure to insure that such materials include a Foundation disclaimer statement. Instead, they rely on the grantees and contractors to comply with the requirements.

Although Foundation officials have said that the Foundation does not endorse the science education materials developed through its support, the Foundation's provision of implementation funds for such materials may be viewed by members of the educational community and others as an endorsement of the materials.

CONCLUSIONS

The Foundation does not have definitive criteria concerning how long and to what extent precollege curriculums should be eligible for implementation funding. Even projects commercially marketed for a number of years are eligible to compete for Foundation implementation funding. For example, MACOS implementation grants were awarded about 5 years after the materials had been commercially available. Due to the innovative nature and expense to schools adopting some Foundation-supported materials, the Foundation may want to provide implementation funds after the materials are commercially available. We believe, however, such a practice does benefit the commercial publisher of the materials and may provide an unfair advantage over publishers of competing products.

The Foundation receives unsolicited proposals for implementing major curriculum and course developments at the precollege level and subjects them to a competitive review process. Foundation officials place considerable weight on their professional opinions in finally determining which proposals to fund. The Foundation does not always include written documentation in its files giving the reasons for the differences between the program staffs' judgment and the panelists' ratings. We believe such documentation should be included for each proposal, giving the reasons for support or nonsupport.

The Foundation, which requires a disclaimer statement on all published materials developed with Foundation support, has no routine procedure to insure that such a statement is in fact included. The Foundation should insure that all Foundation-supported materials include a disclaimer statement, particularly because the Foundation provides implementation funds for materials.

RECOMMENDATIONS

We recommend that the Director of the Foundation:

--Obtain the publishing industry's views about any impact that the award determination and funding practices of the precollege instructional improvement implementation program may have on the supported educational materials and their publishers, and if necessary, experiment with program revisions to minimize any unfair advantage.

--Require the Foundation program staff to document in the files the reasons for support or nonsupport of implementation proposals.

--Establish procedures to insure that the Foundation's acknowledgment of support and disclaimer statement is included on all published science education materials which it has funded.

AGENCY COMMENTS

The Foundation agreed with our recommendations and stated that actions are being taken to implement them.

CHAPTER 6

EDC'S ADMINISTRATION OF ROYALTY INCOME

Educational materials developed with Foundation support may produce royalties.1/ The royalties are usually paid directly to the grantee for a disposition to be determined by the Foundation, because it supported development of the materials. Royalties returned by the grantees to the Foundation are deposited in the U.S. Treasury. The Foundation may permit grantees to retain royalties to be used for purposes it approves. The use of these funds by the grantee, although approved by the Foundation, is not reviewed by the Congress through the appropriation process.

The Foundation permitted EDC to retain royalties from Foundation-funded projects. Our review of selected EDC royalty fund transactions indicated that the Foundation needs to more closely monitor fund activities to insure that all royalty income is correctly determined and used only for authorized purposes.

FOUNDATION ROYALTY INCOME POLICY

Before October 1964 the Foundation did not have a formal policy for the disposition of royalty income derived from projects it supported; however, it generally placed specific provisions in grants instructing grantees to retain any royalties for a disposition to be determined by it. In October 1964 the Foundation adopted a formal policy requiring grantees to remit royalties received on Foundation-funded projects for deposit in the U.S. Treasury. In February 1969 the Foundation changed its policy to allow grantees to use royalty income to defray grant administration costs with prior Foundation approval. In January 1972 the Foundation again revised its policy, this time to allow grantees to use royalties, with prior Foundation approval, to offset costs normally chargeable to the grant and to cover reasonable expenses associated with administering the income-producing activity. The 1972 policy also provided that the Foundation may authorize the grantee to retain grant income estimated to be less than $10,000 to be used for science or science education purposes. However, any income exceeding $10,000, or such lesser amount as may be specified in the grant, was to be remitted to the Foundation unless approved by the Foundation for other uses.

1/A royalty is an amount usually based on a percentage of sales paid by commercial publishers to authors as consideration for the right to sell materials developed by the authors (or to which the authors otherwise have rights).

The 1972 revisions also provided that all income and interest remitted to the Foundation or required to be reported on by the grantees and contractors will be in turn reported by the Foundation to the Office of Management and Budget (OMB) and to the Congress.

The Foundation reports to OMB for inclusion in the President's budget the income remitted to it by grantees and contractors. However, the Foundation does not report to OMB or the Congress the income it authorizes grantees and contractors to retain, and the total amount of such income is not readily determinable from Foundation records. In one documented example, however, the Foundation had allowed EDC to use from royalties earned on Foundation-supported projects about $1.4 million and retain about $325,000 for future authorized disposition.

FOUNDATION ROYALTIES EARNED ON EDC PROJECTS

Before April 1, 1970, EDC either remitted royalties to the Foundation or retained them for disposition to be determined by the Foundation. Such general handling of royalty income was consistent with Foundation practices or policies at that time. Since April 1, 1970, the Foundation has authorized EDC to retain all royalty income from all Foundation-supported projects in a combined account. Foundation officials stated that EDC is the only grantee permitted to pool royalty income and that the arrangement was considered the most practical one because of the number and magnitude of Foundation-supported curriculum materials EDC administered. EDC-collected royalties, reported semiannually to the Foundation, are invested in interest-bearing accounts, certificates of deposit, and U.S. Treasury bills.

Periodically, EDC submits a request to the Foundation for using part of the pooled royalty income with a work description and a budget estimate. The Foundation reviews the submission and, when it concurs, authorizes EDC to use the royalty income for grant administration activities and other approved purposes. This practice is consistent with current Foundation income policy.

Foundation royalty income activities at EDC from July 1, 1960, through March 31, 1975, are shown below.

Income:		
Royalties received	a/ $3,487,484	
Interest	128,698	$3,616,182
Expenditures (note b):		
Returned to the Foundation	1,892,456	
Administrative costs	1,085,527	
Other purposes	313,178	3,291,161
Due the Foundation		$ 325,021

a/$192,102 attributable to MACOS.

b/Since royalties are held in one account and expenditures are not related to funding source, the MACOS royalties used for administration expenses or grant activities or still owed the Foundation are not identifiable. However, before April 1, 1970, when funds were remitted directly to the Foundation, $5,340 of MACOS royalties were remitted.

EDC's administrative costs include costs of those activities related to the administration of terminated Foundation grants and the operation of its film library and distribution center. Film library functions include storing and cataloging films and handling requests for materials. Charges to the distribution center include selecting publishers, negotiating contracts, and providing public information.

The Foundation authorized $313,178 of royalty income to fund the following grant activities.

General grant title	Purpose of funds	Amount of funds
Physical science study committee	Make tests, films, and evaluations related to physics courses developed by the committee	$182,783
Science education	Explore and develop the use of certain science education films	99,000
Developmental biology films	Cover a cost overrun on the the grant	27,355
Fluid mechanics film program	Publish a volume of film notes	4,040
Total		$313,178

MONITORING THE EDC ROYALTY POOL

In general, the Foundation's Grants and Contracts Office, in coordination with other Foundation offices, is responsible for (1) inserting clauses in the grant or contract concerning handling income and (2) reviewing the grantees' or contractors' reports of income. The Audit Office is responsible for auditing grantee income earned on Foundation-supported projects and for examining and reporting on practices and procedures regarding income management and use. The last Foundation audit at EDC was through the period ended March 1969.

Our limited review of selected royalty fund transactions and the uniqueness of the royalty pool to the Foundation indicate that the Foundation should more frequently and closely review the pool. We noted the following questionable transaction and expense allocation issue.

Disposition of royalty income

In the spring of 1970, EDC made a film entitled "The Eskimo: Fight for Life" for CBS Television, Inc. The film was an edited version of the Netsilik Eskimo films funded by the Foundation and the National Film Board of Canada. Their contracts specified that either party would pay the other 10 percent of royalties received from direct television sale of films. In June 1970, CBS paid EDC $68,104 for editing, titling, and other production costs and $10,000 in royalties for a network broadcast of "Fight for Life." EDC remitted a $1,000 royalty payment to the National Film Board and credited $9,000 to the Foundation royalty account. In May 1971, CBS paid EDC an additional $10,000 in royalties for another showing of the film. EDC again remitted $1,000 to the National Film Board and credited $9,000 to the Foundation royalty account.

In September 1971, EDC proposed to purchase the nonexclusive rights to the stock footage 1/ used in the program, and in about December 1971 or January 1972, the Foundation informally approved the purchase. In July 1972 EDC sent the Foundation a check for $9,180 of corporate funds to purchase the rights. The Foundation returned the check for deposit to the royalty account, thus making these funds

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1/Defined as all of the film taken on a project that could be used to produce subsequent films.

available to EDC for future authorized uses. In so doing, the Foundation apparently acted contrary to 31 U.S.C. 484, which requires that the gross amount of all sums received by U.S. officers and agents for Government use be deposited in the U.S. Treasury. Since the $9,180 was in payment for a right owned by the Foundation and did not constitute royalty income under a grant, the Foundation acted improperly in returning the moneys. Even if the income could be considered a royalty due the United States, it would appear that, since such royalty would be in the hands of the agency, it would have to be deposited in the U.S. Treasury and could not be used to augment the agency's appropriation.

EDC believed that the purchase of the stock footage gave it undisputed ownership of the royalties; in June 1972, EDC transferred $19,865, representing CBS royalty payments of $18,000 and applicable interest, from the Foundation royalty account to corporate funds. EDC had notified the Foundation of the royalties earned from showing the film and EDC's removal of the royalties from the Foundation account by statements of royalty account activity submitted to the Foundation. The Grants and Contracts Office reviewed the income statements but apparently did not question the withdrawal of the royalties. Because the royalty income was earned before EDC's purchase of stock footage rights, we believe that the Foundation is entitled to the $18,000 plus accrued interest derived from the "Fight for Life" production.

EDC officials acknowledged the retroactive nature of this transaction and indicated that it would have been more appropriate to purchase stock footage rights before use. We were advised that, although the $19,865 was spent primarily to promote the "Fight for Life" film, MACOS indirectly benefited from reference to the course in "Fight for Life" marketing materials.

Sharing administration costs

The Foundation and EDC share royalties from the physical science study committee project based on their percentages of investment in the project (the Foundation invested 86.8 percent and EDC invested from private sources 13.2 percent). However, EDC does not share in project administration costs.

An EDC official advised us that the determination of the amount of Foundation and EDC investment was negotiated on the basis of a complex set of facts and legal issues. EDC claimed that 13.2 percent was the minimum to which it was entitled. However, this settlement made no mention of expenses relating to future royalties.

Since both the Foundation and EDC share in royalty income and benefit from the royalty pool expenditures supporting the project, we believe that EDC should assume a proportionate share of the project's administration costs. Such costs are not readily identifiable; however, based on the income-sharing ratio of 86.8 to 13.2, we estimated that EDC's share of administration costs would amount to about $49,000.

CONCLUSIONS

The Foundation's current practices for disposition of income resulting from its grants and contracts permit the use of funds that are not reported to the Congress for consideration in appropriating funds to the Foundation. The significance of the amount of such funds has not been determined, but the one grantee considered in our review, EDC, has been authorized to use substantial amounts of funds.

The uniqueness of the royalty pool arrangement with EDC and the questionable transactions identified in our limited review of pool activities indicate that the Foundation needs to more closely monitor and review royalty pool transactions.

RECOMMENDATIONS

We recommend that the Director of the Foundation:

--Provide for a comprehensive review of EDC's royalty fund transactions, including the matters identified in this report, and make necessary adjustments.

--Evaluate the results of the review and consider the need for more frequent audits of the EDC royalty fund.

--Insure that EDC income reports are closely examined to help monitor the royalty fund.

AGENCY COMMENTS

The Foundation agreed with our recommendations and stated that actions are being taken to implement them.

MATTER FOR CONSIDERATION BY THE CONGRESS

The Congress may wish to direct the Foundation's Director to determine the significance of amounts of income resulting from grants and contracts that the Foundation is authorizing its grantees and contractors to use. If such amounts are significant, the Congress may wish to require

the Director to report the receipt and expenditure of royalty income retained by the grantees and contractors. This information would allow the Congress to consider these funds in determining the Foundation's annual appropriation.

CHAPTER 7

SCOPE OF REVIEW

Our review was primarily directed to

--identify the Foundation's policies and procedures for developing, evaluating, and implementing science education projects administered by its Division of Pre-College Education in Science;

--identify the Foundation's policies and procedures for disposition of royalty income that may result from its science education projects; and

--determine the application of those policies and procedures to the MACOS project.

In conducting the review, we:

--Interviewed officials of the Foundation; EDC; CDA; the National Endowment for the Humanities; and the Department of Health, Education, and Welfare and personnel who formally evaluated MACOS.

--Ascertained the authority and functional responsibilities of the Foundation's precollege science educational division and the National Endowment for the Humanities.

--Reviewed the Foundation's project records for MACOS and similar EDC records.

--Determined the extent of competition for developing and marketing MACOS by reviewing the process for awarding grants for MACOS development and the process for obtaining a publisher, including the royalty rate determination.

--Examined the MACOS professional services agreement between EDC and CDA, the Foundation's role in the agreement, and the general services provided under the agreement.

--Reviewed the transactions under the professional services agreement for matching funds through the National Endowment for the Humanities.

--Examined the Foundation's process for awarding educational material implementation funds at the precollege level to ascertain if proposals for funding were competitively evaluated.

--Reviewed the peer review evaluations of MACOS proposals and the objective testing of MACOS during development.

--Inquired into the development and application of the Department of Health, Education, and Welfare's policy and regulations for protecting human subjects and specifically considered the adoption of the policy by the Foundation and any application to MACOS.

--Identified the Foundation's methods for disclaiming any endorsement of science education products it funds.

--Generally inquired into EDC's practices of pooling royalties resulting from Foundation-supported education materials and the general disposition of such royalties, with emphasis on MACOS royalties.

--Gathered background information on the corporate history of EDC and CDA and conducted a general inquiry into their relationships to the Foundation. (See app. I.)

Our review was conducted at the Foundation in Washington, D.C., and at EDC offices in Cambridge and Newton, Massachusetts, and CDA's office in Washington, D.C.

RELATIONSHIPS BETWEEN

THE FOUNDATION, EDC, AND CDA

NATIONAL SCIENCE FOUNDATION

The Foundation is an independent agency of the Federal Government established by the National Science Foundation Act of 1950. The Foundation's functions include:

--Supporting basic scientific research to strengthen research potential and science education programs at all levels in the various scientific disciplines, including the social sciences, by providing financial assistance, such as grants, loans, scholarships, and fellowships.

--Supporting applied research at nonprofit institutions, and, when authorized by the President, at other organizations when relevant to national problems involving the public interest.

--Fostering interchange of scientific information among scientists in the United States and other countries.

--Evaluating the status and needs of the various sciences.

The Foundation receives appropriated funds to conduct its activities. Fiscal year 1975 appropriations were about $768.2 million.

The Director of the Foundation is appointed by the President and confirmed by the Senate. The Director, in promoting scientific research and education, is assisted by, among others, a National Science Board, which consists of 24 members who are appointed by the President and confirmed by the Senate and who are to be eminent in the fields of basic, medical, or social sciences; engineering; agriculture; education; research management; or public affairs.

EDUCATION DEVELOPMENT CENTER, INC.

Educational Services, Incorporated, of Newton, Massachusetts, established in August 1958 to administer a new high school physics curriculum developed by a Massachusetts Institute of Technology professor and his colleagues, received Foundation financial support for the curriculum project. National emphasis on improving educational techniques and reforming curriculums led to expansion of Educational Services' activities. It developed curriculums and trained teachers and preceded a regional educational laboratory system established by the Elementary and Secondary Education

Act of 1965. The act provided for the Department of Health, Education, and Welfare's Commissioner of Education to award grants for, among other things, establishing curriculum research centers, statewide educational planning, measuring educational achievement, and improving teacher education.

In August 1966, the Institute for Educational Innovation was established under the act's title IV, which called for a national program of educational laboratories. The Office of Education was the only sponsor of the Institute, whose operational intent was to address nonschool factors in education, such as parental involvement in school activities at the community level. Educational Services, on the other hand, dealt with curriculum reform. In January 1967, Educational Services and the Institute merged to form Education Development Center, Inc.

EDC, organized to effect curriculum reform, has essentially the same charter as its predecessor organizations. It is a nonprofit membership corporation with no stock-issuing authority. Control of the corporation is vested in the board of trustees.

Support for the organization's projects comes from both public and private sources; however, from its inception (as Educational Services) to September 30, 1974, U.S. Government agencies had provided about $86.5 million (84 percent) of total EDC funding of $102.7 million. The Foundation had provided about $33.8 million (about one-third) of total EDC funding.

CURRICULUM DEVELOPMENT ASSOCIATES, INC.

CDA, incorporated in January 1970 to develop and disseminate curriculum programs, is an expansion of its predecessor organization, Wirtz-Botel Associates. According to CDA officials, the corporation was established partly because of Wirtz-Botel Associates' dissatisfaction with the publishers it had selected for their curriculum programs.

In addition to publishing and distributing MACOS, CDA publishes and disseminates a new math curriculum it developed. A CDA-developed elementary reading program is disseminated by another publisher under a royalty agreement.

EDC, CDA, AND FOUNDATION RELATIONSHIPS

The Committee requested us to provide a history of EDC and CDA, including the relationships between the two organizations and their principal officials, and to determine the relationships between EDC, CDA, and the Foundation.

We identified key officials at EDC and CDA (from the dates these organizations were established to May 2, 1975) and their predecessor organizations (Educational Services, the Institute, Wirtz-Botel). We reviewed EDC's annual reports for 1967-74 and its personnel files. We reviewed CDA's listings of officers (inception to May 5, 1975) and stockholders as of December 31, 1974. We also compared the listing of key EDC and CDA officials with Foundation employment termination records dating back to about 1970 and its employment records of personnel on board as of May 31, 1975.

One CDA official was involved with pilot testing MACOS; however, this involvement was as an employee of a local school system and not as an EDC employee.

Another part-time CDA consultant was formerly employed by EDC in various capacities for over 4 years. She was a consultant on the social studies program from March to June 1965, a social studies staff member from June to July 1965 and September 1965 to August 1966, and the Director of "Man and Other Animals" from September 1966 to August 1969. She has been employed by CDA from July 1973 to the present as a part-time consultant to work on teacher-training workshops and the MACOS revision.

A third individual joined EDC in March 1969 to help develop a MACOS dissemination strategy and other activities related to preparing MACOS for commercial publication. Although the individual left full-time employment at EDC in July 1969 to join a private foundation, he continued on a part-time basis until April 1970. From November 1969 through April 1970, he received $250 per month for work related to MACOS dissemination.

A CDA official told us that this same individual, although never employed by CDA, did assist CDA in developing an overall dissemination model for its programs, including MACOS, during the period January through June 1970. In August 1970, CDA, in appreciation of his help, issued him 250 shares of stock in the company. He advised us that the stock was promptly returned because of the potential conflict of interest with his employment at the private foundation.

One former Educational Services official was previously a member of the Foundation's National Science Board, but the periods of employment were not concurrent. In addition, three former EDC-Educational Services officials have served as Foundation consultants.

APPENDIX II

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

SEPT. 15, 1975

Mr. Gregory J. Ahart
Director, Manpower and
Welfare Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Ahart:

The draft GAO report on Administration of the Science Education Project, "Man: A Course of Study" (MACOS) has been reviewed. In order to resolve the problems outlined in my letter to you of August 13, 1975, representatives of GAO and NSF staffs have been working together over the past few weeks and have resolved, to their mutual satisfaction, most of the apparent problems.

Generally, we concur in the recommendations made in the report; they parallel those made by the NSF Pre-College Science Curriculum Review Team either in its published report or in the administrative recommendations made separately. The policy, administrative, or procedural changes needed to implement these recommendations are currently being developed by the appropriate NSF staff.

There are certain conclusions and suggestions contained in the body of the report, however, that have not been completely resolved during the discussions between the GAO and NSF staff representatives.

Statements are made in a number of places which imply the need for direct involvement of NSF in the operations of its grantees and contractors. For example, in Chapter 4 it is stated that NSF has no specific written criteria for grantees to consider in selecting a publisher. In Chapter 5 it is suggested that as a minimum the Foundation should ensure all Foundation-supported materials include a disclaimer statement. We recognize the need to improve and tighten up the administration of Foundation curriculum development programs, but believe NSF should be primarily involved in establishing overall policy for guidance of grantees and contractors to effectively carry out such programs.

In Chapter 3, "Evaluation of MACOS," there are some aspects which I believe require comment. The chapter ties together two unrelated subjects -- "Evaluation" and "Protection of Human Subjects."

The "Protection of Human Subjects" was provided for in the scope of your review. While it is thus appropriate to the report, placing it in juxtaposition with "Evaluation" makes it appear to be an issue related solely to evaluation. It is more properly an issue for the chapter on development.

The discussion centered around the Department of Health, Education and Welfare's guidelines on protection of human subjects. As pointed out, the NSF has voluntarily adopted the policies of DHEW, although not in the case of educational activities. This is in accord with DHEW thinking. NSF was advised by appropriate DHEW officials that the guidelines were never meant to apply to curriculum development. There are instances where the policies (as contrasted to the guidelines) are applied to educational activities by the Office of Education and the National Institute of Education but not usually to curriculum development grants.

We will undertake to review the need for procedures to protect human subjects under NSF educational programs.

The GAO report concludes that a comprehensive evaluation of MACOS was performed. They question the attribution of pre- to post-test gains to MACOS because of limitation in EDC's evaluation design; further they question the adequacy of EDC's reporting of test results. We understand these conclusions were reached after analysis of only one of 78 findings in the evaluation report.

We have had many discussions with the GAO representatives and have not been able to agree on the validity of GAO's conclusions, particularly since their opinion of the meaning of the specific finding is at variance with the evaluator's and NSF's opinion. There are also differences of opinion as to the significance of a formative evaluation as opposed to a summative evaluation. There are also some questions as to the adequacy of reporting.

Since the effectiveness of educational evaluation is being considered in a separate GAO review, we believe it appropriate that further comment be withheld at this time.

In Chapter 4, "Obtaining a Commercial Publisher for MACOS," closer monitoring and a comprehensive review of EDC royalties are discussed. The report states that the low royalty rate (3%) used for MACOS printed material might have improved the competition for a MACOS publisher. We do not believe the low royalty rate would have favorably influenced publishers to reconsider, since their primary reasons for rejection of MACOS were not related to royalties. No evidence has been offered which demonstrates that the royalty rate was a significant factor during the three-year publisher selection process for MACOS.

Also in Chapter 4 the discussion of the professional services contract between EDC and CDA covers the use of funds for purposes not related to MACOS but related to the National Endowment for the Humanities. Accordingly, this item was not discussed by the GAO and NSF staffs and will not be

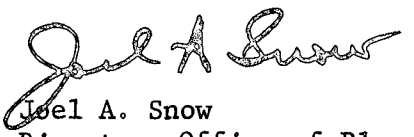
commented on. Concerning the question whether NSF should have reviewed and approved the contract between CDA and EDC on the basis it was a subcontract coming within the scope of the NSF publication "Grants for Education in Science," we believe this is a matter of interpretation. However, we believe NSF, in fact, handled the matter correctly.

In Chapter 6, "Administration of Royalty Income," questions concerning two transactions in the EDC royalty account are raised. These are presently under review by NSF staff.

I am pleased to note that our previous concerns about the tone and substance of the draft report have been largely rectified and the areas of difference have been reduced to the ones above.

As noted above, the GAO review has identified certain administrative areas of the NSF Pre-College Curriculum Program which the Foundation also recognizes as needing to be strengthened. Action is being taken to do this. We appreciate the opportunity to comment on this draft report.

Sincerely yours,



Joel A. Snow
Director, Office of Planning
and Resources Management

PRINCIPAL NATIONAL SCIENCE FOUNDATION OFFICIALS RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DIRECTOR:		
H. Guyford Stever	Feb. 1972	Present
Raymond L. Bisplinghoff (acting)	Jan. 1972	Jan. 1972
William D. McElroy	July 1969	Jan. 1972
Leland J. Haworth	July 1963	June 1969
Alan T. Waterman	Apr. 1951	June 1963
DEPUTY DIRECTOR:		
Richard C. Atkinson	June 1975	Present
Lowell J. Paige (acting)	Sept. 1974	June 1975
Raymond L. Bisplinghoff	Oct. 1970	Sept. 1974
Vacant	June 1970	Oct. 1970
Louis Levin (acting) (note a)	Aug. 1968	June 1970
John T. Wilson	July 1963	Aug. 1968
ASSISTANT DIRECTOR FOR EDUCATION (note b):		
Harvey A. Averch (acting)	Sept. 1975	Present
Lowell J. Paige	Oct. 1973	Aug. 1975
Keith R. Kelson (acting)	Sept. 1971	Oct. 1973
Lloyd G. Humphreys	June 1970	Sept. 1971
Vacant	Oct. 1969	June 1970
ASSOCIATE DIRECTOR (EDUCATION) (note c):		
Thomas D. Fontaine	Aug. 1966	Oct. 1969
Thomas D. Fontaine (acting)	June 1966	Aug. 1966
Henry W. Riecken	Jan. 1965	June 1966
DIVISION OF PRE-COLLEGE EDUCATION IN SCIENCE:		
Director		
Walter L. Gillespie	Jan. 1975	Present
Howard J. Hausman	Feb. 1973	Dec. 1974
Howard J. Hausman (acting)	July 1972	Feb. 1973
Charles A. Whitmer	Nov. 1968	July 1972
Charles A. Whitmer (acting)	Sept. 1968	Nov. 1968
Neville L. Bennington	Nov. 1966	Sept. 1968
Keith R. Kelson	Jan. 1965	Nov. 1966

	Tenure of office	
	From	To
DIVISION OF SCIENTIFIC PERSONNEL AND EDUCATION (note d):		
Associate Director		
Henry W. Riecken	Mar. 1964	Jan. 1965
Bowen C. Dees	Aug. 1963	Mar. 1964
Assistant Director		
Bowen C. Dees	Aug. 1959	Aug. 1963

a/As Executive Associate Director, Dr. Levin performed the functions of Deputy Director.

b/Effective July 1975, title changed to Assistant Director for Science Education.

c/Effective October 1969, the Office of Assistant Director for Education was created. In addition to the duties assigned to the newly established position, the Assistant Director for Education assumed the functions previously assigned to the Associate Director (Education).

d/Effective January 1965, the Division of Scientific Personnel and Education was abolished and replaced by three divisions, one of which was the Division of Pre-College Education in Science, reporting to the Associate Director (Education).