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ABSTRACT

This document contains reports examining research designs for Educational Resources Information Center (ERIC) usage studies at three levels: (1) system operations; (2) subscribers to the services provided; and (3) the ultimate "end-users" of the service. The first level report, which addresses ERIC as an information network, proposes two changes which would provide greater coordination and cohesion for the system--the development of a more hierarchical network articulation of the ERIC system, and a systematic reporting system a part of a more formal management information system. This report describes a framework for comprehending, examining, and managing the ERIC system; describes useful data categories and appropriate levels of data collection; suggests a method of developing a model data collecting system; and examines these suggestions with present possibilities. The second level report recommends non-experimental approaches to ERIC use assessments and examines methodological and research design considerations for ERIC usage studies. The third level report focuses on ERIC impact studies, i.e., how ERIC products and services have affected the end-user. General methodological recommendations are made for particular studies, and all available ERIC impact studies are analyzed in terms of these recommendations, and in terms of the specific impact measures employed. Research plans for future impact studies are included. (CWM)

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ERIC/IR
Special Project Report

DESIGN OF
ERIC USAGE STUDIES

Volume II

ERIC Clearinghouse on Information Resources
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INTRODUCTION

This Volume contains the reports in full of three consultants who tackled the job of recommending Level I, II, and III type ERIC usage study designs.

(See Figure 1.) Volume I of this ERIC/IR Special Project Report contains an executive summary for each report, as well as introductory tables and typologies prepared by the project staff.

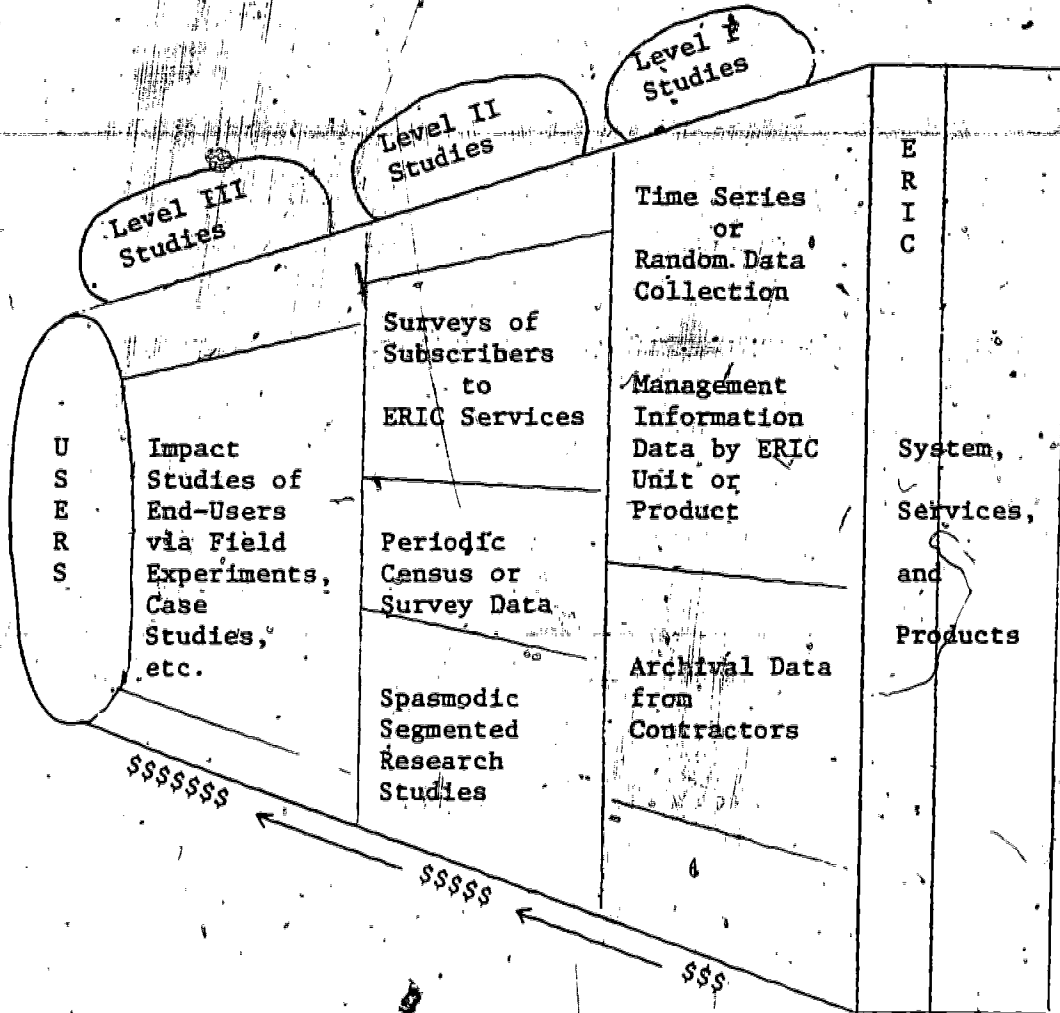


Figure 1. Types of Usage Studies with Varying Data Collection Methods and Analysis, Variation in Implementation Costs, Validity, Reliability

APPENDIX I

Level I ERIC Usage Study

Data Gathering for the Management
of ERIC as an Information Network

by Evelyn Daniel

Introduction

The story of the six blind men with the elephant has been greatly overused. Perhaps one reason lies in the fact that it continues to provide a dramatic and vivid analogy for a frequently recurring phenomenon. As the complexity and size of our organizations increase, we have become accustomed to people holding a wide spectrum of perceptions about the nature of the particular agency with which they are dealing. This is not any the less true when dealing with ERIC, a system (of sorts) of wide variety and many contact points -- a system intended for greatly divergent user groups with a wide range of purposes for their use -- a system of diffuse and global goals on the national level and great diversity of specific objectives among the various component parts.

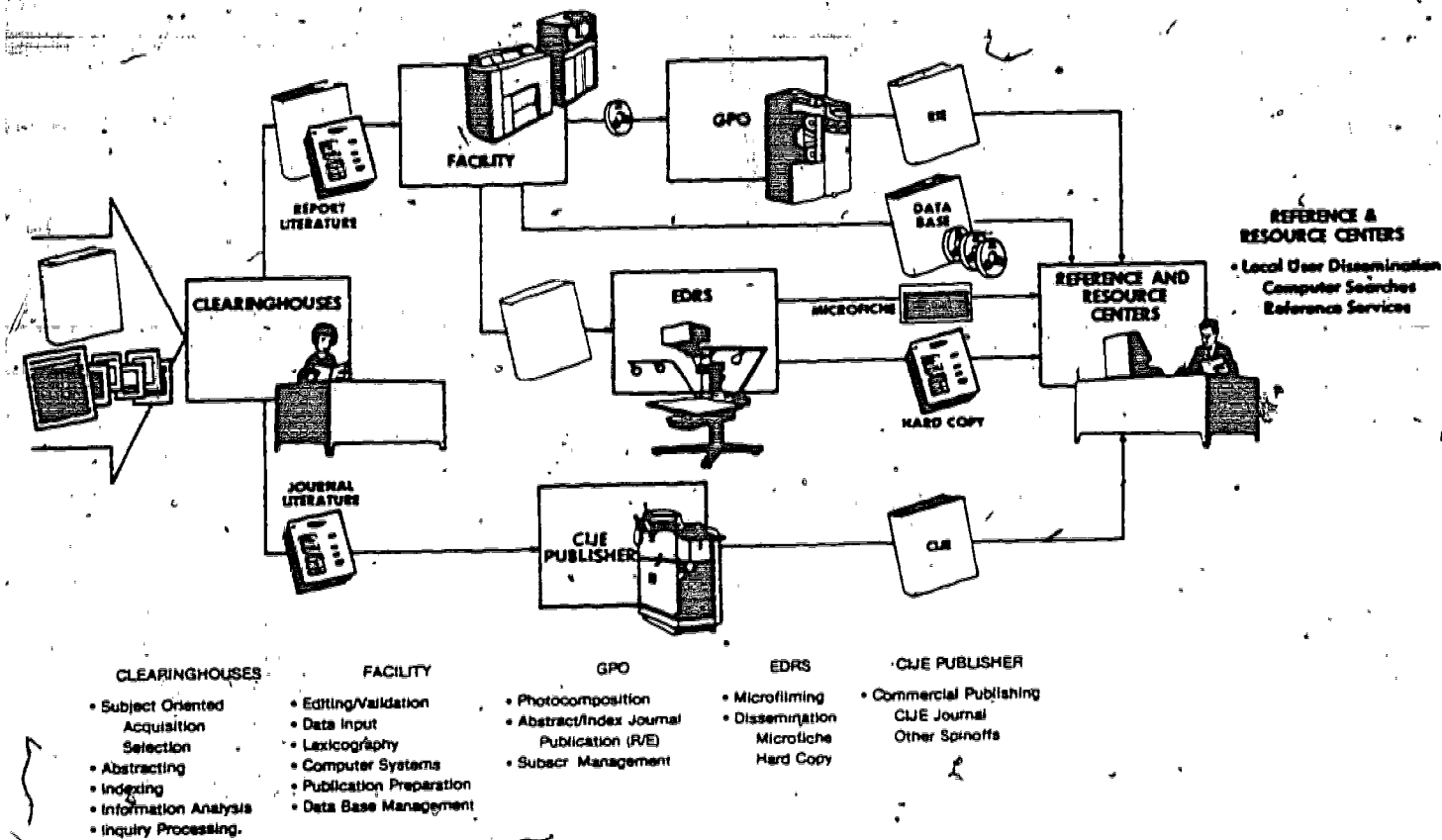
Obviously then, with such a degree of differentiation in the ERIC system, there must be a strong impetus to search for integrative devices -- ways to encompass and comprehend this vast and sprawling young giant without inhibiting the flexibility and experimentation necessary for continued growth. The dynamic tension between the need for greater integration and the opposing need for continued differentiation provides the backdrop for this paper. At the moment the decentralized character of the system seems the dominant factor. Efforts to understand and control, much less direct, the growth of the system suffer from an overbalancing toward the differentiation end of the scale.

PART I. Suggested Views of ERIC as a Network of Services

In this paper, the writer will proffer two complementary suggestions that may provide greater coordination and cohesion for the ERIC system. The first suggestion is for a more hierarchical network articulation of the ERIC system; the second suggestion is for a systematic reporting system as part of a more formal management information system.

Neither suggestion is totally new. Various approaches to describe the ERIC system to the user exist. One recent example is the undated publication of Central ERIC entitled, How to Use ERIC, in which the ERIC system is described as a "system with four levels". (p. 5) This diagram is provided below.

ERIC is a system with four levels.



The descriptive text reads as follows:

The first or Governmental level is represented by Central ERIC (the funder, policy setter, and monitor) The second or non-profit level is made up of the 16 Clearinghouses located at universities or professional societies. The third or commercial level consists of the centralized facilities for managing the data base, putting out published products, making microfiche, and reproducing documents. Fourth are the users who receive the benefit of these activities.

The four levels presented are not really hierarchical as the word "levels" might suggest. The diagram seems purposefully to have been presented horizontally rather than vertically to prevent such a misconception. Further, I venture to suggest, this description fails to provide a useful framework for comprehending the ERIC system either from the viewpoint of the user, the standing order customer, the clearinghouse staff, and perhaps even from Central ERIC itself. The viewpoint seems library-like with heavy emphasis on materials, their acquisition and processing, rather than services for the user.

A somewhat different system articulation of the ERIC network will be presented in this paper as a more helpful framework for comprehending the system from a variety of perspectives -- that of the funder, the manager, the staff, and the user.

The second suggestion derives from the first. Given a satisfactory description of the system, systematic techniques for data gathering about use in a management information system framework can be devised. The many use studies by and for ERIC have provided gross figures on use, uses, and users, but they lack comparability and they lack inherent directions for management. A good management information system will provide data for decision making at all levels of the ERIC system. A tentative description and method of developing an appropriate management information system will be presented.

This paper, then, is divided into three parts for ease of examination.

Part A, entitled ERIC Network Articulation, describes a framework for comprehending, examining, and managing the ERIC system. Part B, entitled Management Information System, describes useful data categories, appropriate levels of data collection, and suggests a method of developing a model data collecting system. Part C, entitled Recommendations, examines these suggestions in light of the art of the possible.

A. ERIC Network Articulation

First, it may be helpful to discuss some prior decisions that were necessary before developing an alternative framework. The first concern was whether ERIC should be conceived as a purveyor of products or whether ERIC's primary mission was to provide services. A second concern focused on the standing order customer. Were there advantages to seeing them as members of the ERIC system rather than customers only who stood outside the boundaries of the ERIC system? A third problem centered on the clearinghouses with their dual function. What should be the primary allegiance of the clearinghouse -- to the national interest community or to the local geographic community? Given that both are important, what reorientations should take place and/or what conflicts might be foreseen and prevented? The fourth problem concerned the hierarchy. If there was value to conceiving a single hierarchy for the ERIC system, what were the appropriate levels and what were the unique responsibilities of each of these levels? Finally, how were the system elements related in the network? What degree of independence/dependence should each element have?

1. System of Products VS. System of Services. Current management theory has become increasingly results-oriented rather than activity-oriented. (For a good overview of current arguments on this topic, see Waldhart, Thomas J.,

"Implementing Results-Oriented Management in Academic Libraries", The Journal of Academic Librarianship, 4 (September 1978), 209-213.) In the more traditional activity-oriented view of management, management was seen as a system of authority, emphasizing such activities as organizing, directing, controlling, and staffing. In a results-oriented approach, management is conceived as a resource to the organization and results are stressed through participation and coordination. The stress on results focuses more attention on outcomes and less on internal activities. Activity-oriented management might express objectives in terms of products even though the products are only instrumental in achieving the actual overall goal of the organization.

If ERIC is seen as a system of products, then a relatively simple marketing model, looking at sales, costs, and returns, geographic distribution, number of continuing customers, etc., would be sufficient. It is apparent from the emphasis placed on the end use that this product orientation is not acceptable. Rather, a view of ERIC as a system of services seems the appropriate model and has the added advantage of alignment with current results-oriented management theory.

2. The Standing Order Customer. Many of the user studies focus on the standing order customers. (A particularly useful one is that prepared by Eleanor V. Horne, A Profile of ERIC Microfiche Collection Sites, ERIC Clearinghouse on Tests, Measurement, and Evaluation, Princeton, NJ, 1976.) These SOCs can be seen in two different ways. If ERIC is conceived of as a system of products, the SOCs are the retailers and the end point. However, looking at ERIC as a system of services, the SOCs become the primary outlet point, the place where the end user interfaces with the ERIC system. This means that the SOCs might helpfully be considered as elements of the ERIC system and not external to it.

In terms of policy and allocation of resources, it would mean greater attention to the SOCs, development of incentive plans to encourage the SOCs to play a more responsive role, and a stronger hierarchical network concept. Presently the Clearinghouses vary in the amount of contact and concern with the SOCs and the SOCs do not understand or recognize the Clearinghouse role. Greater attention to the SOCs has great implication for the Clearinghouses to which we now turn.

3. The Dual Function of the Clearinghouses. In this conception of a more integrated, controllable system, the Clearinghouses assume central importance. It is they who will be the middle managers, coordinating policy, plans, and resource allocation for Central ERIC to those SOCs in their geographic purview, and at the same time, systematically collecting feedback from the SOCs to pass on to Central ERIC.

The Clearinghouses presently vary widely in their emphases, and no doubt rightly so. Most, however, focus strongly on their national interest community and spare little time and attention for the SOCs in their geographic region. There are many inherent conflicts, of course, in asking the Clearinghouses to assume the dual function of supervisor/facilitator to the SOCs in addition to their prescribed duties of product acquisition and development and marketing/consulting contacts with associations and specialists in their subject field.

In the system coordination aspect of the Clearinghouse, there would be a number of additional general education and consultation functions required by the Clearinghouses as they "big-brother" the SOCs, but probably the primary additional role would be as collector of reliable use data in a systematic fashion. To some extent, the Clearinghouses presently perform the former general education function. They might spend more time in referring end users to

appropriate SOC facilities, reserving direct user interface for occasions where subject specialist knowledge is important and necessary.

The establishment of the Clearinghouse as the primary collecting point for use data would have a number of advantages. Presently, Central ERIC commissions national user studies to document the value and the impact of the ERIC system. The data collected, however, are often gross estimates and so, are unreliable. Perhaps even some inaccuracies occur in the present use data collected by the Clearinghouses, at least to the extent that the data does not seem inherently useful to them and is only being collected for reporting purposes. The accuracy of the data would undoubtedly be enhanced if it were meaningful and useful to the level where it is being collected.

A Hierarchical Systems Framework

Figure 1 on the following page presents a view of the ERIC system which may be a useful and timely way to conceptualize it. Each of the three levels shown has its own distinct responsibility and requires certain kinds of information in order to fulfill its responsibility competently. The information needed by each level will be, in most cases, summaries of the information needed at the more articulated level. There may be value in examining this system from the bottom up, giving primacy to the grass roots level where most actual use occurs.

SOCs, as shown in Figure 1, are categorized into one of three types. Types 1 and 2 are quite different in their institutional constraints and in their intended user groups. Type 1 SOC's are the college and university subscribers. They are different in that they are constrained by the university environment to serve those users who are members of the university. A second important aspect is that they see ERIC as only one of a number of educational

CIJE
Macmillan

EDRS

Central Processing
& Reference Facility

GPO

Clearinghouse
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type

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resources available to them. Use data, to be helpful for this group, must reflect both the constraints and the larger set of available resources.

Type 2 SOC's are those that serve public school personnel. These are often sponsored by state education agencies. Some are statewide computerized networks such as EPSIS in New York State, SMERC in California, IRDN in Illinois.

Others are based in a region, a county, or a city, or a large city school system.

As in the case of SOC's, the data for these networks should be collected in a way that

allows for comparison of the data across the networks.

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on population to be served, percent of population that are current users, percent that are repeat users, percent that are first time users, etc. SOCs also need information to help them predict when heavy use times will occur. This can be predicted in part from data on types of use relative to month of year. Central ERIC may be less interested in the time-bound aspect of this data, more interested in numbers and proportions of types of use aggregated on user statistics.

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To perform the second mission, acting as a regional node in a national network for distributing ERIC products and services, some of the same types of activities are necessary -- the linkages, a publication program, direct provision of information, instruction, but here they are directed to a specific geographical regional-unit and could be done so in a similar fashion to the total ERIC system and services. The general idea is to have a unit that is immediately directly to and from the public and to have a unit that is more locally oriented and geographically specific. The unit that is more locally oriented could be a regional office or a regional center. The unit that is more geographically specific could be a regional office or a regional center. The unit that is more geographically specific could be a regional office or a regional center. The unit that is more geographically specific could be a regional office or a regional center.

sources for pre-determined information needs.

Many definitions of a management information system are available. Most seen to include these four important elements:

- (1) The MIS is used as a basis for decision-making.

It is a s:

Information

and who gets

and how

and why

and

and

respect to the allocation and utilization of resources, and it is also needed to demonstrate organizational effectiveness and efficiency in the use of resources. In addition, as there are no absolute measures of performance for the SOCs, the Clearinghouses, or Central ERIC to assess performance against, information exchange can provide comparative data. The basis of comparison differ, but some common set of criteria will be agreed on regarding, and definitions will make the data comparable. The data will be used to identify areas of strength and weakness, and to provide a basis for improvement.

up to record actual use, uses, and users. If formalized techniques can be per-
formed on the data at intervals by qualified experts. The data collection sys-
tem should be kept as simple as possible.

Third, data should be collected on a sampling basis. It is usually the
case that greater fractions of the total population of users are represented
by individual instances of use. The data collection system should be designed
to collect data on a representative sample of users and their use of the system.

the latter incentive is a powerful one.

3. Tentative Model of a Data Collection System. Applying the present data categories used by the Clearinghouses to a simple matrix, Figure 2 demonstrates how these programmatic functions can be mapped into a series of program measures. Financial data is required for all programmatic functions. Personnel is required for all programmatic functions, either in service or as a consultant. The following table illustrates the mapping of programmatic functions into program measures.

Program
Measures

FINANCIAL

PERSONNEL

FACILITIES

ACTIVITIES

ANALYTIC
MEASURES

Programmatic
Functions

DATA BASE BUILDING

USE: 11 2

FRON: 11

This information simply fleshes out the present reporting system, providing a fuller picture of activity and resource use. It should prove helpful in increasing control and in developing useful longitudinal studies of Clearinghouse activity.

Still, CRCS has been developed to measure effectiveness, and will be developed to measure the type of activities that are being conducted. The following

User Characteristics	TYPE OF CONTACT	PURPOSE OF CONTACT	USER TYPE	PURPOSE OF END USE	PERFORMANC MEASURES
User Services					
PRODUCTS					
USER SERVICES					
RESEARCH ADVISORY SERVICE					
MACHINE REFERENCE					
MANUAL					

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C. Recommendations

If the suggestions in this paper seem to be worthwhile goals, what would be a reasonable plan of implementation? For an organization as large and as diverse as ERIC a totally new system would be exceedingly difficult to implement. The suggestions here proposed advocate using the available data collection system and gradually increasing its complexity and its extensibility so that within a three year period a management information system is fully operational.

gories can be established.

- (7) Using the outcomes of SOC and Clearinghouse information problem meetings, set up series of meetings for representatives of SOCs, Clearinghouses, and Central ERIC to develop management information system.
- (8) Establish standard terminology and definitions for acceptable data categories. Consider categories developed by American National Standards Institute.
- (9) Develop standard format for uniform record keeping with optional categories that can be deleted and opportunities to add categories for other local required information.
- (10) Use expert to help establish appropriate sample sizes and frequencies for recurring usage data.
- (11) Assist Clearinghouses in developing a rolling data collection plan for all SOCs in their geographic region so that all SOCs are sampled at least once every five years.
- (12) Select a set of SOCs that are already keeping good records and that include a range of types, sizes, and geographical areas and set up a ten-year longitudinal study. Some incentives may have to be provided to the parent institutions.
- (13) At periodic intervals, engage an expert to analyze the descriptive data collected in more sophisticated ways.
- (14) Provide periodic data summaries to Clearinghouses so that they can compare their results with the aggregate or with selected others like them on certain characteristics.
- (15) Resist temptation to collect more data in greater detail at any particular level than is necessary for management decision-making.

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new promotion drives, new policy or procedures, are best captured this way. The survey approach, on the other hand, is better suited for use assessments, given the emphasis on representativeness and generalizability. Thus, broader aspects of ERIC, use patterns and longer term changes and developments can be studied well. Therefore, this paper will deal with non-experimental approaches to ERIC use assessments. The goal is to obtain firm estimates of use, while avoiding the expense of census. This job involves a careful, sequential execution of specific tasks, two of which deserve special attention here.

First, sound sampling decisions ensure the representativeness of the group which will provide information. Second, only valid questions receive valid answers. Getting valid answers from representative respondents is what is needed. Getting valid answers from unrepresentative respondents defeats generalizability; how broadly your results apply remains unclear. If the responding group is representative, but the answers are invalid, the quality of measurement has been diluted; whether your results and conclusion can be trusted becomes questionable. To avoid such pitfalls, sampling must be based on a population which is clearly defined and accessible. Also, the information requested must be within the scope of what respondents are capable and willing to offer.

The complexities of the sprawling, decentralized ERIC system have clearly presented a challenge to researchers who try to study it. The difficulties could be at least partially alleviated by narrower conceptualization of the studies' goals and priorities. Fry (1972) recognized that in his final report by saying, "The extent of use . . . by the total universe of users . . . cannot be estimated with . . . the present study." (pp. 1-11) Actually, we may say, chances are that no one study could assess the use of the total universe of users, as this is too global a conceptualization under present ERIC system con-

ditions. Further, major methodological shortcomings in the past have emerged in the areas of sampling, response rates, and measurement.

As Havelock (1977) has pointed out already, survey studies of ERIC since the system's inception have typically used purposive or time samples, not permitting generalization. Furthermore, if such studies attempted evaluation, they would have spoken to people already predisposed to ERIC; if they wanted to measure use, their estimates were rendered unreliable. Apart from the sample's representativeness, there is also the definition of the pool from which respondents are to be chosen. One half of the survey studies deals with educators regardless of their connection to ERIC. Thus, the emphasis of study is inadvertently placed on intended, rather than actual audiences, and amount of ERIC use may be severely underestimated. Once again, Fry (1972) warns of the consequences by saying that "the field is so vast and diverse that only gross estimates of ERIC uses can be extrapolated to an unmeasured total universe of educators." (pp. 1-11) Non-ERIC connected samples are good enough if the goal is to estimate the proportion of users in narrowly selected groups of potential audiences, as done by Denby (1974). However, if the main thrust is on actual ERIC use, then sampling must be done of the "catchment" areas where contact with users can be measured. The identified mass of users could then be broken down into more specific categories of relevance. After use and users have been dependably determined, work on non-users will be easier. Reasons for non-use, discontinuing, rejection of ERIC, could be traced, and ways to enhance the role of ERIC among potential audiences could be devised.

Unsatisfactory response rates plague even the best of survey attempts (e.g., Horne, 1976), so the reliability of their results cannot be determined. As Havelock notes, studies where mailed questionnaires result in response rates below 70% are bound to generate dubious data. Yet, such low response rates come

as no surprise, given that mailed questionnaires have been long known as the least fruitful approach to data collection. It is odd that more researchers have not tried to enhance their response rates by combining mailing with some of the known methods of boosting response. The variation in data collection approaches have been minimal, with mailed questionnaires in the dominant category, as seen in studies reported by Havelock (1977):

<u>Method</u>	<u># of Studies</u>
mailed questionnaire	27
hand delivered questionnaire	5
interviews:	
personal	1
group	1
phone	1
observation	1
experiment	2
records	2

The seriousness of measurement problems is tied to the above-mentioned methodological choices, but also to difficulties stemming from a state of affairs at ERIC system outlets. For example, in reviewing data collection methods, Havelock singled out two studies which braved data collection through records, with this comment: "Efforts to collect such data are generally reported to be hopeless because of total lack of standardization in record keeping on users." (p. 16) Both Fry and Horne therefore found themselves in the difficult position of drawing conclusions based on uneven quality data -- part coming from firm records, part based on respondent "estimates". The word "estimates" means guesses offered by respondents, in the absence of systematic records or observations. The inclusion of impressionistic data can defeat the best of well-designed studies. Without belaboring the point, it is important to underscore the vast difference between survey estimates based on firm data, in contrast to data which represent "estimates . . . by library and information

staff", i.e., guesses. The former allows the calculation of probable error, the latter does not.

In another part of the larger project, Evalyn Daniel's review of record keeping patterns among ERIC outlets suggests that a problem does indeed exist.

(See Appendix I.)

For example, among SOC's, school SOC's tend to keep good records on users and materials; university library SOC's keep some records on material circulation and computer searches, while BOCES SOC's typically do not keep records. This immediately suggests that the most promising SOC subgroup where use assessment could be accomplished would be school SOC's. Yet, based on current information, we are told that about 72% of ERIC SOC's are placed elsewhere -- at college and university libraries, where record keeping is spotty. So expending effort on the small group of school SOC's alone would contribute little to our knowledge of overall SOC use patterns. In the same vein, Horne's study found that 63% (n=160) of the 254 SOC's who responded to her study kept some records. Since we do not know what kind of self-selection led to these particular 254 SOC's responding, out of the totality of SOC's contacted, we cannot know what the probable record keeping proportion for all SOC's might be. The study also alludes to a further complication -- of the 160 record keeping SOC's, only 91 were willing to share their information and records; that is, 36% of all responding SOC's, or 56% of the record keeping ones, and an unknown proportion of all existing SOC's.

By contrast we see evidence of ease and detail in the EPSIS study by Wilkes (1976), when records of computer search requests were available, the time period, users and unit of analysis were clearly defined.

Given the above, the immediate concern of current assessment studies emerges as mainly one: resolving the problem of availability of uniform use data (records).

In addition, records should become somewhat more comparable from place to place. At the same time, it must be recognized that a drive for such accountability presents a delicate problem in the larger picture of library operation.

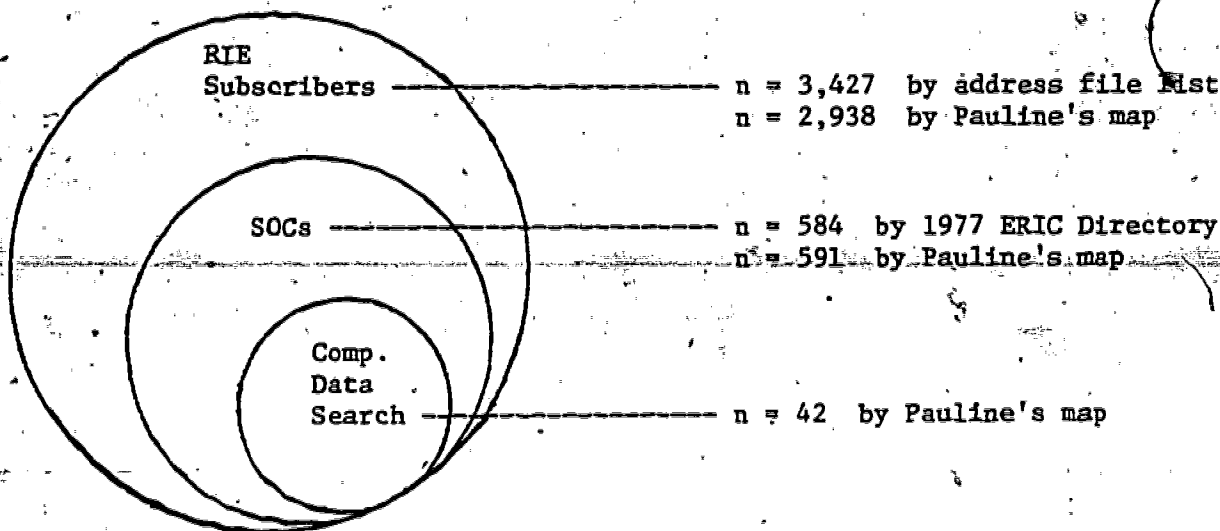
ERIC is one of many tools available to patrons; as such, its role in a typical library is not necessarily central, from the point of view of library staff and information specialists. Thus, there may be practical limits to staff willingness to devote sizable amounts of time working on ERIC records.

On a broad plane, ERIC use assessments can benefit most from a programmatic, incremental approach, where consecutive studies add on to the overall use picture in a reliable manner. A regular, long-term monitoring (use) and evaluation (impact) program should be drafted and gradually implemented by Central ERIC, if at all possible. Such studies could have the following desirable attributes:

- (1) Clear frame of reference, narrower conceptual definitions of user and use, with corresponding operationalization and measurement. The priority should initially fall on actual use, rather than potential or desired use, and user populations. Smaller, valid studies build a trustworthy picture faster; global, multi-purpose studies generate needs for further validations.
- (2) Clear separation and reporting of results based on firm records from those extrapolations based on unsystematic observations, or opinion.
- (3) Random probability sampling of clearly listed "populations".
- (4) Choice of data collection method, or combination of methods, which enhance response rates.

II. Research Design for ERIC Use Assessments

Let us now turn to some of the concrete steps that can be taken toward assessment of ERIC use. Our focus will be on domestic SOCs and RIE subscribers. Currently available statistics suggest the following Venn diagram:



A. Augmentation of Directory of ERIC Microfiche Collections.

Additional information collected via ERIC's questionnaire for the directory is seen here as the first building block toward valid use assessment study designs. Currently, the following nine items of information are being requested:

- | | |
|-------------------|-------------------------------------|
| name | equipment: a. microfiche readers |
| address | b. reader/printers |
| phone | services: a. hard copy reproduction |
| contact person | b. microfiche reproduction. |
| collection status | charges |
| | access days/hours |

We propose augmentation of this questionnaire by three more items of information:

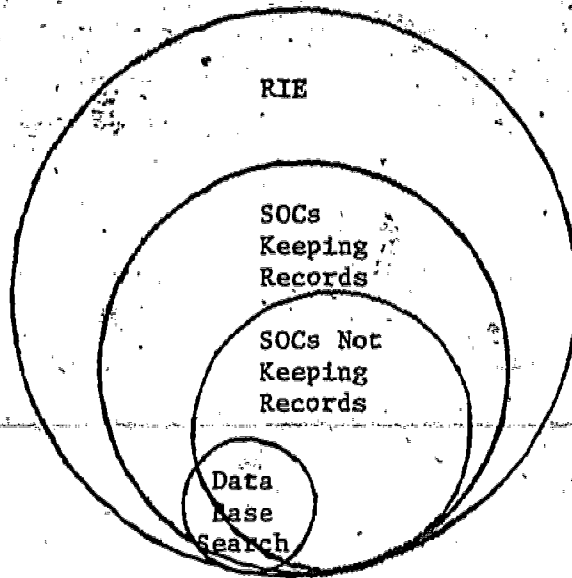
1. Under "services" add c. computer base searching, and
d. lending of microfiche readers and fiche.
2. Add a second page for a new item heading - "records of use".

Given such augmentation, the new questionnaire will consist of two pages, as follows:

Directory of ERIC Microfiche Collections																
Questionnaire																
<u>Page 1</u>	<ol style="list-style-type: none"> 1. institution name 2. address 3. telephone 4. contact person 5. collection status (years covered) 6. equipment available. <ol style="list-style-type: none"> a. # of microfiche readers b. # of microfiche reader/printers 7. services available <table style="margin-left: 20px; border: none;"> <tr> <td>a. hard copy reproduction charges</td> <td><input type="checkbox"/> yes</td> <td><input type="checkbox"/> no</td> </tr> <tr> <td>b. microfiche reproduction charges</td> <td><input type="checkbox"/> yes</td> <td><input type="checkbox"/> no</td> </tr> <tr> <td>c. computer base searches</td> <td><input type="checkbox"/> yes</td> <td><input type="checkbox"/> no</td> </tr> <tr> <td>d. lending microfiche readers</td> <td><input type="checkbox"/> yes</td> <td><input type="checkbox"/> no</td> </tr> <tr> <td>e. lending fiche</td> <td><input type="checkbox"/> yes</td> <td><input type="checkbox"/> no</td> </tr> </table> 8. days/hours available to the public 	a. hard copy reproduction charges	<input type="checkbox"/> yes	<input type="checkbox"/> no	b. microfiche reproduction charges	<input type="checkbox"/> yes	<input type="checkbox"/> no	c. computer base searches	<input type="checkbox"/> yes	<input type="checkbox"/> no	d. lending microfiche readers	<input type="checkbox"/> yes	<input type="checkbox"/> no	e. lending fiche	<input type="checkbox"/> yes	<input type="checkbox"/> no
a. hard copy reproduction charges	<input type="checkbox"/> yes	<input type="checkbox"/> no														
b. microfiche reproduction charges	<input type="checkbox"/> yes	<input type="checkbox"/> no														
c. computer base searches	<input type="checkbox"/> yes	<input type="checkbox"/> no														
d. lending microfiche readers	<input type="checkbox"/> yes	<input type="checkbox"/> no														
e. lending fiche	<input type="checkbox"/> yes	<input type="checkbox"/> no														
<u>Page 2</u>	<ol style="list-style-type: none"> 9. records on use (see below) 10. comments 															

As a result, we now will have information useful both to Directory readers and for the purpose of designing assessments of system use. More specifically,

based on the augmented questionnaire data, we can take the previously mentioned Venn diagram one step further:



We propose the following items for inclusion under records on use, page 2:

9. records on use

Please indicate which of the following usage statistics you keep, if any:

- # fiche circulated yes no
- # fiche duplicated yes no
- # paper copies made yes no
- # manual searches yes no
- # computer searches yes no
- # orders from EDRS yes no
- uses of RIE, CIJE, Thesaurus yes no
- # of clients served yes no
- types of clients served yes no
- purpose of clients yes no
- other usage records (please explain) _____

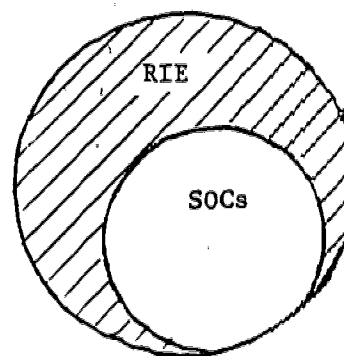
The proposed inquiry on records given above is purposely brief, as the main goal at this stage is to prepare an accurate list of the SOC dichotomy -- those with and those without usage statistics. Once completed, this phase of information gathering will serve as the basis for the SOC survey which we envision; detailed data will be requested at the time of survey implementation. The discussion of such a survey appears in later pages of this report.

B. RIE Subscriber Questionnaire.

The next step would be to turn our attention to the RIE subscribers. At the present time, we have a listing of these subscribers, but we lack much information as to their collection, equipment, or services relating to ERIC. In a number of cases we expect these to be minimal. It would be desirable to approach RIE subscribers in a manner similar to microfiche collections (SOCs). Periodic compilation of a comparable RIE subscriber directory could be the result of such an effort.

To this end, all known SOC's will be eliminated from the list of all known domestic RIE subscribers. Using Pauline's map data, this would mean that we shall eliminate the 591 known SOC's from the 2,938 known domestic RIE subscribers, thus arriving at 2,347 eligible RIE subscribers.

Whenever a known RIE address is listed for more than one subscription, it will still be counted only once.¹ Using the Venn diagram again, we are now looking at the shaded population:



1. Normally, we can assume that all SOC's subscribe to RIE. However, researchers should be alerted to possible anomalies. For example, according to 1976-77 data, Arkansas had 3 RIE subscribers and 8 SOC's, which leaves 5 SOC's without an RIE subscription. The appropriate checks should be made for these and similar anomalies at the time of any future study.

Given the above numeric estimates, an RIE directory would mean four times as many questionnaires and a correspondingly large publication, compared to the SOC Directory. Nevertheless, the purpose of contacting RIE subscribers is to establish a baseline of information unavailable previously; thus, a complete overview (census), rather than sampling, is recommended as serving the goal of full description best. The magnitude of the effort can be limited by reducing the scope of the questionnaire submitted to each RIE subscriber. Thus, we propose the following items for inclusion on one page:

Directory of RIE Subscribers

Questionnaire

- 1. Institution name
- 2. Address
- 3. Telephone
- 4. Contact person

These should be printed in ahead of time, as they are known. The respondent would have the opportunity to mark any corrections or changes that might be necessary.

5. RIE subscription status (year started)

6. Other ERIC tools available:

CIJE yes no

Thesaurus yes no

7. Equipment available:

Microfiche readers yes no

Readers/printers yes no

8. Any ERIC related services (please describe): no

charges: _____

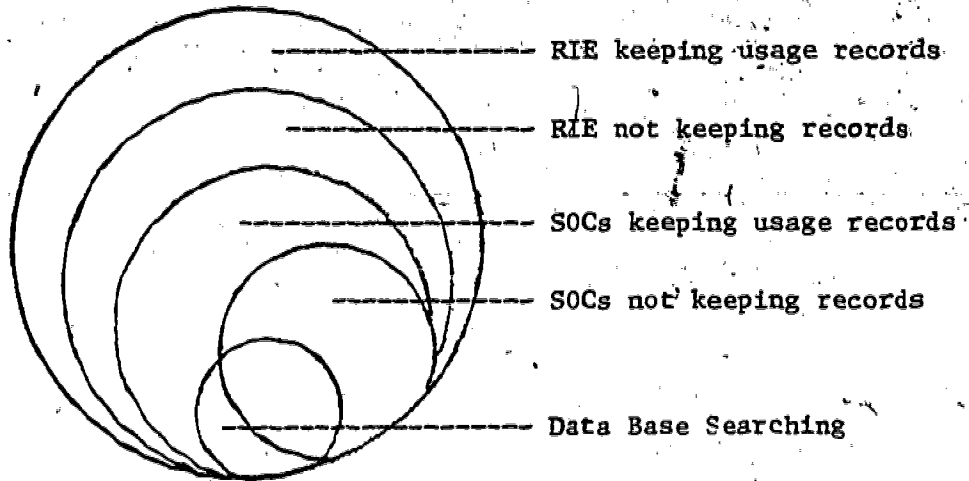
9. Any ERIC related usage statistics you keep (please describe): no

10. Comments: _____

THANK YOU FOR YOUR TIME AND COOPERATION!

Examples can be added for items 8 and 9, if deemed necessary by the Directory project coordinator; the questions are purposely open-ended.

After all responses are received and the data properly tabulated, a more specific descriptive image of non-SOC RIE subscribers will emerge. For example, RIE subscribers could be divided into relevant groups, i.e., by availability of tools other than RIE, or equipment and services related to ERIC. Most importantly, a dichotomy based on presence or absence of records (#9) can now be generated. Again, the Venn diagram, serving as our working frame of reference, is taken still one step further:



Some surprising results may introduce changes in this scheme. For example, some non-SOC RIE subscribers may report access to data base searching.

C. Surveys on Usage.

At this point a project director may be ready to begin actual ERIC usage studies' design. This is so because, assuming that previously described steps have been taken and the designated information obtained, two important tasks have been completed:

- (a) Clear separation of ERIC outlets keeping records from those

not keeping records is now possible. This means that further down the line, reporting of results based on firm records can be separate and distinct from other economic situations.

- (b) Proper sample...

...

...

...

...

...

...

places the record keeping and non-record keeping SOC's throughout the USA. Then, two separate random samples are to be drawn from either population. Thus, the SOC would be in the same position as the studies implemented in the time period. Both studies would be conducted at the same time.

the SOC directory and pre-coded on the form sent to respective institutions. A provision for correcting or updating of pre-coded information should be made.

ERIC Microfilm Edition
 Stanley E. ...

1. ...
 2. ADDRESS
 3. ...
 4. ...
 5. ...

11
 12
 13
 14
 15

11	12	13	14	15	16	17	18

7. How would you characterize the placement of ERIC materials and services at your institution:

consolidated in one location

ERIC TRAINING CENTER

ERIC
ERIC
ERIC
ERIC
ERIC
ERIC

ERIC
ERIC
ERIC
ERIC
ERIC
ERIC
ERIC

- # community individuals
- # government (local, state) agency staff
- # others (specify) _____

12. Purpose of client activities:

- # elem/secondary staff
- # college instruction
- # elem/secondary teacher
- # college course work
- # theses and dissertations
- # program development
- # curriculum development
- # proposal development
- # administrative plans
- # personal/professional
- # other (specify) _____

12
12
12

- 12 110
- 12 111
- 12 112
- 12 113

17. If Central ERIC prepared such a common SOC record-keeping form, would you be interested in using it?

yes no

The non-record k

1 name to display

ADDRESS (including zip code)

PHONE # () -

THE PR OCE D U R E

REGORIES

survey to be implemented as a "mailed questionnaire only" study, given the dismal response record of previous attempts.

Again, the project director, because of limited resources, and cost limitations,

units; hence, if needed

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Havelock, R. ERIC

Horne, E. A Profile 1976. ERIC

Katzenbach, J. Dis

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APPENDIX III

Level III ERIC Usage Study

ERIC "Impact Studies": Methodological Recommendations

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ERIC "Impact Studies": Methodological Recommendations

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ERIC "Impact Studies": Methodological Recommendations

In any empirical study of ERIC impact (in fact, in all empirical studies in all of the sciences) the investigator has two ultimate concerns or questions:

- (1) to what extent is the impact of ERIC on the educational system and (2) to what other factors are responsible for the educational system's performance.

end-user would require the following four steps.

1. Randomly divide the current and potential end-users into two groups: those who will see the proposed change (at least for the duration of the study) and those who will see or come in contact with the current system. The proposed change is to be implemented in the current system.

To analyze this as a true field experiment, an alternative set of four steps need to be followed.

1. If all of the plots are to be involved in the study, here

are enough of them to apply simple randomization that is,

there are N plots and n are to be selected from them.

Some of the plots are to be selected from the N plots.

Some of the plots are to be selected from the N plots.

Some of the plots are to be selected from the N plots.

Some of the plots are to be selected from the N plots.

Some of the plots are to be selected from the N plots.

(e) Never discard a unit from the list because it doesn't match very well with its paired unit. If one or more units need to be discarded, do this first (before step a) and if possible, randomly choose which units are to be discarded.

2. Make or permit the proposed ...
 units. And with ...
 at ...
 the ...
 long ...
 units ...
 the ...
 the ...
 the ...
 the ...
 the ...

1. True experiments require that some units (end-users) be denied the proposed change. Since the change would not be recommended unless it was believed to be better than the current situation, it would be unethical to conduct an experiment and deny anyone what is thought to be a better treatment.

continue to support ineffective programs.

- 1b. With regards to ERIC it is doubtful that denial of the proposed change in policy or procedure will be as harmful as say the denial of a new medical treatment to seriously ill patients. Moreover, the denial of the proposed change is not permanent -- it need only continue for the duration of the study. With little additional effort, corrective action can be taken after the study has determined whether or not the proposed change is, in fact, an improvement. Those end-users in the "poorer" group can be given the opportunity to make use of what was available or permitted in the "better" group. In fact, if the impact study leads to an improvement in ERIC then those in the "poorer" group may profit from the study by being able to avail themselves of the changed system.
- 2a. While it is easy to conceive of the situations in which true experiments cannot be carried out -- as in the measurement of some ongoing, unchanged operations -- true field experiments are possible more often than might be believed.

ERIC impact studies deal with the effect of a service or product given to an end-user. If a product or service can be given, it can also be withheld. So at least potentially, one of the requisites needed for randomization exists in most, if not all, impact studies.

This is important to emphasize because the step-by-step experimental guidelines above have dealt with only one way to effect a change in the end-user, by changing ERIC. This is not a requirement for an experimental impact study. The re-

quirement is to effect a change in the life of the end-user, and as mentioned above, this may be accomplished by withholding services instead of by changing ERIC.

There are other indications (see also Cook & Campbell) which suggest that randomization may be possible. Whenever the number of requests for a specific ERIC product exceeds the ability of the system to supply that product, the choice among requestors can be made randomly. Or, in more general terms, whenever a proposed change is difficult, expensive, or time-consuming, it cannot usually be implemented all at once everywhere in the system. A random implementation plan will allow true field experiments.

One potential difficulty with field experiments is contamination between those who are to receive the proposed change and those who will not. This problem is alleviated somewhat whenever the experimental units (end-users, CHs, or SOCs) are unknown to each other or are separated spatially or temporally. Since this describes many ERIC end-users (and some CHs and SOCs as well), true field experimental impact studies of ERIC are an even more attractive alternative.

- 2b. Many true field experiments have been conducted in medicine (which may seem to be more amenable to laboratory-like procedures), in criminal justice (e.g., who should be required to pay bail), in education, in welfare reform, in television advertising, and in other areas. It is difficult to imagine that they would be impossible to conduct in other areas, such as in ERIC impact studies.

Some manufacturing plants use a quality control proce-

cedure called EVOP (evolutionary operations). It is an experimentally based procedure built into the everyday production process. By means of EVOP, changes are made on a regular and systematic basis to continually improve the cost-effectiveness of the product (see Box and Draper).

In addition to these two general objections, impact studies of information systems suggest another, more specific objection.

3. True field experiments are so rich with uncontrolled stimuli and the measures available to assess impact are so weak, that any real difference in impact between the two groups of end-users will not show up in the results. The true results will be either hidden in the noise of the other stimuli, or not measured with instruments sensitive enough to discern them.

Without denying the premises in this objection, it should be noted that,

- 3a. Many non-experimental studies of ERIC have contained some assessment of impact. These studies used impact measures which differentiated among classes of people (such as users and non-users). Because the only key difference between these studies and true field experiments is how people become members of the user or non-user group, there is every reason to believe these same measures can be used in experimental studies of impact.

B. Other Research Designs.

True field experiments should be the first choice of a design for ERIC impact studies. And as the previous section argued, such designs are possible

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line the effect of a change in policy or procedure. Usage studies in information systems are especially vulnerable; the manager compares the previous set of usage figures with current data and attributes the difference to some specific change which occurred in the interim. This design should not be used.

Design II is much better. By making use of several before and after measures, a careful researcher is more able to identify the effect of the change on the end-users. It is important that the different measurements be the same or comparable -- the same instruments and observations taken from comparable samples of end-users. Either the same group of end-users can be measured every time (as in a panel study), or different random samples of end-users can be employed. Each alternative has its attractive features and its liabilities. The panel study is subject to systematic "dropping out" of participants, biasing the panel and possibly causing whatever differences are obtained between the before and after measures. Use of different random samples eliminates this problem, but prevents any assessment of the long run effect (impact) on individual end-users. Analyzing the results of this design is not straightforward and will require some expertise in statistical techniques (see Lass, Willson, and Gottman).

Design III needs to be described in more detail. It requires two groups of end-users: the members of one group are able to avail themselves of the change, those in the other group are not allowed to do so. This design differs in three important ways from the first true experimental design described earlier: (1) Design III requires one set of before measures from both groups of end-users; the experimental design did not use any before measures. (2) Design III can use intact collections of end-users -- such as two SOCs; the experimental design requires that the groups be created through randomization.*

The alternative true experimental design presented earlier makes use of intact units also. The fundamental difference between the alternative and Design III

(3) Design III uses a coin-flip to decide which group is to be given the change in procedure or policy; the experimental design uses a coin-flip to decide group membership for each end-user.

Design III can be implemented in the following manner. For the purposes of simplifying the presentation, only two units (naturally occurring collections of end-users) will be considered.

1. Identify the two units. Ideally, these should be as similar as possible in terms of all measures related to impact. And therein lies most of the difficulties with this design. If the two units are selected because of availability or by administrative ruling, they may not be similar enough. If the researcher is permitted to choose among several available units those two which are most similar, the selection procedure itself may decrease the trustworthiness of the findings. To avoid, but not prevent, the latter problem, the before measures should not be used to find similar units, nor should any end-users be discarded from a unit in order to improve the degree of similarity.
2. Make or permit the proposed change available to one unit and withhold it from the other unit. The choice between units should be determined randomly if possible.
3. Devise an instrument to measure the impact of the proposed change. Try to have all end-users, or a large random sample of all end users from each unit complete the instrument.

has to do with the conclusions. The alternative true experimental design must have many units and the results apply to units. Design III only needs two units (it may have more) and its results apply to the end-users.

4. Tabulate the results and compare the two sets of end-users.

If the two units were similar enough on all essential variables, then any difference in impact between the units can be attributed to the change.

Design IV combines the attributes of Designs II and III; there are two units of end-users and each is measured several times before and after the change is implemented. As before, it is important that the two units be similar and it would be helpful if the choice between the units (which is to receive the change) be determined randomly.

C. Measurement Considerations.

These include who to measure, how to measure them, and what to measure. These are general recommendations -- specific impact measures are discussed later in the paper.

1. Obtain micromeasures as well as macromeasures. King and Bryant distinguish between these as follows. Macromeasures are aimed at determining the total impact of the information system or a component of that system. On the average, how well is it functioning? How effective is the information system?

Questions of turn-around time, accuracy of information, timeliness of information, coverage of collection, form of output, and cost are some common macromeasures. They are at the macro-level because an aggregate conclusion is made about the average response or the general tendency.

Many investigations of information systems deal only with micromeasures possibly because they are easier and less costly to obtain. But the improvement of any operation depends upon the incremental elimination of failures (instances of poor performance). Micromeasures are a study of individual failures. Why did this particular unit have such poor performance? Why was turn-around time

so long? Why was it more costly than others, etc.? By examining each instance of failure it is possible to determine if the situation was atypical and ought to be ignored, or if it can be traced back to the same source as other failures -- in which case remedial action needs to be taken.

When impact is being studied there are several major potential sources of failure and it will often be difficult to reliably determine the source of those failures.

-- collection failures: the selection or production of ERIC products, the coverage of the data base, the accuracy and recency of materials, etc.

-- organization failures: the arrangement and classification of products

-- delivery failures: the availability of products and services and the timeliness of their delivery to the end-user

2. Measure non-users as well as users. There are two concerns here. First there is the question of frame of reference. If ERIC is the focal point, the investigation is of users and their role, reactions, behaviors, etc. as a component of ERIC. This frame of reference, while valid and often useful, is limited. It cannot deal with educators who obtain ERIC materials indirectly; it precludes a microanalysis of non-users -- are they "failures" of promotional materials, of accessibility and location of the SOCs, or of pricing structure; and it eliminates any direct comparison of ERIC users with non-users -- which, if systematic differences were found, would certainly affect any conclusions drawn about the impact of ERIC.

The alternative perspective, though more costly to implement, is recommended. It has people as the focal point and determines the role and impact of ERIC in

their professional lives.

The second concern is an old one, but well worth repeating even though most ERIC impact studies avoided the problem. To study users one must deal with real users, not surrogate users such as experts or judges. Surrogate users can judge impact, usefulness, quality, or relevance in a very limited sense. Moreover, surrogate users have a difficult time interacting with ERIC which also limits the usefulness and applicability of the obtained data (see D. Swanson).

And finally, it should be pointed out that a comparison between users and non-users, while recommended, cannot adequately serve as a substitute for a true experimental design. True experiments require "identical" groups for comparison. Since people select themselves into a user or non-user category, these groups are rarely identical.

3. Obtain trustworthy measurements. To obtain reliable and valid measures careful preparation, training, and pretesting are essential. Using several measures rather than one will help, as will unobtrusive measurement.

The vast majority of ERIC impact studies make use of questionnaires or interviews. The specific wording, format, and order of each question or item can potentially affect the response or the investigator's interpretation of the response (see Noelle-Neumann).

One common example of invalid measurement in the study of information systems occurs when the investigator asks potential users their needs, but gets instead their expectations. Frequently used technical terms are often ambiguous to respondents lowering both the reliability and validity. Of particular concern are terms like "usefulness", "satisfaction", and especially "relevant".

Researchers should also be wary of using the general global opinions of end-users as a major impact measure. Carefully measured opinions can provide

some clues as to overall functioning of the system, and each end-user's response can be analyzed as a micromasure. But a major weakness of such opinions is that they may bear no relationship with the quality or impact of the system — participants, respondents, and end-users are likely to be quite favorably disposed toward ERIC even if a more objective approach identifies serious weaknesses (see C. Weiss, p. 41). The safest way to interpret the opinions of end-users is by comparing them with a suitable comparison (such as in an experimental study):

ERIC impact studies often need to focus the end-user's attention on the past: questionnaires and interviews ask about prior usage and the impact of that usage. General questions of this sort can provide trustworthy information only if the end-user's memory is accurate. That is not usually a safe assumption. To minimize this problem, it is helpful to focus the end-user's attention to a specific, recent interaction with ERIC and frame all questions in terms of that "critical incident".

While single measures which are highly reliable and valid are desirable, they are often hard to find. Another approach (which should be used in conjunction with the improvement of each measure) is to use several related measures and look for some commonality in response. Several measures which agree are clearly more trustworthy than a single measure. Though it helps to ask the same impact question of ERIC users in several different ways, it is still better to base an investigation on behavioral as well as verbal responses.

- Did potential users report that ERIC has an impact on their professional lives (verbal)?
- Did potential users demonstrate that ERIC had an impact on their professional lives (behavioral) by using ERIC products

or services (e.g., citations in articles written by the user, change in teaching practices in the classroom, etc.)?

Another advantage of some of the behavioral responses is that they may be observed unobtrusively -- without the user knowing they are being observed.

If the process of measurement does not impinge on the user it cannot distort the findings. Checking citations for sources provided by ERIC is an example of unobtrusive measurement.

II. Measures for ERIC Impact Studies*

While there are hundreds of measures proposed or used in the assessment of the performance of an information system, there are very few commonly used measures of impact. It is clear from the literature that the state-of-the-art of impact measurement is still in its infancy. Part of the difficulty has to do with the subjective, non-quantitative nature of impact assessment. And part of it has to do with the fact that practically all of the other measures used in system assessment are irrelevant (or almost so) to impact. For example, in a study of the performance of an information system, accuracy measures based on relevance (e.g., recall and precision) will usually matter. However, in an impact study of the same system, end-users may find the retrieved information to be useful, helpful, and having an effect on their professional lives regardless of the relevance of the retrieved documents in terms of their original information needs.

In measuring impact, it is important to keep in mind that ERIC end-users are like everyone else -- they are not always systematic in their searching behaviors, they often change what they want and what it is wanted for, and they are quite willing to follow an unexpected information path if it looks interesting

*I am indebted to Professors Michael McGill and Judith Tessier for their assistance in the conceptual development of this section.

or promising (see Taylor; Dervin). This suggests that what seems to be a logical impact measure may not be. For example, a citation count of an educator's use of ERIC documents may only be an impact measure in the very weakest sense. Such behavioral indices need to be substantiated with some assessments of how the citations helped the educator.

After reviewing what little literature there is on impact, three somewhat overlapping measures stand out: savings, novelty, and uses. Before considering each of these individually, two reminders seem appropriate. First of all, ERIC affects not only those educators who interact directly with the system at its official outlets (e.g., SOCs, CHs, EDRS), but also those educators who obtain ERIC materials or benefits from ERIC services indirectly (e.g., from other educators). Impact studies should include both types of end-users. Secondly, the impact of an information system may be quite a bit more than the sum of the impacts of each information item. ERIC users may interact with an intermediary and refer to the thesaurus before obtaining documents. Each of these contacts can affect the user in some meaningful way, and a thorough impact study should include the end-user's total interaction with ERIC.

A. Savings.

One type of impact is evident if an ERIC product or service can be shown to save users time or resources. It is difficult to obtain any objective measure of such savings. Cooper's "naive methodology", though difficult to implement in practice, is in principle on the right track. He suggests that users be asked to estimate the value of each document produced by the system and quantify that value by assigning an amount in dollars (which may be positive, negative, or zero). The user judges each document in the order in which they appear from the system; if the user changes his mind about the topic, if he

stops before considering all of the documents, if a later document duplicates the information in an earlier one -- if any of these rather common events occur, they will be reflected in the dollar estimates.

Dollar estimates for each document can be summed to obtain a measure of the utility of the total search interaction. By comparing these values with those obtained from alternative versions of the information system, Cooper hopes to obtain a useful measure of system effectiveness.

The "naive methodology" can be extended to assess impact. Users can be asked to estimate the dollar savings which might result from making use of the information in each document. Or they could estimate productivity changes or time savings, and transform these into dollar amounts.

Such subjective judgments need to be interpreted carefully. One approach which will help is the use of a comparison group -- by comparing the subjective dollar impact judgments between the groups, biased estimates of the difference in impact between ERIC and an alternative source. It would also help if each user is asked to focus on a specific education problem or project and describe in some detail where the savings are to come from.

Savings in time can be assessed in a similar manner. However, a true field experiment with several "after" measures will provide a more objective measure of one aspect of time savings: not savings on the job, but the amount of time ERIC saves in locating information products. By comparing ERIC users with non-users periodically over several months, one could learn how long it takes the non-users to "catch up" with users in terms of their knowledge of, familiarity with, and use of various information sources and products.

Some discussions of impact measures propose that avoiding duplicating previous research is a type of time savings. Though this will save the user time, it has questionable impact on the profession as a whole. Education, like many

of the applied social sciences, needs more research replications, not fewer, if it is to be able to separate those research results which are true and should be believed from those which are false and should not be believed.

Ease-of-use and response time are two performance criteria which provide an

additional... the system... operation...

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get of tea...
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d) A...

7

IMPACT OF ERIC ON THE USER

A "Worthwhile" Impact Between ERIC

... by ...
... in ...
... the ...
... ERIC ...

D. An Approach for Measuring Impact.

Impacts on the profession are relatively easy to measure, but a study of the effect of IMIC on the profession goes beyond a mere count of publications, speeches, and other materials included in the relevant procedure which can reflect, in a limited way, the impact of the program. Notice that with the...



solved or they may have already been resolved. What matters is that the respondent can recall the problem in some detail.

3. All important aspects of the problem are then listed in chronological order. This task is aided considerably by dividing it into a few separate steps. The steps are listed in the following order:

deAA

and related fields. Question (d) is the "how" question for personal impact. And question (e) provides the measures for a failure analysis.

later in the interview...

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6

A. Research Design and General Measurement Considerations.

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 the...
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-- "What were its bad or awkward features?" (Timble & Coombs)

In those studies which included users, only [unclear] years [unclear] [unclear]
and Benson asked librarians to estimate user [unclear] [unclear] [unclear] see
[unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear]

[unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear] [unclear]

respondents to estimate the effect that their use of ERIC has on their stu-

dents. Sieber used the following questions:

-- "Did you talk about any of the following with your students?"

1. ERIC

2. ERIC's full text

time savings) which supported the user's reply.

-- Savings were implied by the goals of SIC and inferred by sales or subscription figures. (Burchinal)

-- "If your institution has any [unclear] where) have you obtained them" or [unclear] the natives was "at personal expense" [unclear]

FROM Application [unclear] others? (if yes [unclear])

[unclear] ([unclear])

tion important materials that you probably would not see elsewhere?" (A. often; B. occasionally; C. never) (Fry).

-- If you need information to solve an important problem in your work, what is the farthest that you would be willing to go to examine it?" (6 alternatives ranging from "same office or room" to "another town or city in another state") (Magisus)

place?" (6 alternatives ranging from "same office or room" to "another town or city in another state") (Stant)

not

uses were asked, including subjective appraisals, personal impacts, open-ended rating scales, and open-ended critical incidents

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... rating ...

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... as ...

- other school or agency personnel appreciated me more
- pupils learned faster
- it helped with pupils' growth
- pupils' discipline was improved

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centage -- estimate if necessary." (Followed by a list of specific alternative uses.) (Horne)

-- "In your judgment, what have been the purposes of the ERIC microfiche searches? (rank in order, most important)" (Followed by seven specific alternatives.) (Hull)

... information ... (Followed by specific alternatives.)

...

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"As a result of using this document, did you examine any of the documents cited? (If yes, was the content of the document what you had been led to expect by the content of the bibliographic reference?)" (Wanger)

"Would you recommend this document to your colleagues in the educational community? (If yes, for each purpose given below, indicate how useful you believe it might be.)" (7 alternatives, each rated on a 3-point scale ranging from "very useful" to "not at all useful".) (Wanger)

IV. Research Designs for ERIC Impact Studies

A. General Considerations.

The diversity and characteristics of the various ERIC products and services precludes any single research design to assess their impact.

ERIC has total control over the type of products and services offered, their format, style, arrangement, and frequency. Any planned change in one or more of these characteristics has the potential to be studied experimentally -- such as by introducing a new product slowly and at random, or by maintaining both the old and new versions with random distribution of each. For example, a new thesaurus can be distributed to the SOC's in two waves; the first wave to a random half of the SOC's and the second wave to the remaining SOC's, but only after collecting impact data from end-users or both groups of SOC's.

In a similar vein, experimental or acceptable non-experimental impact studies can be implemented whenever new organizations are added to the ERIC system as SOC's. Randomly pair the organizations and delay providing materials to one set of the pairs until after the impact study is completed.

Assessing the impact of computer tapes is more difficult because ERIC does not provide a computer searching service. Some experimental studies of the computer tapes may require the cooperation of the service providers. Or, it may be possible to produce two versions of the computer tapes and distribute

each version to a different group of service providers. By carefully choosing which SOCs to study, an experimental or an acceptable non-experimental design is possible.

And lastly, users and potential users of carefully selected SOCs and CHs should be queried on a regular basis. This will begin to implement a regular study of performance and impact, it will obtain micromeasures, and it provides the needed before measures if any one of the three acceptable non-experimental designs are to be carried out at a later time.

B. A Detailed Example.

Information Analysis Products (IAPs) are an important and expensive component of ERIC. Well over 1000 were produced in 1975. Several years ago they occupied a larger portion of each CH's budget (Wanger reports 40-45%) than they do now (about 10-20%), but that is still a considerable amount of money. Presumably the intended impact of the IAPs is to make the materials more accessible to, and more understandable by, end-users.

This section will briefly review Wanger's study -- the only study which focuses on IAPs and will outline two research designs which could have been conducted when the IAPs were initiated, and to some extent, can still be conducted to assess their impact.

1. Wagner's study (ED 064 527-8). Wanger studied the reactions of a wide variety of educators to a sample of 135 ERIC CH products prepared in 1969-70. Her first questionnaire (Q1) was sent to over 4000 educators, some of whom were selected randomly and the rest chosen more purposefully from ERIC mail lists and similar sources. The response from Q1 (return rate = 64%) was analyzed to separate the educators into two categories: users of ERIC and non-users. The non-users were sent a second questionnaire (Q2) and asked

to react to 10 surrogates of ERIC products. Replies from Q2 (return rate = 68%) were divided into a reader and non-reader category. The non-users (N=361) were sent a third questionnaire (Q3). A fourth questionnaire (Q4) was sent to a separate sample of education specialists who were asked to read some of the ERIC documents and react to them.

ERIC products were analyzed in terms of

- quality: coverage, up-to-dateness, format, clarity of writing
- utility: use, degree of usefulness, relevance, need
- impact: (asked only of readers), how was it used in their everyday decisions

The major findings indicate that ERIC products are known and positively valued, used and useful to a limited public. In the analysis of impact, Wanger found that ERIC products assist educators in their everyday planning, classroom applications, research design, and other professional decision-making situations. Readers of ERIC products serve as information sources to other educators multiplying the impact. And readers of ERIC bibliographies report that they use them to find other helpful items of information. Wanger concludes that the products are favorably received but underutilized. She recommended that "two separate evaluation studies be conducted in the future"

- An assessment of the outreach of products, using both random and non-random samples, should be made periodically, particularly after the implementation of an improved announcement system or of modifications to the delivery system.
- A continuing evaluation program should be instituted to provide the original units with current feedback on NCEC products

It is very interesting to note that these recommendations fall within the spirit

of EVOP. But the key component of true experimentation is not mentioned. This is an important consideration, because no matter how competently executed the study (Havelock notes some weaknesses in the questionnaire methodology), it is still subject to difficulties arising from self-selection of respondents to analysis categories. That is, users (both readers and non-readers) and non-users of ERIC products may differ on various personal and professional related variables -- which will hamper any unambiguous assessment of the impact of these products. Or to give another example, ERIC users may be regular searchers for new information. In such a situation, it would not be justified to conclude that one impact of an ERIC produced bibliography is the number and use of new information items; the reader might have found these items, or even better items, if the IAP were not available. Only a true field experiment can cope with these potential problems.

2. A true field experiment. In order to remove the potential problem of self-selection inherent in survey research, it will be important to make a comparative analysis among groups of educators who are (or who are not) ERIC users.

In this proposed study, only ERIC users will be included.

The users need to be identified and randomly split into two relatively homogeneous groups: those who received one or more IAPs and those who have not.

Given that the users in both groups requested the IAPs (and given a large enough sample of educators in each group, then any difference between the groups in terms of various impact measures can be attributed to the IAP.

The study can be conducted at a single CH or at many CHs. And depending upon the scope of the study, it may require the cooperation of EDRS in order to include those users who request IAPs from that source. For simplicity the study to be described here is in terms of a single CH.

1. When requests for IAPs are received, a coin-flip is used to decide whether or not the request will be honored. Those denied the IAP can be told it is "out of print" or they can be told, at least in some general sense, something about the study. Of course, if those denied are told about the study, those who were not denied should also be told.

A complete record of each IAP request is needed, including date of request, requestor, IAP requested, and whether the request was honored. If the demand for certain IAPs is particularly heavy, it would be useful to stratify the groups in terms of IAPs; try to keep an equal number of denied and not-denied requests for each of the high demand IAPs.

2. At some time later contact all requestors to determine the impact of the IAPs. For bibliographies one could ask if the citations found were previously unknown. Were they read? Were they thought to be useful? Were they actually used? And if so, how were they used? Note that the same question will be asked of those denied and those not-denied. For review articles the measurement problems are a bit more difficult but one possibility is to interview requestors of the same IAP and ask what they have thought about and completed since the request. Were those denied more likely to drop a line of inquiry? Were those denied less productive in terms of the subject matter in the IAP? Did it take a longer time for those denied to discover the information in the IAP?

The interviews can be conducted by mail, phone, or in person, depending upon the depth and complexity of the specific

question asked and the budget of the study. It is important, however, to ascertain the fact that those denied an IAP by the CH did not obtain a copy elsewhere.

The timing of this interview is important and with a large enough sample size it would be best to conduct the interview over different subsets of requestors at different time periods -- say two weeks after replying to the request, plus one, two, four, and six months after. This would permit an assessment of "catch-up" time, which as mentioned earlier, is in some sense an impact measure.

3. When the study is completed, it may be useful to maintain a more limited program of random denials for IAPs across all the CHs. If properly conducted, it can provide a trustworthy mechanism to assess any changes in ERIC policy or procedures regarding the IAPs.

3. Non-experimental approaches. Though it appears that randomization of end-users is possible within a given CH, it may be too difficult to carry out in actual practice. Other research designs (II, III, IV) are possible. However, there are some peculiar problems studying IAPs which makes these designs less attractive alternatives and more difficult to implement. IAPs are products of CHs and CHs are subject-specific. Therefore, if CHs are treated as units, the subject matter confounds the results. That is, will the obtained differences between the units be due to the availability of the IAPs or due to the subject matter? Unfortunately, there is not any simple solution to the problem -- a true field experiment is clearly the best choice. But assuming that is impossible, the next best alternatives are to:

- work with only one CH (as in design II) and limit the conclusions to the end-users of that CH and to that subject matter
- use many CHs and employ randomization to divide them into two groups in an attempt to "equalize" the groups in terms of subject matter

V. Summary

Impact is the ultimate goal of any information system — to have an effect on the lives of its users. However, studies of information systems rarely deal with impact, primarily because it is difficult to measure. Instead, other goals or sub-goals (such as effectiveness or efficiency) are analyzed. The purpose of this paper was to discuss and recommend methods and measures which could be used in future studies of the impact of ERIC. Certainly few of these recommendations are new. But because they have not found their way into research practice they bear repeating.

The major methodological foundation is to use true field experiments. None of the existing ERIC studies was experimental, causing their findings to be less clearly interpretable. Gilbert and his colleagues reviewed research studies in other human service areas and concluded that:

"one characteristic of nonrandomized studies that shows up in context after context is that even after repeated studies had consistently gotten the same results, there was always room to doubt the validity of the finding." (p. 134)

And, note that these authors found interpretation difficult even when several studies agreed. Studies of ERIC impact are too few and too different to form a reliable basis for estimating the amount of agreement among their results.

No single measurement recommendation was made. Instead, future researchers are encouraged to make use of those procedures and standards which are relatively well known. From the literature of information systems comes the suggestion to include non-users as well as users (no surrogates). Focus the initial question on people or their information needs rather than on the particular system being studied. And lastly, include the users' interactions with all components of the system and with his friends and colleagues afterwards (indirect usage). From the literature of social science measurement comes the suggestions to use several measures instead of one, including the use of unobtrusive measures. Improve the reliability and validity of all measures by pretesting, removing ambiguity, using critical incidents to aid recall, training interviewers, etc.

Taken together, these suggestions will improve the state of practice of impact assessment.

After surveying studies of ERIC, only 16 could be found which contained some impact component. Some of these studies were impressive in scope and in execution (e.g., Asher & Vockell; Fry; Hood; Sieber; Wanger). None of the 16 studies made a major or unique breakthrough in the measurement of impact. This is not a criticism but rather a reflection of what seems to be an accurate picture of the current state of impact measurement. New and powerful methods for measuring impact may not be easy to come by, and the surest road toward better impact studies is the systematic application of procedures which have been tried in related research areas.

Appendix A

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