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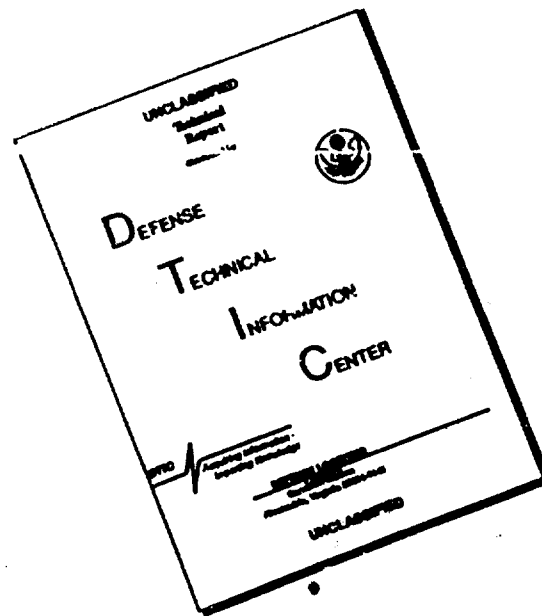# PLANNING FOR ON-THE-JOB TRAINING OF LIBRARY PERSONNEL

Everett M. Wallace, et al

System Development Corporation
Santa Monica, California

1 March 1968

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Planning for On-the-Job Training of

Library Personnel

1 March 1968

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TECHNICAL
MEMORANDUM

(TM Series)

Planning for On-the-Job Training of

Library Personnel

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March 1, 1968

SYSTEM

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A B S T R A C T

A plan is described for a project being performed by System Development
Corporation under sponsorship of the USOE and U.S. Army. The purpose of
the project is to provide on-the-job training courses for updating and
upgrading the knowledge and skills of library personnel. The need for
such supplementary training stems from increased demands on libraries for
services, increased rates of personnel turnover, and a growing lag
between personnel retraining practices and the rapidly changing require-
ments for personnel performance.

The personnel performance and knowledge areas chosen for attention during
the initial project are (1) reference tools and procedures, (2) foreign
and technical terminology, and (3) applications of modern technology in
libraries. The training approach to be used for all three areas emphasizes
flexibility and modularity in the course materials, and trainee-directed
self-testing and study. The work to be carried out in the project includes
task performance requirements analysis, training requirements analysis,
construction and pilot testing of the lesson packages, construction of
diagnostic tests for the skills and knowledges covered in the courses,
running of an evaluation experiment to test the overall effects of the
training courses, and documentation of these activities and materials.

The products to be delivered from this project include training course packages
for the three above-mentioned areas of library knowledge and skill; docu-
mentation of the methods and procedures developed in analysing the require-
ments for, and constructing, the training courses; and a report of the
evaluation study. Possibilities for application of the project approach to
other areas of library personnel training requirements are discussed.

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1.   PURPOSE AND SCOPE OF PROJECT

The 24,000 libraries in the United States are having increasing difficulties
in meeting the requirements imposed by expanding work loads and the changing
requirements of society. There has been a large increase in both the volume
and range of literature, on the one hand, and an increasingly large, literate,
and the demanding user population, on the other. Although the budgets, sizes
and number of libraries are increasing, literature coverage and services are
not effectively meeting the needs of today's library users, nor are they
adapting rapidly to the foreseeable requirements of the future. If the range
and quality of service are to be maintained, more efficient use of technology
and communication in the forms of improved equipment, interlibrary cooperation,
and increasing numbers of well-trained personnel will be required.

This project is intended to alleviate the problem of maintaining well-trained
personnel, through the development of on-the-job training courses to update
and upgrade the knowledge and skills of library personnel. This document
summarizes the background of the problem, presents a plan for developing and
testing training courses, and proposes an initial effort directed toward
training requirements in scientific and technical libraries.

The initial work under the current contract will be directed toward the
areas of reference materials and service, language, and technology in
libraries. After the present project has applied the developmental and
testing methodology to these three areas and effective instructional
sequences are developed, follow-on work can be undertaken to include other
areas of library work demanding improved training and skills.

1.1   BACKGROUND OF THE PROBLEM

In the years since the second World War, we have seen the emergence of a
dozen new technologies reflecting the immense growth of scientific inquiry
and engineering development. Associated with the growth of these technologies
has been the emergence of new conceptions, vocabulary, and varieties of
literature associated with the development efforts. It has been very difficult
for library personnel trained and educated in an older tradition to adjust to
these changes, both with respect to their ability to comprehend these new
subject matters and with respect to their perspectives on organizing, search-
ing, and handling new information and new literature. These developments have
been accompanied by equally great increases in specialization in all kinds of
subject areas, together with the development of specialized literatures that
reflect new perspectives and mission-oriented activities, rather than being
organized around the subject concentrations characteristic of academic
disciplines. One may expect over the next several years to see an continua-
tion--and, perhaps, even an acceleration--of these same trends.

1.1.1   Problems of Technology in Libraries

Over the past 20 years a revolution has been in progress in procedures and
capabilities of handling information. These changes have been due primarily
to the introduction of the digital computer and its associated technology.
During the same period many researchers have sought ways to apply these new
tools to library operations. The academic and research libraries of the
country had already reached a high state of development before the introduc-
tion of the computer. Long tradition and practice had developed a very
complex and intermixed set of clerical and intellectual procedures that were
beginning to bend under increased workloads and changing dimensions of access
and service required by the changing society. Tradition had also contributed
to a rather slow rate of innovation in library practice. One result has
been insufficient responsiveness to the rapid proliferation of varied new
demands for service. A second result has been a too-limited application of
automation, specialized equipment, or data processing techniques to libraries.
Data processing techniques have been confined primarily to support of technical
processes and circulation records, and the equipment and concepts used have
largely been those associated with Electronic Accounting Machinery (EAM).
Relatively few libraries have made use of computing machinery.

A major obstacle to the application of advanced technology to library
operations has been the lack of adequately skilled and trained individuals,
experienced both in the requirements of library operations and in the computing
art. The education and training of the great majority of professional librarians
and other library personnel has not fully prepared them to appreciate or assim-
ilate the capabilities and promise of the new technology. In a similar vein,
persons skilled in the computing art are rarely equipped to deal with the specific
and complex requirements of library operations. At present it requires a great
deal of time and effort to arrive at effective communication between system
specialists and other library personnel. One result of this communications
impasse has been that innovation and application of new tools have been slow, and
no wholly satisfactory application of data processing machinery has yet been
developed for many important library functions.

1.1.2   Shortage of Trained Personnel

There has long been a persistent and troublesome shortage of well-trained
personnel in libraries in all categories--professional librarians, library
technicians, clerks, subject specialists, language specialists, and systems
specialists. There are but 42 accredited library schools in the nation.
There is a larger number of unaccredited library schools, but most of these
have appreciably lower standards of admission, scholarship, and facilities.
Very few schools have provided anything other than purely introductory
courses in automated approaches, and even these are rather recent phenomena.

It is only in the past few years that schools have begun to offer specialized technical training courses that are appropriate to the new requirements for library service. The vast majority of working librarians have been educated in an older tradition that did not offer a good preparation to respond effectively to the newer demands.

There is also a need for more effective and systematic means of training personnel other than professional librarians. Almost all of the training for such personnel has been conducted on the job, rather than in a classroom. and it has most often been geared to the practices of the particular library, supervisor, and set of tasks. In terms of traditional routines, this has been a source of wasted effort, particularly for a considerable portion of the transient clerical staff. Clerks in all categories tend to be a highly mobile work force. While it is true that many of the larger libraries have formal training programs, these differ greatly from one another, and the skills so developed are not readily transferable to different libraries without further extensive explicit instruction. From this standpoint alone, if effective training methods were developed for clerical personnel, a great deal of professional skill and effort that are now expended in routine orientation, instruction, and surveillance for purely clerical procedures would be recovered and available for current professional tasks. In terms of future applications of advanced technology, much needs to be done to ensure that the library technicians and clerical staffs of libraries are brought to an appreciation and understanding of the requirements that automation will bring to their own work.

The other category of library personnel that needs to develop a detailed appreciation and understanding of the traditions and requirements of conventional library practice is that of systems specialists. Whether hired from outside the library organization or within, they are given the task of analyzing, designing and implementing automation programs. It is very rare for their experience or training to have provided sufficiently detailed knowledge of library operations to allow them to exploit applied technology properly for the library.

1.2   REQUIREMENTS FOR A NEW APPROACH

1.2.1   Inadequacy of Current Mechanisms

None of the present mechanisms for educating and training librarians, library personnel, or systems specialists if likely to meet the problems outlined here adequately in the foreseeable future. The majority of library schools will continue to produce librarians trained primarily in the conventional skills and with a conventional outlook. It will take some years for information science curricula now taking shape in several universities to develop adequate numbers of people skilled in both the arts and technology of library and information handling operations. To be sure, curricula of

1. Announcement and Dissemination

2. Acquisitions
   a. Gifts and Exchanges
   b. Ordering and Accounting
   c. Serials
   d. Reports
   e. Government Documents

3. Cataloging
   a. Descriptive Cataloging
   b. Subject and Classification Cataloging
   c. Files and Filing

4. Circulation
   a. Microform Systems
   b. Edged Punched Card Systems
   c. Optical Coincidence Systems
   d. EAM-Based Systems
   e. EDP-Based Systems
   f. Inter-Library Loan
   g. Accountability Records

5. Indexing
   a. Coordinate Indexing
   b. KWIC/KWOC Indexing
   c. Selective Dissemination
   d. Citation Indexing

6. Reference
   a. Copying and Reproduction
   b. Search Logic and Tactics
   c. Reference Sources
   d. Indexes and Abstracts

7. Special Collections and Materials
   a. Art
   b. Data
   c. Maps
   d. Law and Decisions of Quasi-Judicial Bodies
   e. Magnetic Tape
   f. Motion Picture Film
   g. Music
   h. Phonorecords
   i. Photographs
   j. Specifications and Drawings
   k. Patents

8. Management
   a. Planning, Accounting, Budgeting ... POSDCORB
   b. Personnel
   c. Records and Statistics
   d. Facilities and Equipment

9. System Development and Transition to Automated Support
   a. System Analysis and Design
   b. System Evaluation

Figure 1. Library Functions Requiring Training

both kinds of professional schools are changing, but they cannot meet the
needs for retraining and updating the education and skills of working library
personnel of all categories. The in-service training programs of most
libraries are also not currently adequate to these tasks. Figure 1 illustrates
some library functions requiring training.

In addition to the need for training in new, emergent skills, there is also
a need for improving the level of training in traditional skills of professional
and nonprofessional library clerical staffs. In-service training in most
library systems has been confined to orientation and a few lectures and work-
shops, and these efforts have not sought to measure the efficacy of the
instruction received, nor have they usually been wrought with an eye to a
systematic development of knowledge and skill over a period of time.

1.2.2.   The Approach of On-the-Job Training

It will be useful to differentiate the approaches that have been character-
istic of past in-service training programs from on-the-job training as
construed here. In-service training has most often used an approach of
having personnel take courses, attend lectures and workshops, and receive
general orientation in a library system. While such training could encompass
all library activities, most programs have been quite limited in aims and
scope. It has also been rare for such programs to have tested the efficacy
of the instruction or skills.

The approach of the on-the-job training project will be to design instruction
to assist in the mastery of skills, techniques, procedures and other activities
that are task-specific to a particular function or job in the library. It
will provide for systematic coverage of materials and procedures, it will
test both alternative instructional media and techniques, and it will provide
means of assessing the effectiveness of the instruction. This approach
requires a detailed analysis of job requirements and performance. The
components and devices that will be chosen to impart course content will
be adaptable to differences in knowledge, learning capacity, and cognitive
set. The training procedures will also be designed to give trainees some
degree of accomplishment and satisfaction in a reasonably short time.
Figures 2 and 3 illustrate the types of library positions that must be taken
into account, and some of the media that should be considered for their
effectiveness in imparting different kinds of information, and in developing
skills.

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┌─────────────────────────────────────────────────────┐
│                                                       │
│         1.  Professional Librarians                   │
│             a.  Acquisitions Specialists              │
│             b.  Catalogers                            │
│             c.  Reference Specialists                 │
│             d.  Administrators                        │
│                                                       │
│         2.  Language Specialists                      │
│                                                       │
│         3.  Subject Specialists                       │
│                                                       │
│         4.  Systems Specialists                       │
│                                                       │
│         5.  Senior Nonprofessionals                   │
│                                                       │
│         6.  Clerks                                    │
│                                                       │
│         7.  Instructors                               │
│                                                       │
└─────────────────────────────────────────────────────┘
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Figure 2. Library Personnel Requiring
Instruction

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┌─────────────────────────────────────────────────────┐
│                                                       │
│   Lectures * Demonstrations                           │
│   Personal Instruction                                │
│   Training Manuals                                    │
│   Textbooks and Readings                              │
│   Procedure Manuals                                   │
│   Charts and Diagrams                                 │
│   Slides + Sound                                      │
│   Motion Pictures                                     │
│   Television                                          │
│   Teletype Consoles                                   │
│   Teletype Consoles + Programmed Instruction          │
│   CRT Consoles                                        │
│   CRT Consoles + Programmed Instruction               │
│   Tests and Tasks                                     │
│                                                       │
└─────────────────────────────────────────────────────┘
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Figure 3. Teaching Devices

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2.   PLAN OF WORK

2.1   INTRODUCTION

Project work will result in three kinds of end products: (1) on-the-job
training course packages for improving the knowledge and skill of library
personnel in three selected areas of library work (reference tools, technical
and foreign vocabularies, and applications of technology to libraries); (2)
documents describing the details of the training technology procedures used
to create the training packages; and (3) a report on an evaluation of the
training packages. (The two kinds of project documentation will facilitate
the future application of the training package technology to other areas of
training requirements for library personnel.)

The plan of work that follows describes the activities leading to the delivery
of the above items.

2.2   APPROACH TO ON-THE-JOB TRAINING

The production of each of the three on-the-job training packages will involve
several main steps: (1) analysis of training requirements, (2) design of the
training materials and procedures, and (3) pilot tryouts and revisions. The
steps, which apply equally to the production of all three training packages,
are discussed below. Later, specific details of each training package are
described.

2.2.1   Analysis of Training Requirements

The several steps of the analysis of training requirements will follow some
basic procedures of job analysis. First, we will selectively gather existing
information on library positions and work, and will examine relevant training
materials such as the dictionaries, course outlines, materials, and textbooks
and training aids. From these materials we will prepare job profiles in the
form of "situations-and-skills-required" matrices. These matrices will be
used as job performance requirement checklists, to ensure proper coverage for
the next step of the analysis.

In this step we will conduct in-depth interviews and make on-the-job observa-
tions with several kinds and skill levels of library personnel at several
installations. We will interview library professionals and clerical workers,
as well as their supervisors, to determine as accurately as possible which
aspects and components of job performance are most in need of supplementary

on-the-job training. We will use three main criteria to identify these aspects and components: (a) those components that are used with an intermediate frequency (not so extremely high that personnel proficiency can be assumed, and not so extremely low that personnel proficiency is relatively unimportant); (b) components that are mentioned as key failure elements in critical incidents; and (c) components that are identified as "new," (in the sense that new technology, knowledge, procedures, or conditions have recently created new job performance requirements).

In step three, each job component with a supplementary training requirement will be subjected to a detailed behavioral performance description. To generate this description, the investigator will: (a) get a highly skilled worker to perform the work involved, while he observes and discusses it with him; (b) try to perform the work himself, noting his own needs for knowledge, his actions, and the results, and (c) observe other relatively unskilled persons performing the work. Finally, the behavioral performance descriptions will be circulated to persons highly skilled and knowledgeable in this work, for their concurrence.

2.2.2   Design of Training Materials and Procedures

The behavioral performance descriptions obtained above reflect the performance goals that will guide the construction of training packages. Thus, it will be useful to keep the project's fundamental training philosophy in mind during the analysis of training requirements. This philosophy considers as primary goals: (1) improving the trainee's skill in training and re-training himself, and (2) motivating him to improve his own knowledge and skill levels. These goals are thought important because, if accomplished, they would provide for longer-lasting improvement during the period of changing work patterns that libraries are now entering.

Two concepts are basic to the development of such self-help skills: performance standard and performance self-diagnosis. In developing the concept of performance standard for the trainees, we will emphasize two ideas: (1) that the actual existence of knowledge and skills can only be confirmed through performances that exhibit such knowledge and skills; and (2) that different situations may appropriately and legitimately call for different standards of customer service regarding matters of speed, exhaustiveness, accuracy, and degree of perserverance. The training sequences will be designed to provide practice in applying these ideas. We will also explain the concept of performance self-diagnosis and link it to the training situations.

Another major project goal is to develop means of sensitizing the trainee to the need for, and techniques of, planning and managing complex tasks, to maximize the performance returns available from his own capacity to learn.

He needs to learn, for example, how to decide what parts of a memory require-
ment for a task can most efficiently be relegated to standard available
reference works and other materials; what parts will require the construction
of personal "aids" such as checklists, redundancy procedures, action logs,
special-purpose personal indexes, and so on; and what parts will require rote
memorization.

The approach to be taken in constructing training packages is a variant of a
method developed at SDC called "performance programming." Performance program-
ming, an application of the systems approach to on-the-job training, takes
account of the fact that systems are constantly changing, and attempts to
reduce the negative effects of change by developing more effective reference
materials and on-the-job training. The basic idea behind this approach can
be expressed best in terms of an analogy to an automobile trip. If a driver
were going on a long journey, one way to help him arrive safely would be to
have him memorize the route--50 miles straight ahead, turn left 90 degrees
and go 3 miles, bear left till he reaches a windmill, and so forth. Such a
procedure would take considerable time and effort and would be very vulnerable
to unexpected changes in the route. It is easier and more economical to
attempt to develop good signs for the route and to train the driver in reading
and following the sign. Performance programming focuses on the development of
sign posts that tell how to reach a target and how to perform a task, and
trains the person to read such signs accurately.

Course sequences will be organized so that the trainee will master general
skills first, to acquire the readiness to master more specialized and difficult
skills. Regardless of whether the skill involves reference, indexing, serials,
or any other library function, we will work from the general to the specific.
Another feature built into the training packages will modularity. With a
properly constructed set of modules, personnel needing on-the-job training
can, on the basis of diagnostic self-testing, select appropriate lessons, do
the exercises, complete the assurance test contained in the lesson, and go on
as need and desire dictate.

The training package for each of the three selected content areas will consist
of three items: (1) an articulated series of lessons, largely designed to be
self-administered by the trainee and each requiring between 20 and 40 minutes
for completion; (2) a course outline, table of contents, and index to allow
the trainee ready access to any portion of the course content he may wish to
find; and (3) evaluation tests, keyed directly to course training objectives,
that can be used by supervisory personnel to appraise progress.

Each lesson will be designed to fit smoothly into the overall package of in-
struction, to represent an easily manageable increment of learning effort, to
provide clear means for the trainee to conduct assurance testing of his
immediate learning, and to provide him with a clear sense of progress in
mastering each lesson. Each lesson will consist of seven main ingredients:

1. Summary review material, consisting of brief descriptions of high
points and essentials of immediately preceding lessons, with emphasis
on those points that must be mastered before the material in the current
lesson can be easily handled. (This is an additional aid to refresh a
trainee who is unable to maintain a continuous enough study schedule to
keep material from previous lessons fresh in his mind.)

2. A brief preliminary self-diagnostic test, covering performances to be
learned. (This is to motivate learning, to provide a basis for sensing
progress, to help inculcate the concept of self-diagnosis, and to allow
the student to elect to skip the lesson if he already knows the material.)

3. A statement of enabling objective--a schematic statement briefly
naming and describing the concepts or skills to be mastered in a lesson
or group of lessons, and the kinds of performances that will be taken
as evidence of mastery of these concepts and skills.

4. The task description, which presents, discusses, and clarifies the
concepts and skills to be learned, linking them to the materials that are
normally involved in exercising such knowledge and skills.

5. A performance practice set, which consists of materials and exercises
designed to facilitate correct response, through the use of redundant aids,
hints, and cues, and iterating with progressively reduced cues, hints and
aids.

6. A performance assurance test, consisting of stimuli that elicit per-
formances under minimum helping cues and aids, self-scorable test items
of required performances, re-study suggestions for each failed performance
item, and an alternate form of the performance assurance test.

7. Suggestions for further study and extra-lesson assignments.

2.2.3   Pilot Tryouts and Revision of Lessons

Although general guidelines for constructing effective training lessons are
not difficult to develop, the most effective configuration of certain variables
and arrangements must be empirically determined for each new training situation.
Therefore, it will be necessary to pilot-test each instructional unit. Three
main features of the training packages will be assured by pilot testing:

First, the instructions and materials must be clearly understandable to
individuals at the lower end of the distribution of intelligence and academic
preparation of the group to whom these training packages are expected to be
applied. We will draw pilot study trainees from this group.

Second, the amount of material presented in each lesson will be scaled to be covered and learned by the pilot study subject within a period of thirty to forty minutes. (This may often mean that the same lesson can be completed by more capable trainees in twenty to thirty minutes, but this is an advantage for flexible application to on-the-job training.)

Third, the self-testing materials in the lesson (i.e., the pre-practice performance diagnosis, the post-practice assurance test, and retest) must not raise questions for the learner that the lesson materials do not answer. In using the lessons, the typical unprepared trainee must soon develop the faith that the material in a lesson will provide him with adequate closure for the problems and questions it raises, provided he assimilates all the material; thus, the lesson must consistently meet this requirement.

2.3   COURSE DESIGN AND DEVELOPMENT

2.3.1   General Considerations

The first step in developing course designs is to specify terminal objectives for the several categories of personnel with respect to their jobs, and task requirements within these jobs. The specification of task requirements will lead, in turn, to statements of enabling objectives to be met by the instructional units within course sequences. In actually laying out course and lesson plans, we will take account of the differential motivations, attention spans, and other traits that affect ability to assimilate information, as well as to the different skills, knowledge, and readiness that individuals will bring to a course. We will also consider that some types of material or content require a grasp of principles, as well as facts, and some require complete recall rather than simple recognition. Finally, we will consider length of lesson, complexity of content, volume of material to be acquired and mastered, and the media of presentation.

As indicated earlier, we will direct the initial effort towards improving skills and knowledge of personnel in technical libraries and will concentrate upon three areas: reference tools and services, foreign and technical terminology, and technology in libraries. The work will be intended to develop a methodology that can be extended to other types of libraries and other course content as well.

2.3.2   Reference Tools and Services

The first course sequence will concentrate upon giving library personnel a

grasp of the characteristic subject matter, vocabulary, physical arrangement, and other characteristics of basic reference tools. These tools include hand-books, dictionaries, encyclopedias, indexing and abstracting sources, and citation and other relatively unorthodox indexes.

The first course materials to be developed will deal with general reference tools that are broad-ranging and useful in many contexts, followed by more specialized tools. For example, for general works, a range of English language unabridged dictionaries will be used, with information on: the various ways in which dictionary definitions are arrived at, whether they are prescriptive or normative, what are the arrangements of definitions of words that have multiple meanings, and the degree to which any given work reflects current usage or contains neologisms that have emerged in the language in the past few years. Following the more general dictionaries, we will build instruction around more specialized works such as the International Dictionary of Physics and Elec-tronics and other sources of definition for subject specialities in the sciences and engineering fields. The emphasis of instruction will be primarily procedural, that is, having to do with finding one's way about in a strange work, together with exercises intended to strengthen the grasp of this kind of procedure.

The same approach from general to specialized will be followed with encyclopedias, starting with examples such as the McGraw-Hill Encyclopedia of Science and Technology and proceeding to the more specialized encyclopedias of subject field such as handbooks of mechanical engineering, of physics, etc. An important aspect of specialized handbooks to emphasize to trainees is the fact that hand-books are classified arrangements of topics, subdivided according to the ways in which the professional practitioners in those fields construe their subject matter. Thus, a person unfamiliar with the details of such fields can find his way about more readily if he understands that encyclopedias afford clues not only to the specialized jargon of a field, but also to the ways in which that jargon is embedded in context. From the handbooks also come specialized tables--mathematical tables, tables of physical constants and measurements, and statistical tables of various kinds; practice in using and interpreting these will be given.

For any kind of library, directories of manufacturers, trade catalogs, people, and organizations are very important. Gazetteers and atlases form a specialized area of useful reference. All of these will be covered in the course content.

Indexing and abstracting services are a particularly important aspect in technical libraries, as a key to both the serial and the report literature. It is estimated that more than 400 English-language indexing and abstracting services, are currently published. No library is likely to contain more than

a fraction of these. There is, therefore, a problem of choice among the most useful and generally found works. The instruction here will be to identify the ways in which these works are organized; the differences in vocabulary and coverage, overlap, accuracy of indexes; and other characteristics by which a person can learn to find his way about in an unfamiliar work of this type.

Finally, there are the bibliographic tools such as the <u>National Union Catalog</u>, <u>The Union List of Serials, Cumulative Book Index</u>, and other bibliographic sources. While it is common for library schools to have prepared professionals to use these tools for bibliographic checking or serials work, not all offer adequate practical preparation. We feel that training sequences here would be useful for those relatively inexperienced professionals who are not well acquainted with such tools, as well as for other categories of personnel.

Another important area of skill has to do with reference and other public service personnel establishing effective communication with library users. Users often approach the library with serious misconceptions about what the library is about, what kinds of services are and are not available, and what kind of performance it is reasonable to expect from a library. Sometimes, when the user's expectations are too modest, he is not corrected by reference personnel, and therefore never receives the satisfactions that are in fact available. Othertimes, a user's exhorbitant expectations are corrected in an unnecessarily painful fashion that does no good to the library's customer service image. There are reference personnel who are extremely skillful in establishing effective, sympathetic communications with their users, and there are others who are not so skillful. The differences in practices and concpetions of these two kinds of reference personnel can provide the basis of materials and exercises to improve such communications skills.

2.3.3   <u>Foreign and Technical Terminology</u>

The training sequence built around language will address itself to two kinds of problems: first, the problem of specialized English language vocabulary that is characteristic both of the technical field per se and of the biblio-graphic descriptions of literatures produced within those fields; second, the foreign equivalents of these terms, which would include a foreign library, or bibliographic, language and a foreign technical language. Here, it will be important to show that a great deal of the technical language in use, at any point in time, is not necessarily described in dictionaries. As the language changes and grows, new usages continue to emerge for terms already in the tongue. For such vocabulary, tools other than dictionaries are necessary. Library personnel must consult handbooks, articles, and often specialist personnel themselves. With respect to technical vocabulary in languages

other than English, it will be important for library personnel to know that,
while there are many similarities in the use of common roots for many terms,
such terms may not mean precisely the same thing as their equivalent root
forms in English. The question of transliteration is more straightforward.
At the outset the course will confine itself to Russian transliteration.

More specifically, the foreign terminology will have two main goals: (1)
acquiring a reading translation capability for a selected high-use subset of
words, phrases, and constructions in the target foreign language, and (2)
acquiring procedural skills and sophistication in using foreign language
dictionaries and other aids in interpreting foreign language text. The high-
use words, phrases, and constructions will be frequently used items in the
language of documentation itself, such as "index," "forward," "edition," etc.;
items from library sciences, such as "shelving"; items from information science
and technology, such as "retrieval" and "file structure"; as well as major
subject category discriminators from the content field being studies, (e.g.
in psychology "mental measurement," "psychosis," "learning," "motivation," etc.)
In addition, names of societies, institutions, and abbreviations important to
the field will be covered. Special attention will be paid to high-frequency-
use words that have multiple meanings, and also to foreign words that have
recognizable roots also occurring in English, but that have meanings different
from what an English-speaking person might infer.

The procedural skills to be practiced will include those having to do with
finding one's way around in unfamiliar foreign language media; knowing special
characteristics of various foreign language technical dictionaries; knowing
how to recognize different kinds of entries, such as for serials, books, etc.;
knowing how to determine whether a word is being used in a highly specialized
sense; and understanding the self-help aids that are available for foreign
language learning, as well as the use of worksheet aids in interpreting foreign
language entries.

In a sense, this course will be an extension in a more specialized direction
of the introductory material presented in the reference course with respect
to dictionaries and specialized encyclopedias and handbooks, etc. Many of
the more useful works in this area are in languages other than English.

2.3.4   Technology in Libraries

The domain of technology applicable to libraries comprehends such areas as
data processing by electronic accounting and computing machinery; procedural
technology, such as document storage and retrieval, automated indexing and
classification, mechanized translation or aids to translation; automated
extracting and question-answering systems; and computer-aided instruction;
as well as a variety of related equipment and material technology, including

microforms, reprography, automated printing and dissemination techniques, materials handling, and storage devices, and procedures.

The concept of procedural technology includes techniques of managing library operations, such as system or functional analysis and design, work flow, analysis of the effectiveness of work procedures with respect to technical efficiency, and analysis of cost tradeoffs.

Libraries currently have a serious problem in trying to make use of technology: the limited ability of those who manage, operate, or otherwise work in libraries to understand both the potentials and the limitations of modern equipment and procedural technology. It is very clear that substantial assistance to library operations can come from concepts of operation in which machines serve as aids for personnel. Achieving this assistance, however, will require active and informed participation by library personnel in exploiting the available technology. This means that managerial and supervisory personnel must be brought to an appreciation of what needs to be done within their own libraries, if effective new services are to be provided.

In addition to appreciating what needs to be done, library personnel will need to do much of the work of redesigning their own systems and operations. It would be useful to impart many of the techniques of functional analysis and system design to managerial and supervisorial personnel. These techniques are not new, but have not often been made a part of the equipment of library managements. If they were, a more rational organization of procedures could be arrived at, both for the improvement of work conducted in a traditional or conventional manner, and also for adaptation to new techniques and technologies. Especially with respect to data processing machinery, it will be necessary for formal descriptions to be made available if libraries are to make effective use of this machinery and the procedures that have been developed for its use. Much can be learned from the experience in the business world, particularly that of the 1950's, where machinery was acquired prior to any detailed appreciation for how it might be used and, because of various "bandwagon effects," the choice of what was acquired and the choice of persons and procedures often did not lead to a net improvement in operations. These problems have been documented extensively in case studies of various kinds that can be drawn upon for appropriate instruction in the library.

With the points of the preceding discussion in mind, the course in library technology as presently envisioned will consist of three groups or series of lessons. The first short series will be aimed at making the student aware of the reasons that library personnel with system management responsibilities should become easily conversant with techniques of functional analysis and system design. These lessons will involve short, selected case studies of inadequate applications of modern technology to both business data processing and library operations. The case studies will be coupled with descriptions of

the deficiencies in functional analysis, plus suggested alternative analyses
that might have been provided more adequate outcomes.

The second, longer series has the aim of inculcating criteria for functional
analysis of library operations and for making choices of appropriate applica-
tions of machinery of various kinds to these operations. The lessons will
present functional analysis concepts and problem exercises in three main
categories: by projected system requirements; by available equipment capabilities
and characteristics; and by the existing system's current procedures and
operations. There will also be lessons addressing problems of evaluating
manufacturers' promotional claims.

The third series of lessons will provide selective familiarization with the
operating and performance characteristics of available hardware and with
related software technology. The highlighted examples will serve as spring-
boards for considering the characteristics of alternative equipments and
procedures.

It is anticipated that some clerical personnel might take only the third series
of lessons, some management personnel might take only the first or first and
second series, and some supervisory personnel might take all three.

2.3.5   Example Outline of Objectives for a Package

This document has described the procedures to be followed in analysing train-
ing requirements and in constructing training packages, and the general con-
siderations of content for the three areas of training selected. As an
additional aid to revealing the aim of the project plans in more detail, the
figure below presents a sample outline of objectives for the training package
on reference work. (After the actual analysis of training requirements, such
an outline would be much more complete than the example given, of course.)
The outline is presented in the form of a series of questions to which trainees,
after completing the training package, ought to be able to provide knowledgeable,
appropriate answers.

Reference Service Communication

Has the user expressed his intended use-orientation toward the requested material? How can you help him do this?

What is the user's concept of the service he expects? Did he come to browse, do the search himself, tell you what to do, ask you what to do?

What does he imagine will be actually delivered to him? Documents, citations, etc.?

How much time does the user have in which to obtain the material?

How much energy can he spend on the problem himself?

On the basis of interaction with the user, will there be clear, objective indicators, that you will be able to recognize, that indicate when you should stop the work for the user?

If the answer is "no" to the above, can you set minimum and maximum figures for the amounts of effort, time, and resources you intend to spend on the requester's problem?

Have you explained clearly to the user your decisions and the reasons for them, to gain his understanding, acceptance, and agreement as to the service you will be able to render?

Knowing the reference tools available

Do you know the very frequently used tools well, the quite frequently used tools adequately, and the infrequently used tools well enough so that you can use them competently?

Does each tool have any special strengths, weaknesses, special uses, etc.? Do you know them?

Have you decided for each tool what aspects of its contents and use procedures you must remember, what parts you should relegate to personal aids such as checklists, and what parts can be safely depended upon to show themselves in the proper context when the tool is used?

Do you know how to keep yourself currently informed as to what new reference tools are available, and where? Do you know how to find out if there is a reference tool available for a certain type of literature?

Technical knowledge of the content area

Do you know now to find whatever technical handbooks are available for a given area of technical-scientific content?

Figure 4. Sample Outline of Objectives for Training Package (Sheet one)

Do you understand the various ways that technical handbooks can be used
to aid in formulating and conducting a search?

Have you decided what aspects of technical handbooks and their use you
will need to remember, what parts you can commit to personal reminder
aids, and what parts can be depended on to show themselves properly in
the context of use?

Do you know the symptoms of having too little content knowledge in an
area: Finding that most requests in the area seem "unusual," not know-
ing how to question the requester to find out more, commonly finding
yourself corrected early in the search formulation transaction by the
requester.

Do you know the symptoms of depending too much on your own personal
knowledge of a content area (overloading the user with your own obser-
vations about technical content, answering from your memory rather
than using the reference tools and sources)?

Have you memorized a list of words used with several or many technical
senses within each given content area? For these words, do you have
available a means of defining these various senses and clues for
disambiguating them contextually?

Managing the reference searching process

Do you follow systematic procedures? For example, do you: (1) formulate
problem statement of what user wants, (2) generate possible solution
components with notes, (3) formulate plan for use of reference tools,
chaining, etc., (4) conduct search, recording your actions as you go
(for re-reference), (5) have a rational "familiarization routine" when
dealing with reference tools and books in the course of searches?

Have you worked out thoughtful procedures for:

- rapidly finding word meanings
- dealing with acronyms and organizational titles
- finding biographic and organizational information
- dealing with abbreviations
- checking reference tools for mistakes, recognizing when one is
  likely using serial, report, and government literature in "chain-
  ing" searches?

Figure 4. Sample Outline of Objectives for Training Package   (Sheet two)

2.4   DOCUMENTATION OF PROCEDURES USED TO CONSTRUCT PACKAGES

A document will be produced describing the steps involved in providing a per-
formance-programmed package. These steps include training requirements analysis,
behavioral performance descriptions of training requirements, production and
testing of expository and practice materials, and construction of diagnostic
and evaluative tests.

For each outlined step there will be a discussion of the difficulties encountered
in the present project and the solutions taken, with examples. Finally, dis-
cussions and descriptions will be keyed to citations of appropriate literature
in training technology and job analysis.

2.5   EVALUATIVE STUDY OF TRAINING PACKAGES

The aim of the evaluation study is to assess the overall training impact of each
of the three packages when applied in the self-help OJT mode. The design of
the evaluation experiment takes account of several factors: the limited number
of appropriate trainees (approximately 60) who are available to this project,
given reasonable expenditures of time, energy, and travel money; and the need to
control the experiment for "Hawthorne" and sequential effects. The experi-
mental activities, which consist of four phases, are diagrammed and described
below.

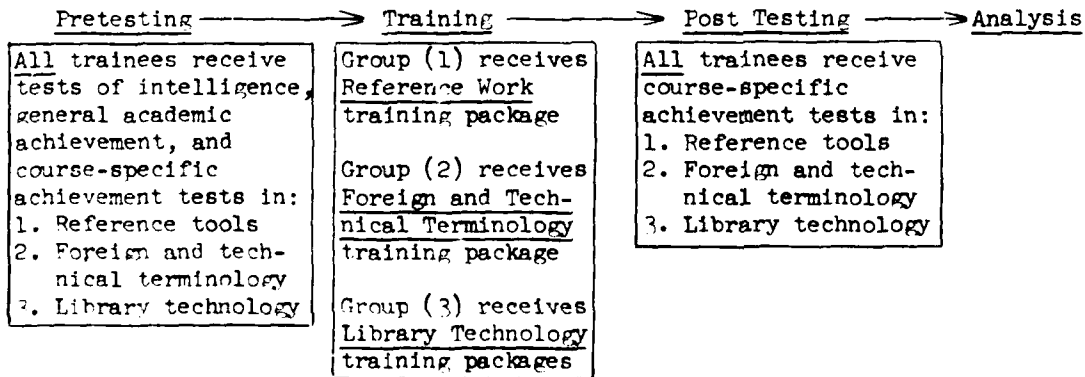| Pretesting ————⟶	Training ————⟶	Post Testing ————⟶	Analysis
All trainees receive tests of intelligence, general academic achievement, and course-specific achievement tests in: 1. Reference tools 2. Foreign and tech- nical terminology 3. Library technology	Group (1) receives Reference Work training package Group (2) receives Foreign and Tech- nical Terminology training package Group (3) receives Library Technology training packages	All trainees receive course-specific achievement tests in: 1. Reference tools 2. Foreign and tech- nical terminology 3. Library technology	

Figure 5. Experimental Activities

2.5.1   Pretesting

Each test trainee will be administered the following tests:

> 1. A short standard academic achievement test, providing scores in English-language vocabulary, mathematics, social sciences, physical sciences, etc.
>
> 2. A short standard adult intelligence test.
>
> 3. Three short achievement tests, especially constructed for this project, in the areas of reference work, the foreign and technical vocabulary to be learned, and new technology in libraries.

Results from the academic achievement test and intelligence test will be held for later use. The scores from the three achievement tests in the three library work-related areas will be used to make the assignment of each trainee to one of three experimental treatment groups. Membership of the three experimental groups will be assigned so that the means and standard deviations of trainees' scores on all three achievement pretests are as equal as possible across all three groups.

2.5.2   Training

Each group will receive a different one of the three training packages. Trainees will be asked to spend their available spare time studying their assigned package, and to refrain from comparing notes with trainees who have packages different from theirs. They will be assured that, if they desire, the other training packages will be available to them after the experimental phase of the work. A target date for testing the knowledge gained from using the training package will be announced at the beginning of the training period, which will run from 4 to 6 weeks.

2.5.3   Post testing

Each trainee will first be re-administered the achievement test for the train-package he has used. After this, he will be administered the achievement tests for the two training packages that he did not use. These tests will be the identical ones administered in the pretest phase. Before taking any post tests, he will fill out a questionnaire containing both structured and open-end questions, aimed at getting his reactions to the training package as well as to the experiment, and to gain estimates of the amount of time he devoted to the training.

2.5.4   Analysis

The main method of statistical analysis to be used is that of residual gains.
For each of the three achievement tests, data from the 2/3 (40) of the trainees
who do not take the corresponding training package will be used to derive
multiple-regression formulas for predicting the trainee's post-practice test
score. The independent variables here will include all test scores obtainable
from the pre-practice testing. These prediction formulas will then be applied
to the pre-practice test scores of the 1/3 (20) of the trainees who do take
the corresponding training package, providing a predicted post-practice achieve-
ment score for each trainee on the achievement test corresponding to his train-
ing package. This predicted score takes account of effects such as regression
toward the mean, serial sensitization and learning effects, Hawthorne effects,
etc. The trainees' obtained scores will then be compared statistically with
their predicted scores, the gains representing the effects of the training
packages.

2.6   SCHEDULE OF WORK

The schedule of work as shown in Figure 6 is designed to show the projected
development of the project from USOE and U.S. Army concurrence through
delivery of the final report.

The first task indicated is analysis of training requirements. These require-
ments will be established in detail by May 31, 1968. We will follow some of
the basic procedures of job analysis, selectively gathering information on
library positions and work and examining relevant training materials.

Overlapping with the above stage of work is the design of training materials
and procedures. This stage begins on February 1, 1968 and is scheduled to be
completed by October 31, 1968.

The next stage of work is pilot tryout and revision. This work will begin on
March 1, 1968 and is scheduled to be completed on October 31, 1968. Library
personnel, both professional and nonprofessional, will be recruited from the
Los Angeles area to serve as subjects.

Course modification and packaging, the next stage of work, will begin on
June 30, 1968 and will be completed by January 1, 1969. Concurrent with,
and as an integral part of, course modification and packaging will be field
test design. This stage will involve some on-site design work. The schedule
calls for this stage to begin on July 1, 1968 and end on October 1, 1968.

The USOE and the Army will designate libraries at which the next stage of
work, field trial, will take place. This stage is designed to test the
utility of the packages. This will involve testing and modification of the
modules in preparation for their turnover to the funding organizations.
Work will begin on this stage on October 1, 1968 and end on January 1, 1969.

The next stage of work is that of package turnover to the USOE and to the
U.S. Army. This will involve final organization and packaging of all developed
courses so that they are ready for field use. This work is scheduled to begin
on January 1, 1969 and end on February 28, 1969.

During the work on Phase II of the project, three reports are required. On
May 31, 1968 and September 30, 1968, interim reports will be submitted to
USOE and the U.S. Army. The final report will be submitted on February 28,
1969.

3.   PRIORITIES FOR FUTURE TRAINING

Upon completion of the work described in the preceding section, the project
will have developed a methodology for developing and testing on-the-job
library training courses, together with an instructional methodology for
assuring effective improvement of knowledge and skills. With this preparation
we shall be in a position to attack other areas of library work for which there
is a need for supplementary training. Four areas of work have been identified
in which the needs for training are clear; these would form a logical extension
of the initial efforts. They are, in estimated order of importance: manage-
ment and supervision, technical processes, report literature and public
documents, and specialized reference sources and tools.

3.1   MANAGEMENT AND SUPERVISION

It is widely recognized in the library profession that there is a need for
improvement of managerial and supervisory skills. Nevertheless, the formal
education of professional librarians has not provided an adequate background
in supervision, training, personnel administration and other management skills.
Particularly weak are areas of planning and costing, work analysis and design
of new procedures, together with appraisal of physical plant and equipment,
contracting for work by outsiders, and instructing subordinates. Library
personnel at all levels need to be acquainted with management practices and
objectives. Library managers themselves need to develop a philosophy of
management appropriate to the aims and missions of their particular libraries.
Some of the important issues and techniques appropriate to managerial and
supervisory work will already have been introduced in the technology in
libraries training package. This package should provide a useful introduction
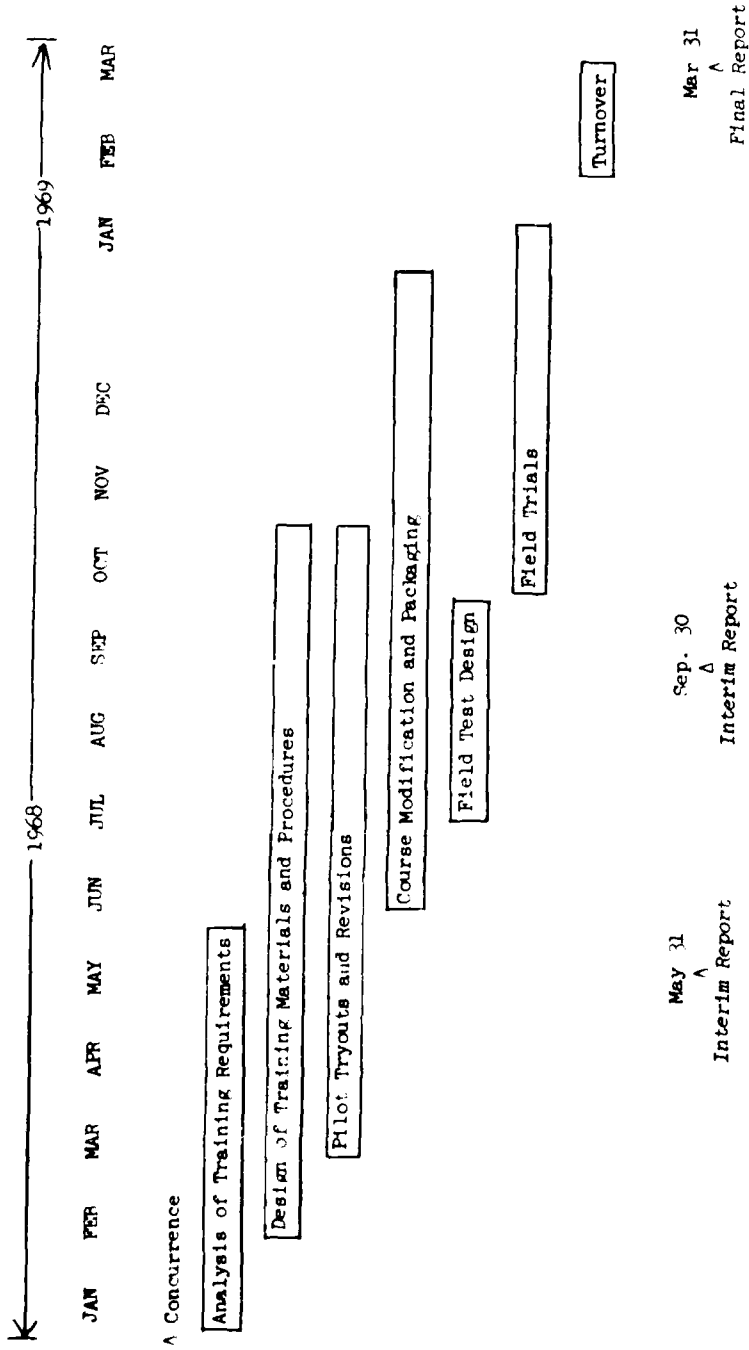to the content of a course concentrating on management and supervision.

Figure 6. Schedule of Work

3.2   TECHNICAL PROCESSES

Technical processes comprise another area in which the conventional education
of professional librarians is not wholly adequate, and for which there is also
a strong need to find efficient methods of training nonprofessional personnel.
Conventional curricula are particularly weak in the area of acquisitions,
serials records, and the organization of specialized files. Libraries employ
a wide range of processing techniques that differ from place to place. It is
not, therefore, a trivial task to construct useful training sequences that
can serve as a significant portion of the library. It is anticipated that
the largest needs for training would lie in the area of acquisitions, serials
records, descriptive cataloging and bibliographic checking, and files and
filing.

3.3   REPORT LITERATURE AND PUBLIC DOCUMENTS

The report literature is one of the most diverse and poorly managed aspects
of most library collections, in part because it offers many special problems
of control and access, particularly where security classification is involved.
Together with public documents, report literature is often poorly catalogued
or indexed. With the tremendously increased growth and importance of this
literature, there is a need to provide improved access, handling, and pro-
cessing. Current preparation of professional librarians and other library
personnel to meet this need has been inadequate. The development of training
in this area would be particularly important for technical libraries. A
course directed to this subject area would cover the specialized sources of
bibliographic control, the sources of supply, and the management of processing,
storing, searching and retrieving this literature.

3.4   SPECIALIZED REFERENCE SOURCES AND TOOLS

The reference course developed as the initial task of the project will
concentrate upon the needs of scientific and technical libraries. There is
also a need to provide improved knowledge and skill in using specialized
reference tools in other subject areas in public, school, and academic
libraries, and to instruct library customers in their use. The intent of
this course would be to build a set of instructional sequences that would
constitute an extension of the earlier reference course and would include
coverage of nonconventional tools such as coordinate and citation indexes.
They would also introduce personnel to techniques appropriate to specialized
services for such materials as phono-records, magnetic tape, art, maps,
motion picture film, and microforms.

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14. ABSTRACT

A plan is described for a project being performed by System Development Corporation under sponsorship of the USOE and U.S. Army. The purpose of the project is to provide on-the-job training courses for updating and upgrading the knowledge and skills of library personnel. The needs for such supplementary training stems from increased demands on libraries for services, increased rates of personnel turnover, and a growing lag between personnel retraining practices and the rapidly changing requirements for personnel performance.

The personnel performance and knowledge areas chosen for attention during the initial project are (1) reference tools and procedures, (2) foreign and technical terminology, and (3) applications of modern technology in libraries. The training approach to be used for all three areas emphasizes flexibility and modularity in the course materials, and trainee-directed self-testing and study. The work to be carried out in the project includes task performance requirements analysis, training requirements analysis, construction and pilot testing of the lesson packages, construction of diagnostic tests for the skills and knowledges covered in the courses, running of an evaluation experiment to test the overall effects of the training courses, and documentation of these activities and materials.

The products to be delivered from this project include training course packages for the three above-mentioned areas of library knowledge and skill; documentation of the methods and procedures developed in analyzing the requirements for, and constructing, the training courses; and a report of the evaluation study. Possibilities for application of the project approach to other areas of library personnel training requirements are discussed.

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KEY WORDS	LINK A		LINK B		LINK C	
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Library personnel						
Reference tools						
Technology						
Technical terminology						
Methods						
Procedures						
Training courses						