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An Evaluation of a Library Skills Workbook for Beginning College Students

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AN EVALUATION OF A LIBRARY SKILLS WORKBOOK FOR BEGINNING COLLEGE STUDENTS

By

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This quasi-experimental study was undertaken to evaluate the usefulness of the library skills workbook for beginning students at Hillsdale College. The pretest was administered to five sections of a freshman English course. Five other sections, which analysis of SAT, ACT, and first semester GPA figures indicated were similar to the pretest group, constituted experimental and control groups. The experimental group completed the workbook and a research project. The minimally and moderately instructed groups received instruction and completed a library based project. The posttest indicated significant differences between the groups, probably due to the workbook experience. Recommendations are made for further refinements in the workbook and the test instrument.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

The Problem

Introduction

Bibliographic instruction has become an important activity in the world of librarianship. Its importance has been disputed by some librarians, (Wilson 1979) but bibliographic instruction has been generally accepted by the profession. Evidences of this acceptance are the annual conferences such as those at Eastern Michigan University and the College of Charleston, several bibliographies (Yaple 1976 and Lockwood 1979) and an annual bibliography in the periodical Reference Services Review. Its status in the profession is indicated by the appearance of several committees such as the one which published the "Guidelines for Bibliographic Instruction". (ACRL 1975)

Part of the increased activity in bibliographic instruction is the introduction and spread of the library skills workbook. According to a survey done by Kirkendall in 1979, about ninety institutions out of 900 surveyed, used what they called a workbook. (Kirkendall 1980) Several librarians have published articles describing the use of the workbook at major universities. (Renford 1978; Phipps and Dickstein 1979)

One of the librarians active in the development of the workbook, Beverly Renford, has co-authored a book on bibliographic instruction which gives considerable attention to the workbook. (Renford and

Hendrickson 1980) Unfortunately, there is little in the book on the evaluation of library instruction in general or on the workbook in particular. In light of the use of the workbook and the paucity of research on its effectiveness, work is needed on the development of procedures for the evaluation of the workbook. Publication of the findings of this research can provide the basis for decisions on the adoption of the workbook or on the recommendation of a more appropriate means of library skills instruction.

Hillsdale College is a liberal arts college of approximately 1100 students. The staff of the Mossey Learning Resources Center (the Library) is composed of four professional and two support staff. Librarians dealing with questions at the Mossey Center information desk have concluded that a considerable number of students have not developed their skills sufficiently in using the library to effectively complete library-based assignments. Although some instruction in the use of the library takes place in many classes, no coordinated program of library skills instruction exists at the College.

In the past it was assumed that basic library instruction took place in the freshman composition course. Current practice in these courses is to limit the instruction to what is necessary to complete a literary research paper. Instruction in the composition and rhetoric courses varies from minimal to moderate. The minimal involves discussion of textbook chapters on library research and directions to use the materials placed on reserve and any other library resources which the student needs. The moderate involves additional classroom instruction and laboratory sessions in the library. In the laboratory

sessions, students are required to use Reader's Guide, Humanities Index, Essay and General Literature Index, and the MLA Bibliography to find five sources (from each work) in the Mossey Center. Bibliographies (except the MLA) are not introduced and specialized dictionaries and encyclopedias are not discussed. The subject headings of the Library of Congress system are not covered and search strategy is only briefly presented. All of the sections require a literary research paper, although some of the instructors do not require the use of more than two or three references. None of the other departments conducts a program of library instruction, although some research is required of freshmen in history and chemistry classes.

During the Spring of 1980, librarians and members of the English Department held a series of meetings to discuss library skills needed by freshmen and to determine ways of sharing responsibility for the instruction in library skills. One of the outcomes of the meeting was the appointment of a subcommittee made up of three members of the English Department (Mr. Charles Wesley, Ms. Kay Cosgrove, and Dr. Genevieve Quigley), the head librarian (Dan Joldersma) and the researcher to develop a library knowledge test to assess the entry level skills of freshmen. The questions were to cover basic locations in the library, basic facts about the catalog card and subject headings, parts of the periodical citation, and basic types of reference sources which freshmen would use in completing a literary research paper.

The test was administered to freshmen during the early part of the fall semester of 1980 as a diagnostic test and revealed a fairly predictable pattern of deficiencies in that group. The test results

confirmed the impressions of the librarians with regard to areas of instruction required by the freshmen. No systematic plan of instruction was developed, due in part to the feeling of English Department members that the amount of instruction should be determined by each instructor. Several instructors indicated that they wanted to see individualized materials for the development of library skills made available to beginning students and that these materials would be considered for use as an adjunct to classroom instruction. Many of the areas of deficiencies in library use skills identified by the library knowledge test are addressed by the objectives of the library skills workbook. The library skills workbook has other advantages, claimed for it by those who have used it, which recommends it for consideration as the appropriate instructional method for the situation at Hillsdale College.

1. It can be prepared during periods when there is less demand for the librarian's attention at the information desk.
2. The amount of time required for correction of student responses is minimal and can be handled by clerical staff.
3. The workbook requires use of the information sources.

Two versions of the original workbook developed by Dudley (1977) were selected. The first was the version developed at the Pennsylvania State University by Beverly Renford. (1979) Its strength was the multiple choice format and the grouped answer arrangement which speeded preparation of individualized exercises. The second was a version developed for use at Lakeland College, Sheboygan, Wisconsin, an institution similar to Hillsdale College. (Bendix and Root 1978) (See Appendix B for table of contents pages from the workbooks by Ren-

ford and Bendix and Root, and from the workbook used in this project.) Further searching of the literature was undertaken to locate recommendations on revision of the workbook and on evaluation techniques for use with the workbook and related forms.

The Research Question

The objective of this study is to determine if the workbook is an effective means of instruction within the context of the situation at Hillsdale College. To meet this objective, the workbook versions described in the previous paragraph were revised and sections combined using the guidelines established by the ACRL committee (1975). Some objectives were added or modified to meet requirements of the English Department. (See Appendix A for a copy of the objectives.) The workbook was designed to follow a typical search strategy order using information sources frequently consulted by beginning college students. Sections on film reviews and the MLA Bibliography (and other bibliographies) were added to meet local requirements. Evaluation of the workbook was undertaken using the established "Library Knowledge Test" developed by library staff and members of the English Department. Students using the workbook were compared to students receiving traditional instruction at minimal and moderate levels of library skills instruction.

This study assumes that a test of library knowledge consisting of multiple choice and matching questions accurately reflects the ability of the student to use the library. It assumes that the workbook as it has been developed is appropriate for the situation in which it would

be tested. Although some revisions of the workbook were made, no systematic revision based on principles of instructional design was made. It was assumed that the absence of some components of the Solomon four group experimental design due to administrative problems did not present an insurmountable barrier to useful findings on the effectiveness on the workbook as a means of instruction. The two sections of freshmen under one instructor available for experimental treatment were assigned to the workbook treatment. Time in the other sections was available for one administration of the test, either before or after the library instruction and research paper study units.

This study has certain limitations. The sample was not homogenous, thus no generalizations are made in the study beyond the group tested. This research covers only one stage of evaluation. Adequate evaluation would require revision and additional testing to evaluate fully the workbook as an instructional method.

The hypotheses for this study concerns the relation between control groups and experimental groups:

1. The experimental group will prove superior to the minimally instructed control group in achievement as measured by a library knowledge test.

2. The experimental group will prove superior to the moderately instructed control group in achievement as measured by a library knowledge test.

Although the students in the control groups received some instruction and wrote a research-based paper, the fuller exposure to a variety of sources and the prsentation of them in search strategy order thorugh the workbook will result in superior library use skills as measured by the achievement test. The confirmation of this hypothesis will con-

firm that the workbook is an effective means of instruction at Hillsdale College. It will also provide the profession with a firmer basis for evaluating the workbook as an appropriate instructional device in varying circumstances and provide the basis for increasing the effectiveness of the workbook as a presentation method.

CHAPTER II

Review of Selected Literature

Introduction

Tucker, in his historical survey of library instruction in Library Trends, has described the establishment of user education as an institution:

> Despite its philosophical and theoretical shortcoming, library instruction has grown rapidly in a short period.... Early random attempts to prepare librarians to teach more effectively have become institutionalized. Conferences and workshops have continued to appear and are annual events at Eastern Michigan University and the College of Charleston. American Library Association committees address themselves to the issue of library instruction; enough has emerged to institute the Library Instruction Round Table. A clearinghouse of instructional materials was opened at Eastern Michigan University, the first of several such collections. (Tucker 1980,22)

There is increasing recognition that library use instruction is part of the educational process. While its origin is in the library's tradition of service, its inspiration lies in the Library-College movement's ideal of the "generic book" as the center of learning; its discipline and science will likely come from the relatively new discipline of instructional design. The art of library skills instruction will emerge from the teaching profession in general, and specifically from the experiences of those who instruct college students in composition, speech, and study skills. (Lindgren 1978,75-78)

Before looking in detail at some of the research which has pro-

vided specific guidance for this study, some of the more general studies which provided entry into the literature will be considered. After the general studies, the literature directly related to the workbook will be discussed. Following this, a sampling of the library-related programed instruction literature will be examined. Finally, the literature specifically on evaluation will be considered.

Literature Reviews

In a review of the literature covering the period from about 1930 through the early 1970's, Young summarizes writings under four general headings. First, he considers literature surveys and bibliographies; second, attitudinal studies; third, studies which focus on the library as an educational institution, including a discussion of test evaluations; and fourth, more sophisticated studies of user education. He concludes that:

1. The role of the instructor is the key element in fostering library use.
2. Tests of library knowledge of the norm-referenced variety have not reached a level acceptable to educational measurement standards.
3. Library knowledge as determined by a library test may be only a reflection of general achievement.
4. Studies in library instruction using programed instruction have shown results similar to those in the literature of educational reserach, which reveal that programed instruction to be an appropriate instructional technique where the emphasis is on factual learning and skills.
5. Studies on library skills and knowledge have been plagued by inadequate experimental design.
6. Future research should focus on long term studies which look at information seeking activity from a variety of angles such as card catalog use, circulation statistics, etc.

7. Programs which evaluate achievement beyond the basic level should be developed. (Young 1978,81)

Updating this review in 1980, the same author reiterates his view that there is little need for further research on self-instructional approaches, since the literature has demonstrated the value of these presentation formats when they are well done. He does not cite any studies dealing specifically with the workbook, however. Attention should be given, he believes, to longitudinal studies, to cost studies and to the impact of online services. (Young 1980,81) Young comments favorably on four studies which he views as significant advances in research on bibliographic education. Surprenant is noted for his use of the Solomon four group experimental design in a study of programed instruction; Kuo for the comparison of six presentation formats; Smith for the description of an integrated library instruction program at the elementary level; and McInnis and MacGregor are noted for the strength of their conceptual approach basing library instruction on different levels of information sources. (Young 1980,74-75)

Werking, in his review of advances in the evaluation of bibliographic instruction, cites several articles as being noteworthy. The article by Hardesty is significant for the clear explanation of the "process of systematic evaluation and of creating a valid and reliable instrument." (Werking 1980,158) The evaluation of the program at the University of Arizona demonstrates how to use pretests and posttests to improve the test questions and to evaluate the achievement of program objectives. Use of statistical tests at the Pennsylvania State University and a demonstration of the importance of using control

groups at Northeastern Oklahoma State University are also noted. Flaws noted in various studies include the low passing level on the test used by Hardesty at De Pauw; the lack of detail on the objectives, the design of instruction, and the development of the test instrument at the University of Arizona. The lack of control groups at Penn State was a shortcoming of that study. At Northeastern Oklahoma State University the lack of information on the extent to which the library skills program was systematically developed according to standard instructional design procedures, and the lack of control on pretest sensitization flawed the study done there. (Werking 1980,158-159)

Several research reports such as those done by Kuo, Surprenant, and Wiggins, which were noted for the sophistication of their experimental design, will be discussed in more detail later since they provided significant assistance to this study. Key questions for further research according to Werking are:

1. What should be evaluated?

   Knowledge, the process of a library search and its efficiency, the product of the search, the learner's observed behavior in uncontrolled situations, or the learner's attitude.

2. How should the evaluation be done?

   With pencil and paper tests of library knowledge, survey instruments, interviews after actual searches or evaluation of annotated bibliographies or research papers.

3. How can tests be improved?

   a. Pretest and post procedures must be controlled.

   b. Administrative barriers to establishing control groups must be dealt with.

c. Better sampling and randomization procedures must be developed.

d. Norm-referenced and standardized tests should be developed.

e. Knowledge tests for skills evaluation must be validated.

f. Evaluation of long term gains must be emphasized. (Werking 1980,158-162)

The Workbook

A number of articles on the workbook have appeared in the last ten years. Among these have been reports of the spread of the use of the workbook and similar types of materials. Kirkendall (1980,32-33) reports that between 1973 and 1979, sixty-seven percent of the institutions polled (558 libraries) used some form of individualized instruction. Thirty-eight percent (318 libraries) used "exercises" and eleven percent (ninety libraries) used workbooks. In a survey of small colleges, Lindgren (1978,82-83) found that nine percent of the 160 institutions surveyed used programed instruction (workbooks were not listed separately in that survey). Credit for originating the most popular form of the workbook has been given Mirian Dudley (1974, 331) who developed a workbook at UCLA in 1969. Several articles describing programs using workbooks have appeared in the literature, although none of the articles attempts a full evaluation of the workbook. Two early developers of workbook-based programs, the University of Wisconsin-Parkside and the Pennsylvania State University, have indicated that evaluation is underway, although full reports have not been published. Renford (1978) does describe the workbook developed

at Penn State and discusses the cost and administrative details in an article and in a book which she co-authored. However, the book provides little guidance for developing evaluation procedures. One other institution, the University of Texas-Austin, has developed a version of the Dudley workbook and has reported on the pretests and posttests using control groups, as well as on using other types of evaluation methods, but has not published a full research report. (Burton 1977, 102)

A number of articles dealing with the advantages and disadvantages of workbooks have been published. Following is a summary of these selected from several articles on workbooks. (Frost, 1978; Phipps 1980; Pryor 1980)

Advantages

1. Advantages related to the programed instruction format.
    a. During use period requires little presentation or administrative time.
    b. Self-paced.
    c. Small units mastered before new material introduced.
    d. Motivation component.
    e. Feedback with immediate correction or prompt return of workbook.
    f. Inclusion of learning and performance objectives.
    g. Presentation not dependent on personality of instructor.
    h. Can be self-supporting project with charge for workbook.
    i. Effective with varying size of student population.
2. More adaptable to student needs than lecture.
3. (Can) require more interaction time with instructor than usual programed instruction.

4. Less time for completion of a unit than with lecture method.

5. Direct interaction with information sources.

6. Means of instruction to be used by librarians not skilled in presentations to large groups.

7. Takes less of class time than lecture.

Disadvantages:

1. Related to the workbook as a form of programed instruction.

   a. Initial preparation time great.

   b. More difficult to limit student procrastination.

   c. Clear effectiveness advantage demonstrated only at factual level of learning.

2. Heavy use of information sources may require purchase of duplicates or early replacement of worn copies.

3. May detract from development of personal relationships with librarians necessary for later interaction.

4. Impersonal format may be perceived as boring.

5. Most workbooks are not carefully developed using instructional design principles.

A workbook may be further characterized as either source-oriented as is the Dudley workbook and similar versions or as process-oriented. In the latter type, sources are used to illustrate steps in the search strategy process. The process-oriented workbook is found most often at the advanced level in workbooks designed for a specific discipline. (Rogers 1980,71-72)

The most significant research report on a workbook project was that done at the University of Arizona in 1979. For this project the Dudley workbook was used as a model since an "independent learning device was desired." (Phipps and Dickstein 1979,205) Out of a

population of 105 sections of freshman English, a sample of fifteen were selected to use the workbook and fourteen were designated as control sections. Before the treatment, a pretest was given to twelve of the Library Skills Program (LSP) sections with a total of 280 students and to eight of the control sections with a total of 207 students. After the treatment period, the posttest was given to 243 LSP and to 179 control group students. These groups were divided into two sections, LSP 3 and LSP 4, the latter being the more advanced students. The analysis of the twenty-item test showed that the experimental group, the LSP sections, had improved from 4.24 correct (LSP 3) and 5.75 correct (LSP 4), to 10.59 correct and 12.14 correct, respectively. The control groups had improved during the term from 4.24 and 5.01 to 7.96 and 8.37, respectively. (Phipps and Dickstein 1979,209-211) The project was deemed a success even though the posttest scores averaged about sixty percent correct. Also, the experimental students answered only two or three more questions correctly than did the control group. The emphasis of the article was on the use of percentage correct on the test question as a basis for analysis of the extent to which instructional objectives had been met. Seven conclusions were made by the authors:

1. If the only identifiable difference in the experience of the two groups was the completion of the workbook, one can infer that it was responsible for the experimental group's greater degree of improvement.

2. The LSP is responsible for improving the students' awareness of the variety of uses that are provided by encyclopedias, almanacs, and atlases. The workbook experience, requiring students to use and complete an assignment about specific tools, enabled these students to respond correctly to questions concerning these materials as information sources.

3. Some familiarity with library organization is acquired without the structured experience of the LSP.

4. The LSP can familiarize students at the University of Arizona with the key concepts important to effective library use.

5. Analysis of the question on identifying the first two letters in a Library of Congress call number showed that although an understanding of call number interpretation was taught to some, the concept had not been taught to as many as expected.

6. If reinforced learning is to be accomplished by the completion of assignments, the assignment must reinforce the objectives that are established for the teaching that occurs in the text of the chapter.

7. If a concept is to be taught, it must be clearly and directly presented in the workbook....(Phipps and Dickstein 1979,211-214)

One other study dealt with a workbook related format for library skills instruction. One hundred and sixty-one students in a freshman communications class were randomly selected as subjects to treatment with a lecture or a programed instruction unit (both based on the same text) and using the same visuals. The posttest of twenty-five items produced approximately the same score for both groups, 12.77 for the lecture and 12.22 for the programed instruction group. The test was objective-based; and an item analysis and reliability measure were done on the test. No control group was used, which one of the authors noted may be important. No attempt was made (such as with the Phipps' report) to analyze the reasons for the low scores, such as the thirteen percent and thirty-seven percent on the questions related to choosing a topic. (Phillips and Raup 1979,422-423) The total percentage of just above sixty percent for the groups is a low standard considering the approval of the results given by the authors.

Programed Instruction

The other studies which provide assistance in the evaluation of the workbook approach are evaluations of programed instruction or programed instruction combined with other presentation forms. The programed instruction units involved in these studies are probably more carefully constructed than the typical workbook, although no detailed comparison of the workbook and any of the programed instruction forms is offered. The studies of Wiggins, Kuo, Kirk, Wendt, and Surprenant discussed below, all provide assistance in designing evaluation procedures for the workbook and in determining methods of instructional presentation.

In a research study conducted at Brigham Young University, a course was designed using standard instructional psychology procedures. The study involved three groups, one using an audiotape and a workbook, the second using a non-programed instruction summary of rules for using the card catalog; and the third serving as the control group. Significant improvement was found in the programed instruction group and statistically significant difference was found between the programed instruction group and the other two groups. Two conclusions made by Wiggins are significant:

1. With the test of card catalog use, actual use was simulated, and there was found a correlation between the skill test and the knowledge test.

2. Programed instruction can be demonstrated to be an effective means of instruction at a statistically significant level. (Wiggins 1972,478-479)

The implication of the card catalog test is that the other sections of

the proposed course (tour, periodical indexes, bibliographies, book review indexes, and government documents) could be presented through programed instruction and tested using a knowledge test.

The time required to design the programed instruction was not detailed. While the difference between the experimental group using programed instruction and the audiotape and control groups was statistically significant, whether it was enough to justify the development of the programed instruction was not made clear. If the finding discussed in this article, (that there is a correlation between achievement on the knowledge test and on the simulated skills test), can be verified in additional studies, the convenience the knowledge test offers could be realized with more confidence.

While Kirk's guided exercise differs somewhat from programed instruction, it has similarities to programed instruction and to the workbook. The guided exercise uses a topic pre-researched by a librarian and a frame format similar to programed instruction. (Kirk 1971, 469) The pretest showed that the groups involved were equivalent. The first group received a library lecture with a demonstration of a search and were given a general reading assignment related to the course, but not required. The second group completed the guided exercise which required actual use of the information sources such as encyclopedias, citation indexes, and other periodical indexes.

Evaluation included a posttest of library knowledge and a research essay of 1250 words on an assigned and pre-researched topic. The essay was evaluated by the faculty member participating in the study and the bibliographies attached to the essays were evaluated by the researcher

based on a scale which he developed. The bibliographies for the essays produced by the group having used the guided exercise were significantly better than the control group's bibliographies at the .20 level of confidence (20.12, lecture and 21.03 exercise). The grades on the essays were not significantly different. A follow-up evaluation was done the next term, but no significant difference was found between the groups. (Kirk 1972,472-473)

Although the superiority expected in the guided exercise group was not demonstrated, Kirk recommended the continued use of the guided exercise after a number of changes were made. The reasons for the recommendation were primarily administrative:

1. Less time is spent by the instructor after the initial preparation time.
2. More flexibility of administration is realized.
3. More flexibility of use due to the self-paced nature of the guided exercise.
4. More time for personal attention to patrons when basic skills are handled by the guided exercise. (Kirk 1978,473-474)

Some attention should have been given to confounding variables. On a campus such as Earlham's, given the emphasis on library use and the small size of the campus, contamination of the sample through communication between individuals in the experimental and control groups is a strong possibility. This possible contamination could have negated the effects of the main treatment. The guided exercise makes possible a personalized and more carefully structured library experience compared with the workbook or the usual programed instruction format. It does, however, require more time and knowledge of resources.

In a carefully controlled laboratory study, Wendt, McCoy and Rust (1963) demonstrated that students using a programed instruction form did as well as students who experienced a lecture based on the information that was presented in the programed instruction text. Some of the programed instruction students were able to complete the sequence in much less time than the control group. In addition to the test, students were evaluated on an actual library assignment. While the experimental group did not do significantly better than the lecture group, the self-pacing advantages of the programed instruction group were considered important. No information was provided concerning the administrative aspects of the two alternatives. Information on the relative expense of preparation of the two formats would enable other library skills instructors to evaluate the potential of these formats for other situations.

Using an undergraduate science course emphasizing library use, Kuo divided 200 students into seven groups. The groups were:

1. Control group (no instruction given).
2. Lecture of one hour without visual aids or practice experience.
3. Audio instruction using a cassette tape.
4. Slide/tape based instruction.
5. Television only.
6. Self-paced television plus notebook of visual aids and examples to emphasize important instructions.
7. Audiotutorial instruction, plus a fifty minute lecture by a librarian using transparencies. (Kuo 1973,287-288)

A criterion referenced test of ninety items was administered. All of

the treatment groups were superior to the control group on the test. Groups six and seven were superior to the others, with the latter scoring significantly higher based on findings of statistical tests. The major conclusion of the study was that a combination of methods was best. (Kuo 1973,289-290) The article does not provide any detail on the role of the librarin in the group with the highest score, indicating the type of assistance given. That information would be useful for this study.

Another careful study of basic library skills instruction was done by Roth. (1978) Three instructional approaches were evaluated:

1. Classroom instruction by graduate student assistants.
2. Classroom instruction by a librarian.
3. Independent study.

In addition, Roth considered the effect of the interaction of the treatment with aptitude. The aptitude chosen for this study was locus of control. Achievement as measured by a posttest was the dependent variable. The study was intended to demonstrate that a carefully planned program of library instruction could be effective. (Roth 1978, 67) The classroom sections were given a fifty minute presentation based on specified objectives using a fifteen minute slide/tape program and transparencies. Practice and reinforcement were provided by "programed Instruction Worksheets". In preparation for the classroom presentations, the teaching assistants were given a "packet of informative materials" covering the materials to be presented by the librarian in the other sections. The posttest was an objective-referenced test, designed using standard procedures. To determine locus of control, the

Rotter Internality-Externality Scale was administered before any of the presentations. The independent study group was given an introduction to the library and some of the informative materials and allowed to proceed at their own pace. (Roth 1978,45-47)

The hypothesis concerning locus of control and its interaction with the treatment was not substantiated. Statistical tests showed no clear relation between locus of control and sex of subject; and sex and locus of control were not strongly associated with achievement on the posttest. Using appropriate statistical tests, Roth concluded that the classroom instruction with face-to-face instruction was superior to the independent study group and to the control groups. All three instruction groups were superior to the control groups. Achievement by the librarian-taught group was slightly superior, but not at a statistically significant level. Scores on the post test were 45.8 percent for the independent study group and 53.2 percent for the librarian-taught group. (Roth 1978,60)

Whether a one-session introduction to the library produces significant improvement in skills is not clear from this report. The careful planning described by Roth produced an average difference of only three points between the librarian-taught sections and the independent study group on a forty item test. This difference of eight percent and at a level of less than sixty percent correct is disappointing. Since no pretest was given an estimate of the amount of learning is difficult to make. When the achievement test was field tested, the group taking the test scored an average of thirty-eight percent. The test was, however, revised after the field test administration.

The most significant experimental design found in this review of the literature was the study done by Surprenant. (1979) For this experiment the researcher used the Solomon four group experimental design to control the variables which might confound the results study. He sought to demonstrate that

1. Lecture and programed instruction groups will show greater achievement on the posttest than the control group.
2. The programed instruction group will be superior to the lecture group in achievement at the factual and conceptual levels of learning.
3. The subjects using their preferred mode of learning will show the most significant improvement as measured on the posttest. (Surprenant 1979,75)

Standard procedures were followed in the design and testing of the instruments used. The subjects were 1234 students in freshman English courses at a midwestern college. The sections to which students were assigned were randomly assigned to treatment and control groups. After the preparation of the instruments, the pretest was given to sections of the experimental and control groups. The lecture and programed instruction were given to the groups and the posttest was administered at the end of the same week. The lecture was based on the material covered by the programed instruction. Also given at this time was a questionnaire to determine the preferred mode of instruction. Test questions were categorized according to factual, conceptual and application level. After re-evaluation of the test it was determined that there was only one question on the application level, and that part of the hypothesis was dropped. (Surprenant 1979,100-102)

The statistical tests appropriate to the Solomon four group design

were initiated. Most of the threats to internal validity were controlled. Because the researcher could not obtain the college entrance examination scores for the students, he was unable to establish the generalizability of the conclusions beyond the sample population. The conclusions of the researcher were:

1. The two experimental groups did significantly better than the control groups at the .05 level.
2. Subjects using the programed instruction did better than those in the lecture group.
3. Programed instruction proved superior to the lecture at the two levels of learning, factual and conceptual.
4. Experiencing the preferred mode of instruction did not improve achievement on the posttest. (Surprenant 1979,126)

Although this is the most complete and sophisticated study of bibliographic instruction in the programed instruction format found in the literature, there are some problems which have not been fully addressed. The experiment was not (perhaps could not be) integrated into the course of which it was a part. The programed instruction and lecture covered only the card catalog and periodical indexes, although the findings could probably be extended to cover other information sources. The preparation time for programed instruction is considerable, and it is not clear whether the five to eight point difference between the lecture and programed instruction justifies the development of library skills instruction that format. Additionally, there is the problem of the importance of requiring the use of the reference works being studied. Surprenant cites one research report which appears to demonstrate that "students can learn without using actual tools in the library." (Surprenant 1979,44) The difficult question of what is learned--knowl-

edge or skills--is not addressed, nor is the problem of using only one instructional technique considered.

Although Surprenant noted statistically significant improvement of the experimental over the lecture groups and significant improvement by both over the control groups, there is a body of research which supports the superiority of the use of a variety of instructional techniques. The conclusion of the authors of one survey of research reports is:

> Reviews such as those cited above leave the 'one best way' approach to instructional development virtually indefensible. Limiting the instructional question to 'appropriate media' ignores the uniqueness of the learner, the structure of the discipline and the style of the teacher. (Kozma, Belle, and Williams 1978,9-10)

The authors propose that instructional planning and evaluation include attention to interactions of treatment or mode of instruction and particular characteristics of the subject. Studies which have shown little or no difference among treatments have revealed statistically significant differences when particular traits or aptitudes of the learner were considered. (Kozma, Belle, and Williams 1978,10-11) While Surprenant did consider preferred mode of instruction in evaluation, aptitudes were not considered in the design of instruction. Some attention was given to the structure of the discipline in emphasizing the factual nature of beginning level bibliographic instruction.

Evaluation

Many of the studies discussed above have featured several forms of evaluation, both formative and summative. There are a number of

generally accepted approaches to formative evaluation such as that described by Dick (Dick and Carey 1978); these approached do not receive the attention in the literature that summative evaluation receives. Several typologies of summative evaluation have been proposed. Kirk (1975,43-47) characterizes evaluation as having three phases: process, product, and content. Evaluation of the process of the information search is concerned with the efficiency of the search. Two methods have been used with this type of evaluation. First, students use diaries to record search strategy decisions and sources consulted. Second, librarians or classroom faculty have evaluated bibliographies produced by the students. While this aspect of evaluation would lend itself to observation-based methodology, no reports of this approach have been found. The product of the search, the bibliography, and to some extent the, research, paper, have been evaluated for completeness. The evaluation of content is the focus of the achievement test.

Another typology is discussed briefly by King. He mentions achievement, performance and perceptual evaluation. (King and Dry 1981,31-32) Achievement evaluation features the test of the cognitive product of instruction. Evaluation of performance emphasizes skills with the use of workbooks or other exercises. Perceptual evaluation relies on reports from subjects on the effects of instruction. These self-reports are elicited through the use of questionnaires. Since a change in behavior is the primary purpose of instruction in library skills, evaluation should give attention to behavior. Changes should occur that are observable and measurable such as increased use of per-

iodical articles and books or more frequent library visits. However, as Benson (1979,61-62) notes, the more knowledgeable user may borrow fewer books because the user has learned to recognize which books are appropriate to a particular search. Circulation and other observational data which go beyond self-reports are important. Very little detailed study of this type of evaluation is available. King's study is concerned with behavior, but with self-reports of behavior. Reports of behavior are important, but they exhibit the same types of biases which limit the usefulness of other self-reports, typically of attitude. A study of student reports of use of particular types of information sources would be especially useful if it were shown to be positively correlated with high scoring on an achievement test or if confirmed by observation.

The workbook and other exercises requiring library use are forms of performance evaluation. Assessment of whether the subject has used particular works to find the answers to questions prepared by the librarian provides information on the extent to which the subject learns what is specified in the objectives of the library skills program. Typically with the workbook, mastery of the skills is required, with the subject repeating the exercise until the correct response is made.

In the study done by Kirk (1971) another type of performance measure is used. This is an evaluation of the product of the search, the bibliography. Kirk (1974,25-29) has published a revision of the scale which he used in the original study. But research on use of the scale in library skills programs is not available; moreover, application of the scale is subjective and controls over projects calling for the

student to produce a bibliography are difficult to implement. Evaluating a bibliography requires use of a common topic which encourages sharing of work by students or it requires that extensive research be done in preparation of topics to be used. Burton (1977,102) reports that the program at the University of Texas includes the evaluation of bibliographies, but does not detail the procedure for the evaluation or provide a report of the results of the evaluation.

King (1978,33-38) has conducted a study using perceptual evaluation. He compared the reports of those receiving instruction from a teaching assistant, those receiving instruction conducted by a librarian and those receiving no specific instruction. A questionnaire was administered listing types of sources which students might have used. The students indicated the numbers of each type of source used. As predicted the librarian-instructed group used more periodical articles and consulted encyclopedias more frequently than the uninstructed group, but differed little from the teaching assistant group.

As a form of perceptual evaluation this is a significant attempt to improve on the usual questionnaire approach, which uses generalized reports of the "I use the library more since instruction" type. However, the limits which the use of self-reports place on a research report are not sufficiently analyzed. One of the major sources of bias in a questionnaire is the tendency to give socially desireable responses. (Webb 1966,15) Students who had just completed a library instruction program would realize that they were expected to have used these sources. In addition, procedures used to establish the reliability of the questionnaire were not explained.

The third type of evaluation is achievement evaluation. The pencil and paper achievement test has been the focus of considerable writing. Werking has surveyed much of the literature of tests and summarizes the problems with this form of evaluation:

1. Insufficiently rigorous experimental design.
2. Administrative problems in establishing adequate control groups.
3. Small samples
4. Lack of standardization of procedures.
5. Failure to establish the validity and reliability of questions.
6. Random and unpredictable variables.
7. Focus on short term gains.
8. Findings of tests may not be applicable to evaluating actual skills. (Werking 1980,157-60)

The chief argument for using achievement tests, given the problems and limitations of this form of evaluation, is that there is clearly a cognitive element in library skills. While knowledge identified by tests does not automatically translate into skills, the knowledge is necessary for the skills to develop. In addition, there are established procedures for achievement testing which can assist the evaluator in establishing objectives for learning, selecting the elements of that learning for evaluation, applying appropriate tests for reliability and validity of the questions and evaluating the results of the tests.

Several writers have insisted on the need for several forms of evaluation. Kirk (1975,43-47) argues that there should be evaluation

of the process, the product and the content. Burton believes that both achievement tests and evaluation of bibliographies should be included because both knowledge and skills are of interest to the librarian. She observes:

> Many students who score poorly on the objective tests turn in bibliographies which document their ability to find information appropriate to their needs. Conversely, bibliographies produced by some of the students with highest scores can be disappointing. (Burton 1977,101-2)

Unfortunately she does not describe the procedures used for the evaluation of the bibliographies or present statistics showing the correlation between the two methods of evaluation. Such systematic analysis may show significant correlation even though individual exceptions remain. Along with evaluation of achievement and skills, researchers have noted the interactions of treatment with the aptitude of the subject. Kozma, Belle and Williams (noted on page 23), show that studies which found no significant difference between treatments, have found differences which are statistically significant when interactions are considered. Benson (1980,60-61) refers to several studies which have shown weak interactions between instructional treatments and aptitudes in studies of library instruction. The Roth (1978) study considered interactions with locus of control, but was unable to establish a clear correlation. Surprenant (1979) found that preference for instructional mode did not influence achievement significantly.

In a review of studies of aptitude-treatment interactions, Snow (1980,8-18) considers the following to be of pimrary importance:

1. General intelligence.

2. Fluid-analytic ability or field dependence/independence.

3. Short term memory.

4. Anxiety level.

5. Achievement-via conformity versus achievement-via independence.

6. Locus of control.

7. Preference for instructional mode.

He concludes that:

> Enough is known at present to argue that the inclusion of aptitude variables in planning and evaluation of college instruction is imperative since it is clear that what constitutes good or bad instruction depends heavily on the character of the subjects being taught. (Snow 1980,19)

The workbook was selected because of its appropriateness to the situation at Hillsdale College as described in Chapter 1. In light of the conclusions of educational researchers on aptitude-treatment interaction, some attention to interaction with programed instruction (and the workbook) is necessary. According to the survey by Kozma, Belle and Williams (1978,310-314), interactions with programed instruction treatment are most likely to be found with the aptitudes of general intelligence and field dependence. Being able to proceed at their own pace is beneficial to students of both high intelligence and low intelligence. However, the small steps and the repetitive nature of programed instruction are likely to be perceived as boring by students of high ability. Also, the independence which programed instruction permits causes problems for some low ability students with poor motivation. Field dependent students generally prefer a highly structured learning situation which programed instruction provides.

However, the lack of personal feedback may cancel that advantage. The authors conclude that "generalizations cannot be made at this point about the differential effect of programed instruction with students other than to say that it seems that individual differences are not eliminated." (Kozma, Belle and Williams 311)

Based on this information, it appears that students with motivation problems and those who prefer personal feedback in a highly structured learning situation would profit from sessions with an instructor to help them achieve their fullest potential from the use of programed instruction. By providing several sessions during which the students and the instructor may review material and evaluate progress, aptitude-treatment interactions may be limited.

Conclusions for this Study

From the literature study the outlines for a full evaluation of the workbook may be derived. A workbook based on objectives accepted by the profession should be used. The workbook should be developed according to established instructional design procedures and tested and revised to reflect the results of testing. The evaluation instrument should be based on the workbook objectives and be evaluated for validity and reliability. The preferred experimental design is the Solomon four group design with subjects randomly selected from a population typical of college freshmen. In addition to the test of knowledge some product of the library exercise such as an annotated bibliography or a research paper should be evaluated. To determine whether the learning identified by the test instrument had been influ-

enced by learner characteristics, an analysis of subject attributes should be done, either locus of control to extend the Roth study or attributes such as field dependence/field independence or general intelligence which may be more important with the use of a self-paced format such as the workbook. Some analysis of learning levels such as that done by Surprenant may be advisable to determine if there is learning beyond the basic skills level, although general agreement exists that basic skills can be learned through a self-paced format. Attitudes of subjects toward the instruction, the library, and librarians should be included. Observational studies of subject as they use the information sources should be attempted to confirm the findings of the other measures. The present evaluation should be part of a long range evaluation program designed to make improvements on the workbook and the test (should preliminary findings be positive) and to evaluate subjects' retention of the learning over a longer period of time. The next chapter describes the elements selected from this outline to be used in this research project.

CHAPTER III

Methodology

Introduction

This chapter presents the methodology for the library skills research project introduced in the previous chapters. Included are the following sections:

1. The question being posed in this project.
2. A description of the population from which the sample was drawn and the procedures for selection of the sample.
3. A discussion of the variables in the study.
4. A description of the instrument used for collection of the data and a discussion of the preparation of the instrument.
5. The methods used for collection and tabulation of the data.

The central question of this research project is:

> Is there a difference in achievement as measured by a library knowledge test between groups using a library skills workbook and groups receiving traditional library instruction at minimal and moderate levels?

Population and Selection of Sample

The subjects of this study were students in the English 101 course at Hillsdale College. This course is required of all students. Freshmen are assigned to sections in such a way as to maintain a balance in numbers among sections and to sections which meet during periods not occupied by other courses on the student's schedule. Ex-

cluded from this study was an honors section. Twelve sections were included in the sample.

The freshmen were divided into three groups:

Group 1: Pretest only.

Group 2A: Control-moderate instruction.

Group 2B: Control-minimal instruction.

Group 3: Experimental-using workbook.

Group One, composed of six sections under three instructors, totaled 120 students. This group was given only a pretest. Composition of this group was determined by the preference of two instructors to give a pretest and the reassignment of the sections under another instructor to the pretest group when one instructor decided not to use the workbook. The instructors in Group One administered the library skills test in the same way they had the previous semester, as a diagnostic test given early in the semester.

Group Two was composed of three sections of seventy-three students under two instructors. Two instructors agreed to use the test as a posttest. One of the instructors in Group Two (designated 2A) was requested to participate in the project because he previously provided the most extensive library skills instruction of the freshmen English instructors. The second instructor in that group (designated Group 2B) was assigned to that group because he decided at the last moment not to use the workbook. A first year instructor at Hillsdale, he expected a minimal amount of library activity of his students. Group Three was the treatment group of two sections with forty-eight students under one instructor. When this project was proposed, sever-

al instructors expressed interest in using the workbook. However, only one of the instructors agreed to use the workbook. The two sections under this instructor were assigned to the workbook.

Administrative problems prevented random assignment of individuals to sections or sections to treatment. While the groups and subjects were not assigned to treatments in a random manner, an analysis of the groups shows them to be fairly similar in composition. ACT scores and SAT scores were available for most of the students in the sections. At the end of the semester, during which the research study took place, student grades were requested from the registrar. The grade point averages (based on a four point system) also show the groups to be similar in achievement. Table 1 presents this information.

Table 1

Student Characteristics

	ACT Scores	SAT Scores Verbal/Math	First Semester GPA
Group One (N=120)	20.09	492/480	2.649
Group Two (N=73)	21.03	443/466	2.478
Group Three (N=48)	21.03	431/485	2.633
All Freshmen (N=241)	20.4	431/485	2.594

Variables and Methods of Instruction

The independent variables in this study were the methods of instruction: the library skills workbook and the minimal and moderate levels of traditional library skills instruction. A description of the methods of instruction is given in the next section. The dependent variable was the library knowledge achievement test.

Procedures for Instructional Treatment

The Library Skills Workbook

The workbook used in this research project was based on several versions of the workbook developed by Miriam Dudley discussed in Chapter One. Some of the chapters and the arrangement of the assignments were adapted from a workbook developed from the Dudley original by Bendix and Root (1978). Added were the chapter on collections of excerpts of literary criticism (Chapter 4), the chapter on bibliographies (Chapter 14) and the section of Chapter 10 on film reviews. The chapters were rearranged to reflect search strategy order, although the chapters on Essay and General Literature Index and on bibliographies were placed out of their expected order (either before or after periodical indexes) and placed in the section "Additional Sources of Information." The chapter on search strategy, Chapter 19, discusses the order in which the sources might be covered in a typical search. Tables of contents of the workbook used in this project and the Penn State and Lakeland workbooks are contained in Appendix B.

The exercises at the end of each chapter were intended to guide the user through the research tool, rather than require a response about the tool. (Refer to Appendix C for an example of the exercise sheet.) After the main sections additional exercises were added to give the student an opportunity to apply the knowledge and skills gained in the chapter exercises. These additional exercises use a topic chosen by the student with the classroom instructor to use the information sources just studied. The topic used is the one the student would later develop into a research paper.

Organization of Instruction

The workbooks were handed out on Friday of the tenth week of the fifteen week term. The workbooks were due on the following Friday. (Scheduling problems were responsible for the shortness of the period allowed for the completion of the workbook.) The students were told that the workbook was to be completed as a preparation for the required research paper. The students were instructed to complete the exercises at their own speed within the alloted period. Answers for each exercise were to be transferred from the workbook to a separate answer sheet. As a chapter or a section of the workbook was completed, the answer sheets were to be placed in a box at the Circulation Desk at the library where students could pick them up the next day. The students could continue to work on the remaining chapters while the answers were checked by the researcher and his assistant. If there were problems with any of the exercises, the student was expected to redo the incorrect exercise before going on with

the workbook. The application exercises at the end of each section were intended to be discussed with the instructor in the regular class sections. Due to scheduling problems, these sessions did not take place and many of the application exercises were not completed as intended. Most of the students completed the workbook with few errors. However, there were typographical errors and incorrectly assigned fill-ins (volume numbers and terms to look up did not match) which confused some of the students. Most completed the workbook in six to eight hours according to their estimate.

Although students were aware that in completing the workbook they were doing an assignment that students in other sections were not doing, the problem was not deemed to be a serious one because instructional procedures are determined by each instructor. Considerable variation exists in materials, assignments, and procedures among the various sections of English 101.

Library instruction for Group 2A consisted of a lecture on research procedures and tools and two fifty minute sessions in the library using the card catalog, periodical indexes, Essay and General Literature Index and the Modern Language Association Bibliography. Students in this group were required to locate five books or articles on their topic in two periodical indexes, in the card catalog, and in the MLA Bibliography. The other two sections of Group Two (2B) were given an introduction to writing a critical research paper and instructed to refer to criticism in periodicals and books as necessary. They were not required to include a minimum number of references in either the tentative or final bibliography.

Data Collection and Analysis

Instruments and Field Testing

The instrument used as the dependent variable in this project was a posttest of achievement. The test had been developed by a committee comprised of the head librarian, three English Department instructors and the researcher. The test had been used as a diagnostic device in previous semesters. The original test was revised by the researcher to reflect the objectives of the workbook. The test consisted of seventy-five multiple choice and matching questions. A copy of the test is in Appendix D.

The test was field tested on 271 freshmen in the Fall of 1979. Considered for revision were questions missed by more than ninety percent or answered correctly by more than eighty percent. The corrected version was tested on twenty-seven students in English 101 in the Spring of 1980. A Kuder-Richardson 20 analysis was done producing a figure of .70. A partial item analysis was done; when high scorers avoided a right answer or an answer was completely avoided, revisions were made. Further revisions were made in the format of the questions to permit the use of machine-readable scoring sheets for the evaluation of the test. The item analysis was performed after the posttest administration on seventy-seven tests from groups two and three. The results are shown in Appendix E. The Kuder-Richardson 21 formula for reliability was applied to the test data producing a figure of .85.

Collection and Tabulation of Data

The pretest was administered to Group One between weeks four and six of the term. This was prior to the period during which library activity was expected of the students. The posttest was administered to Groups Two and Three the day that the research paper was turned in to the instructor in week twelve and thirteen. For Group Three the test was given the class period after the research paper was turned in to the instructor. During the preparation of the test to permit machine scoring, errors were made that rendered some of the answer sheets unsuitable for item analysis. The computer sheets for one section of Group Two, the posttest group, were inadvertently destroyed after preliminary scoring. The only information on the results of the test whicy remained was the mean score of 49.5. The analysis of the remaining tests showed that there was some difference between the pretest and posttest groups and between the posttest groups. The average score for the students in the pretest group was 41.65 (SD, 7.59), range 20 to 59 correct. The average score for fifty-three students in Group 2 was 46.9. The average score for the workbook group was 57. The data from the tests of Group 2B and Group 3 were analyzed using a computer program developed by Dr. Jon Kayne of Hillsdale College. The independent t-test was used.

CHAPTER IV

ANALYSIS

The hypothesis dealt with in this study, stated in the null form is:

1. There is no significant difference in the achievement on the posttest between the experimental group using the workbook and the control group receiving traditional classroom instruction at the minimal level.

2. There is no significant difference in achievement on the posttest between the experimental group using the workbook and the control group receiving traditional classroom instruction at the moderate level.

The experimental group completed a library skills workbook and wrote a research paper. The control groups experienced moderate or minimal library skills instruction and worte a research paper as detailed in the previous chapter. The posttest of library knowledge was administered shortly after the research papers were written. The results of the posttest are given below, along with the scores of the pretests:

Table 2

Test Results

	Mean	S.D.	Variance
Pretest			
Group 1 (N=110)	41.718	7.61	57.91
Posttest			
Group 2A (N=20)	49.5	na	na
Group 2B (N=33)	46.939	6.84	46.81
Group 3 (N=40)	56.775	5.8	33.66

As can be seen from the table, the experimental group achieved some seven to nine points above the control groups. To determine the significance of the difference between the scores, they were analyzed using the independent t-test. Group 2B and Group 3 scores were compared because these were the only groups for which complete data were available. The t-value was determined to be 6.647 with seventy-one degrees of freedom. The null hypothesis was rejected at a level beyond the .0001 level of significance.

Threats to Validity

It was not possible to completely eliminate selection as a threat to validity. Only one version of the test was available. Since the instructors involved were reluctant to relinquish the time required to give both a pretest and a posttest, an alternate version of the established library test was not developed. For the workbook group, the problem of pretest sensitization was considered to be significant enough to outweigh the value of a pretest as a check on bias resulting from selection to groups. A partial check on this interaction was made through the examination of the ACT and SAT examination scores and first semester grade point averages. The scores and grade point averages indicated that the groups differed little in general achievement. Further, results of a student reaction questionnaire administered the day the workbook was completed, revealed that the bulk of the material in the workbook was not considered a duplication of material covered in high school. Only one student indicated that much of the material was familiar. If this reaction is a reliable indicator, it is unlike-

ly that the higher test scores of the workbook were due to inadvertent assignment of students with superior library skills to the treatment group. The instructor of the experimental group indicated that he considered the two sections to have average library skills for freshmen. Also, the attitude of the instructor of the experimental group may have influenced the students. For the experiment to be conducted, the researcher applied to the instructors of freshman English. Only one instructor agreed to use the workbook.

The interaction with maturation was checked by the use of the control group which took the library knowledge test about the same time as the experimental group. Some of the difference between the pretest and posttest group scores was due to the experiences of the students during the eight to eleven weeks between the administration of the tests. The writing of the research paper and the library activity required by that assignment as well as library activity in other classes was a likely influence on performance.

The threat to validity of regression was not controlled. The sample size of Group 3, the experimental group (54), constituted all the students available for the experiment. There was some threat to validity from the effects of mortality. Of the students who began the workbook project, six did not complete the workbook and eight did not take the test. While their ACT and SAT scores were above average for the freshman class, their grade point average for the year was 1.939, compared with the group average of 2.633. Had this group taken the test, less difference may have been found. No information was available on the students in the other sections who did not take the test.

One of the disadvantages of developing unique workbooks for each student is that careful checking of the "fill-ins" (the questions and answers) is required. In this case there were thirty-five versions of fifty-six questions. Due to the illness of the researcher and the lack of clerical assistance to adequately check the individualized fill-ins, a number of errors remained in the workbook. Although students were alerted to this problem and told to consult the researcher if they could not find the answers after a reasonable amount of time, some of the students reported high levels of frustration with the activity. The attitudes generated by this problem served to suppress the test scores.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

To provide instruction in library skills appropriate to the needs of the Hillsdale College student and to meet the constraints of the instructional setting, the workbook was selected as the most appropriate instructional format. Although there were some research reports of related forms, a search of the library science literature did not uncover a suitable model for a complete evaluation of the workbook. To assist in the evaluation of the workbook, a test of library knowledge was selected because one was in use at the institution. Also, there is considerable support in the literature for the suitability of a well-designed library knowledge test, in spite of the problems inherent in using a test of knowledge for evaluation of skills. Ideally there should be additional types of evaluation such as evaluation of the research paper and its bibliography, evaluation of the subject's perceptions of instruction and of library use, and evaluation of the interactions between subject attributes such as locus of control with the treatment. These latter types of evaluation were not attempted because the cooperation of instructors was not obtained.

The experimental design consisted of three groups: Group One took the pretest only; Group Two functioned as the control group; and Group Three experienced the workbook and took the posttest as did the control group. The test, the dependent variable, was modified to meet the objectives of the workbook and adapted for machine scoring. After

being field tested in the fall of 1979, it was used as a pretest with Group One. The workbook was adapted from published versions and modified to meet the objectives of the local library skills program. The posttest was administered after the workbook was completed by the students and immediately after they had turned in their library research project. The control group also took the test after completing their library project. The combined posttest groups scored fourteen percent higher than the pretest group. The mean of the treatment group was twenty percent higher than the mean of the pretest group and ten percent higher than the mean for the control group. The difference in means for the scores of the posttest groups were subjected to statistical analysis and the mean of the experimental group was shown to be superior at a level of significance greater than .0001.

Conclusions

It is apparent from this experiment that significant learning occurs through the use of the workbook and the completion of the library project. The findings of this experiment suggest the conclusion that the workbook was responsible for a considerable part of that improvement. This finding is in agreement with studies cited above (page 8 and 9) which indicate that self-paced learning devices are valuable instruction aids. The parallel improvement shown by the control groups did not match that of the treatment group. Since the treatment group was superior to the group which experienced a minimal level of instruction and the group which experienced a moderate level of instruction, (both also completed library project), it was not just the

library project which produced the improvement. The workbook with its full length treatment of library resources can match the improvement in library knowledge produced by self-paced instructional forms such as those used by Surprenant (1979) and Phipps (1978).

A certain amount of knowledge of information sources and acquisition procedures is necessary to develop skills in the use of library resources. A test of knowledge can detect improvements in a student's knowledge of sources and procedures. The improvements in this experiment brought about by the use of the workbook were in knowledge about sources and procedures which are a part of library use skills. The exercises in the workbook emphasized following certain procedures and did not specifically require iteration of the concepts which were developed in the text of the workbook. As the students completed the steps in the exercises they acquired library use skills.

The workbook has much to recommend it on administrative grounds. In spite of the problems of preparing the individualized exercise questions, preparation of the workbook in less busy periods of library work is one of the workbooks advantages. The exercises take little time to correct and the correction can be handled by clerical staff. This frees the instruction librarian for consultation with students. If the library skills program does not need to service a large number of students, the exercises can be used with the student's own topic instead of using pre-researched fill-ins used in this project. This, of course, requires much more time in evaluation of student responses.

The students were able to complete the exercises with a minimum of assistance. Aside from the correction of errors in the preparation of the books, most of the students needed little help while they were completing the exercises. Students did, however, need to be reminded to read the text before doing the exercises. They tended to skip the text and attempt to do the exercises without reading the explanatory matter. The answer sheets were filled out and handed in for correction promptly in most cases. The errors detected in student answers were corrected by the students with little additional instruction.

Students varied considerably in the speed with which they completed the workbook. A number of students lacked the motivation to continue working on the exercises. Since the class sessions which had been planned to assist with this sort of problem did not take place, some additional checking of answers by the researcher was required.

Recommendations

A single evaluation of a library skills program as complex as the library skills workbook cannot produce a complete learning experience for students. Although the test instrument and the instructional presentation form were pretested and field evaluated, they require revision. The workbook exercises should provide the opportunity for the user to iterate the concepts presented in the text. Answering the questions in the exercise does not ensure the learning of the concepts which the test emphasizes. However, completing the exercise does require that the student actually use the information source. This provides an opportunity for the student to develop skill in using the

source. Some attention should be given to an analysis of level of learning to determine whether learning takes place beyond the basic skills level. Due to the problems associated with developing unique fill-ins for each student's workbook, a study comparing the learning produced by an alternate form of the workbook, one in which the student uses each type of information source to research a topic of the student's choice is desirable. Attention should be given to the amount of time required to correct students' work and to the attitude of the student toward the learning experience. Determining which of the two forms requires the most administration time could provide the basis for a decision on the most useful instructional approach.

Confirmation and substantiation of the findings of this study could be realized through a replication of the study with full control provided by the Solomon four group experimental design. The primary barrier here is gaining the cooperation of enough instructors and being able to schedule the administration of the workbook with limited staff. Also the analysis of the test revealed a number of questions which need to be improved to increase the reliability of the test.

Further evaluation of learning resulting from the use of the workbook is necessary. This evaluation should take place at intervals during the students' subsequent years in college to determine whether the workbook instruction has a lasting effect and to determine whether non-workbook students eventually gained the library knowledge through other college library experiences. This, of course, raises the question of which type of skills instruction/library use experience is the most efficient way of learning library skills.

Although the objectives of this workbook differ somewhat from those published by the ACRL group, a slight modification of local objectives could be made so that the study could be replicated at other institutions. The goal of universally accepted library instruction evaluation can be realized only if institutions agree on the basic objectives.

APPENDIX A: WORKBOOK OBJECTIVES

LIBRARY SKILLS INSTRUCTION OBJECTIVES

Level 1 (Orientation)

Terminal Objective 1:

The student will know how to locate the major Library/Learning Center facilities and services.

E 1. Using a map and library signs, the student will be able to physically locate (go to) the following facilities:

a. Information Desk
b. Reserve Book Notebook
c. Bound Periodical Shelves
d. Mises Room
e. Rest Rooms
f. Calculator
g. Photocopier
h. Periodicals Shelves
i. Audio-visual Area
j. Check-out Desk
k. Atlases
l. Microform Area
m. Typing Room
n. Card Catalog
o. Media Preview Room

E 2. Students will identify reference librarians as helpful resources.

E 3. Using maps and signs, the student will be able to locate (by going to) the following:

a. the correct area for a given call number.
b. the correct area for a current periodical.
c. the correct area for the backfile of a periodical.
d. the correct area for non-print materials.

Levl II (Basic Instruction)

Terminal Objective 1:

The student can make effective use of a catalog card.

E 1. Given a catalog card, the student will identify the classification number.

E 2. Given a catalog card, the student will identify the author, title, note, and subject tracings.

E 3. Given a catalog card, the student will identify whether the item is print or non-print.

Terminal Objective 2:

The student will know how to effectively and efficiently use the card catalog.

E 1. The student will identify the card catalog as the first place to look to locate books and audio-visual materials.

E 2. The student will identify periodicals and newspapers as materials not listed in the card catalog.

E 3. The student will utilize the author catalog to identify whether the Center owns a specific book or non-print item whether or not the name used for access is:

a. a corporate body
b. an artist
c. an actor
d. a performing musician
e. a composer
f. a director
g. an author

E 4. Given a book title, the student will utilize the title catalog to identify whether the library owns the title.

E 5. Given a subject heading, the student will list materials included in the card catalog under that heading.

Terminal Objective 3:

The student will be able to use the Library of Congress Subject Headings book.

E 1. Given a subject and using the Library of Congress Subject Headings book, the student will determine if the heading is used in the subject catalog.

E 2. Given a subject heading and using the Library of Congress Subject Headings book, the student will identify at least one related subject heading which is more specific, and one subject heading which is more general in nature.

Terminal Objective 4:

The student can locate books and audio-visual materials listed in the card catalog.

E 1. Given a call number, the student will locate the book on the shelves.

E 2. Given a call number for a book which is not on the shelf, the student will use the correct procedures for determining what happened to the book.

E 3. Given a location for an audio-visual item, the student will locate the item.

Terminal Objective 5:

The student will know how to check out library materials.

E 1. Students will know how to check out print materials.

E 2. Students will be able to check out non-print materials.

E 3. Students will be able to check out reserve items.

Terminal Objective 6:

The student will know how to identify and locate periodicals owned by the Center.

E 1. The student will identify the following information about the periodicals in the Center using the Periodical List:

a. whether the Mossey Center owns the title.
b. which volumes are owned and which are incomplete.
c. where the backfiles are kept.
d. whether the periodical or parts of it are on microfilm or microfiche.

E 2. Given a periodical title and a specific issue which is owned by the Center, the student will correctly locate the periodical on the shelves.

Terminal Objective 7:

The student will know how to use the basic indexes.

E 1. Given the Reader's Guide, Humanities Index, Social Sciences Index, or the Social Sciences and Humanities Index and a specific subject, the student will identify the author, title, periodical, volume, issue (if appropriate), date, and pages of a specified article listed in a specified index volume.

E 2. Given a list of abbreviations, including periodical titles, commonly found in periodical citations in the Reader's Guide, Humanities Index, Social Sciences Index, or Social Sciences and Humanities Index, the student will identify the words or titles by using the list of abbreviations included in the front of the appropriate indexes.

E 3. Given Essay and General Literature Index for a specified time period and a subject, the student will identify by writing the complete citation, one book which contains an essay on the subject.

E 4. Given Essay and General Literature Index for a specified time period, an author, and an essay, the student will identify by writing the complete citation, a book which contains the essay.

E 5. Given Essay and General Literature Index for a specified time period, and a subject, the student will identify a book which contains an essay on the subject and will determine whether the library owns the book by writing the call number.

E 6. Given a specific subject, a year, and the New York Times Index, the student will identify the date, section (if applicable), column, and page of the article in the New York Times.

Terminal Objective 8:

The student will know how to use the microformat and audio-visual equipment available in the Center.

E 1. The student will correctly load a reel of film on a microfilm reader owned by the Center.

E 2. The student will correctly load a microfiche card on a microfiche reader owned by the Center.

Terminal Objective 9:

The student will know how and when to use basic reference tools.

ENCYCLOPEDIAS

E 1. Given the latest edition of the Encyclopedia Britannica and a specific subject, the student will be able to locate:

a. a short article in the Micropedia (index for the Britannica).
b. the volume and page of the long article in the Macropedia.
c. the volume and page numbers of references to the subject in other text articles.

E 2. Given one of the following encyclopedias: The Encyclopedia of Education, International Encyclopedia of the Social Sciences, McGraw-Hill Encyclopedia of Sciences and Technology, the Encyclopedia of Philosophy, and the Encyclopedia of World Art, and a specific subject by using the index and will locate a specific item in the bibliography.

STATISTICAL SOURCES

E 3. Given a subject and a specific volume of Statistical Abstracts, the student will use the index to locate the table containing the statistics and will identify a specific item on the table.

BOOK REVIEWS

E 4. Given the author, title, and date of publication for a specific book, the student will identify by using Book Review Digest a specific periodical which contains a review of the book.

E 5. Given the author, title, and date of publication for a specific book and the name of a periodical which contains a review of the book, the student will by using the Book Review Index identify the volume number and pages of the book review.

BIOGRAPHIES

E 6. Given the name of a person, Biography Index and a specific year, the student will locate a periodical article dealing with the person's life and will identify the title, volume, and pages of the article.

E 7. Given the name of a prominent American who lived before 1940, the student by using the Dictionary of American Biography will find an article and will identify a specific item in the bibliography.

E 8. Given the name of an American who is or was prominent in the news, the student by using Current Biography or Who's Who in America will find an article on the person and will list the first item in the references section.

BIBLIOGRAPHY

E 9. Given a topic and a volume of Bibliographic Index, the student will locate the topic and identify the source and year of the bibliography.

E 10. Given a topic and a year, the student will locate a limited subject bibliography and identify its scope and date.

E 11. The student will identify a comprehensive subject bibliography and locate an article or date in the bibliography.

ATLAS

E 12. Given a place name and a general atlas, the student will use the atlas to find basic information about the place.

Terminal Objective 10:

The student can plan and implement an efficient and effective search strategy.

E 1. The student will identify and use an appropriate encyclopedia or general text for background information on his/her subject.

E 2. The student will identify by using the Library of Congress Subject Headings book appropriate headings for his/her topic in the card catalog.

E 3. The student will identify relevant indexes to find information on his/her topic.

E 4. The student will identify (when appropriate) statistical sources that are relevant to his/her topic.

E 5. The student will consult a librarian or his instructor for assistance and suggestions when appropriate.

Terminal Objective 11:

The student will know the elements of a complete bibliographic citation.

E 1. Given a book, the student will list the author, title, publisher, place, and date.

E 2. Given a periodical citation, the student will list the author, title, volume, issue number, page, and date.

APPENDIX B: WORKBOOK TABLES OF CONTENTS

HILLSDALE WORKBOOK

TABLE OF CONTENTS

LAKELAND WORKBOOK

TABLE OF CONTENTS

PENN STATE WORKBOOK

TABLE OF CONTENTS

APPENDIX C: SAMPLE EXERCISE

ASSIGNMENT TEN, CONTINUED

FILM REVIEWS

Directions: You must see one of two films for English 102. For assistance in deciding you look for a review of the most promising film (the one underlined below.)

Carrie: Convoy: Paper Moon: Conduct Unbecoming: Sleuth:

37. To determine the year in which the film underlined above was released, use Halliwell. The date is

a. 1976
b. 1978
c. 1973
d. 1975
e. 1972

38. Next use the New York Times Film Review, looking in the index for the year given above. The year and date for the first review of this film is _____. The critic who wrote the review is

a. Richard Eder
b. Vincent Canby
c. Lawrence Van Gelder
d. A. H. Weiler
e. Stephen Farber

39. Turn to the Reader's Guide to Periodical Literature for the volume. How many reviews are listed for this film for the first year of its release?

a. 3
b. 4
c. 6
d. 8
e. 10

APPENDIX D: TEST INSTRUMENT

LIBRARY KNOWLEDGE TEST

Directions: Mark your answers on the Answer Sheet as directed.

1. To locate books in this library on a particular subject, one must consult:
   a. the periodical list
   b. the card catalog
   c. the stack area
   d. the loan desk

2. The classification system used by the Mossey Center is the
   a. Universal Decimal Classification
   b. Dewey Decimal System
   c. Library of Congress System
   d. both b and c

Label the following call numbers as to the proper classification system--Library of Congress (A) or Dewey Decimal (B).

3.	4.	5.	6.	7.
H	PS	822.3	909.7	RA
6494	3531	C28	Sh319	440.55
.E9	.L42			.Z9
A228				L975

8. The card file listing the books in the Mossey Center is divided into:
   a. one section: in alphabetical order like a dictionary
   b. two sections: author/titles; and subjects
   c. two sections: authors; and titles/subjects
   d. three sections: authors; titles; subjects

When trying to locate information in Column A, which of the procedures listed in Column B would you use? Use an entry once, more than once or not at all.

Column A	Column
9. Books the library has on baseball list	a. Use a periodical index
10. Magazine articles on the abortion controversy.	b. Consult the periodical
11. Catcher in the Rye	c. Browse the shelves
12. Books by Kurt Vonnegut	d. Look in the card catalog
	e. Check the magazine rack

13. In addition to definitions, the Oxford English Dictionary contains

a. dates and quotations showing the history of world use
b. short articles on people who have coined new words
c. lists of synonyms and antonyms for each word
d. explanations for the latest slang expressions
e. cross references to modern spelling fo words

ANSWERS FOR 14 TO 18.

a. author
b. publication date
c. edition
d. publisher
e. title

ANSWERS FOR 19 TO 22.

f. author card
b. subject card
c. title card
d. tracings
e. place of publication

18.

14. 19. 20.

15.

```
D
810  Stevenson, William.  1925-
.S8       A man called intrepid:  the secret war/William
     Stevenson.  1st ed. New York:  Harcourt Brace
     Jovanovich, c1976.
          xxv, 486 p., 16 leaves of plates.
     ill.; 24 cm.
          Includes index.

     1.  Stephenson, William Samuel, Sir, 1896-
     2.  World War, 1939-1945--Secret Service.
21.
     3.  Title
MiHilC  14  May 79  1694008  EEIMat  75-30730
```

16. 22.

```
          A man called Intrepid:  the secret war
D
810  Stevenson, William.  1925-
.S8       A man called Intrepid:  the secret war/
S85  William Stevenson.  1st ed. New York:  Har-
```

17.

```
          World War, 1939-1945--SERVICE SEVEICE

D
810  Stevenson, William.  1925-
.S8       A man called Intrepid:  the secret war/
S85  William Stevenson.  1st ed. New York:  Har-
```

23. The author card (or main entry card) is usually for a person, but can be:
    a. a corporation
    b. an institution
    c. an agency or government body
    d. a symposium or conference
    e. all of the above

If you were looking for the authors, titles, or subjects below, in the card catalog, in what order would you find them? Use the letters at the right to answer 24 to 27.

24.
1. 100 Apples
2. Aaron's Apples
3. Onerous Oranges

25.
1. Fox, William
2. Fox Flowers for Your Garden
3. The Fox and the Grapes

a. 1,2,3
b. 1,3,2
c. 2,1,3
d. 2,3,1
e. 3,2,1

26.
1. Who's on First?
2. Whole Nations in Destruction
3. Whose Back Was Turned?

27.
1. U.S. History - Revolution (1775-1781)
2. U.S. History - Civil War (1861-1865)
3. U.S. History - War of 1812

Which of the following subject headings would lead you to books? Pick the correct letter for each group.

A. 1 only B. 1 & 2 C. 1 & 3 D. 2 & 3 E. None

28.
1. U.S. History - Civil War
2. Civil War - U.S. - History
3. Civil War - History - U.S.

29.
1. History - Egyptian
2. Egyptian Fiction
3. Art, Egyptian

30.
1. Henry VIII, King of England
2. King Henry VIII, of England
3. Henry the Eighth of England

Use the entry below from the Library of Congress. Subject Headings book to demonstrate your knowledge of this tool. Use the answers more than once or not at all.

31. Dramatists
    sa Librettists
32. Women dramatists
33. xDrama-Biography
    Playwrights
    xxAuthors & the theater
34. Drama
35. Litterateurs
    Poets
36. Dramatists, English
    --Early modern, 1500-1700

a. Used as a primary subject heading.
b. Used as a related subject heading.
c. Not used in the card catalog

The following words or abbreviations indicate special locations or collections. Match each with the location or the procedure for locating the items. Use the answers once or more than once.

37. Oversize
38. Storage
39. Mises
40. Rare Book
41. Audiotape
42. Record
43. Microfiche
44. Reserve collection

a. Upper (lobby) level, left side as you enter.
b. Upper (lobby) level, right side as you enter.
c. Ask at the Loan Desk.
d. Lower level, left as you enter.
e. Lower level, right as you enter.

Demonstrate your ability to explain the elements of the periodical index entry by matching the following using the entry below from the Reader's Guide to Periodical Literature.

INDIANS OF NORTH AMERICA
American Indian beyond the stereotype. F. Ducheneaux il. Todays Educ 62:22-4 My '73
Growing up an Indian. W. Hanlon. il. New Cath World 216:264-8 n '73.
See also
American Indian Movement

45. Growing up Indian
46. Todays Educ heading
47. New Cath World
48. INDIAN OF NORTH AMERICA
49. American Indian Movement
50. American Indian beyond the stereotype

Answers for 45 to 50
a. author
b. primary subject
c. title of magazine
d. title of article
e. secondary subject heading

	Answers for 51 to 53
51. 62:	a. volume
52. My '73	b. pages
53. :264-8	c. date
	d. edition

54. Which of the following is required for borrowing materials to be taken from the library?

a. meal ticket with your name
b. no unpaid library fines
c. College I.D.
d. all of the above
e. b and c

55. Reserve books

a. may be checked out for use in the library with a driver's license
b. must be returned from overnight use within the first hour the library is open
c. may be checked out with an I.D. card
d. must be returned at the Loan Desk
e. all of the above

56. Books (other than overnight reserve) may be returned

a. at the Loan Desk
b. by the House Mother at the end of the year
c. at the Snack Bar
d. through the Book Drop in the Kresge Lobby
e. both a and b

57. What type of information source is best for an introductory or survey article?

a. almanac
b. encyclopedia
c. dictionary
d. abstract

58. Where is the best place to look first for periodical articles on a specific, current topic?

a. encyclopedia article
b. the card catalog
c. browse periodical shelves
d. an index

59. To find scholarly journal articles, one should look in

a. Reader's Guide to Periodical Literature
b. the card catalog
c. Humanities Index
d. Encyclopedia Britannica

60. Which of the following is the best for determining which journals or magazines are in the Mossey collection?

a. card catalog
b. MLA Bibliography
c. Periodical List
d. Reader's Guide
e. browse the shelves

61. Which of the following provides access to scholarly articles in the basic journals in disciplines such as language, history, literature, theater or philosophy?

a. Cambridge Bibliography of English Literature
b. MLA Bibliography
c. Reader's Guide
d. card catalog
e. Humanities Index

62. General and specialized encyclopedias are best used to provide

a. quotations for research papers
b. current statistical information
c. bibliographic references to basic works
d. the latest criticism on a literary work

63. In addition to providing excerpts from critical writing on important authors, works like Library of Literary Criticism are important for

a. in-depth biographical information
b. citations to sources of critical writings
c. pictures of important authors
d. quotations from the major writer's original works

64. Current and basic information on living persons can best be found in the

a. card catalog
b. Biography Index
c. Bibliographic Index
d. Dictionary of American History
e. Who's Who in America

65. Which is the best information source to use to locate parts (articles or chapters) of books?

a. Essay and General Literature Index
b. Humanities Index
c. New York Times Index
d. card catalog

66. Which of the following consists mostly of a list of books and/or articles?

a. biography
b. autobiography
c. bibliography
d. index
e. both a and b

67. Which of the following is the best place to look for a comprehensive list of books and journal articles on works of fiction, drama, and poetry?

a. the card catalog
b. Reader's Guide to Periodical Literature
c. Humanities Index
d. Essay and General Literature Index
e. MLA Bibliography

68. Which information source provides access to just the basic literary journals in the Mossey Collection?

a. Social Science Index
b. Contemporary Literary Criticism
c. Reader's Guide
d. Humanities Index
e. MLA Bibliography

69. The MLA Bibliography is organized on which of the following principles?

a. by country, by period, and by subject
b. alphabetically by author
c. by type of literary work: drama, fiction, poetry
d. alphabetically by subject

70. When using a bibliography or index, for which of the following must you usually look in the front of the volume for full information?

a. author's name
b. article title
c. journal title
d. publication year
e. subject heading

71. An atlas provides, in addition to topographical maps

a. maps showing road and cities
b. transportation routes, elevation, population
c. geographical definitions and place name identification
d. articles on continents and major islands

72. To locate articles containing personal information about individuals, living or dead use

a. Reader's Guide
b. Historical Abstracts
c. Biography Index
d. Bibliographic Index

73. Film reviews may be found through which of the following information sources?

a. the card catalog
b. Movie Reviews Index
c. New York Times Index
d. Reader's Guide
e. both c and d

74. Which of the following information source(s) can be used to find specific bits of current news?

a. encyclopedia
b. almanac
c. New York Times Index
d. the card catalog
e. Humanities Index

75. Which type of information source can be used to find current statistical information?

a. encyclopedia
b. almanac
c. dictionary
d. abstract
e. both b and d

APPENDIX E

ITEM ANALYSIS OF ACHIEVEMENT TEST

ITEM NO.	PERCENT CORRECT IN UPPER 3RD	LOWER 3RD	ALL	DIFFICULTY INDEX	DISCRIMINATION INDEX
1.	95	12	88	12	29
2.	41	6	27	73	35
3.	95	83	84	16	12
4.	91	67	73	27	24
5.	91	78	81	19	13
6.	91	78	81	19	13
7.	96	67	79	21	29
8.	73	50	61	39	23
9.	96	61	87	13	34
10.	86	39	65	35	47
11.	96	61	83	17	30
12.	100	83	92	08	17
13.	82	17	51	49	65
14.	96	100	99	01	-4
15.	96	89	95	05	07
16.	100	100	97	03	00
17.	--	--	--	--	--
18.	100	89	97	03	11
19.	91	67	82	18	24
20.	100	83	92	08	17
21.	100	98	99	01	00
22.	96	61	82	18	24
23.	91	72	86	14	19
24.	82	56	78	22	26
25.	27	06	16	84	22
26.	32	11	26	74	21
27.	14	11	14	86	03
28.	55	61	52	48	-6
29.	18	33	25	75	-14
30.	36	28	34	66	09
31.	100	50	81	19	50
32.	100	50	77	23	50
33.	36	00	25	75	36
34.	91	28	58	42	63
35.	86	22	55	45	64
36.	91	39	75	25	52
37.	86	32	66	34	53
38.	82	67	74	26	15

ITEM NO.	PERCENT CORRECT IN UPPER 3RD	LOWER 3RD	ALL	DIFFICULTY INDEX	DISCRIMINATION INDEX
39.	96	39	71	29	57
40.	77	56	70	30	22
41.	86	68	69	31	20
42.	96	68	86	14	18
43.	91	68	82	18	24
44.	96	68	84	16	29
45.	96	72	87	13	23
46.	100	67	92	08	33
47.	96	79	91	09	18
48.	100	72	91	09	28
49.	86	83	88	12	03
50.	91	44	79	21	46
51.	96	39	78	22	57
52.	100	89	97	03	11
53.	96	72	87	13	23
54.	91	72	87	13	19
55.	59	44	48	51	15
56.	96	56	81	19	40
57.	100	44	69	31	56
58.	91	39	71	29	52
59.	68	17	48	52	52
60.	86	61	79	21	25
61.	86	28	68	32	59
62.	73	44	58	42	28
63.	86	68	70	30	20
64.	73	39	51	49	34
65.	77	28	44	52	49
66.	77	50	53	47	27
67.	50	00	31	69	50
68.	14	06	10	90	08
69.	59	25	25	75	59
70.	77	11	40	60	66
71.	68	33	44	56	35
72.	86	33	58	42	53
73.	27	05	13	87	22
74.	82	57	70	30	26
75.	86	57	70	30	31

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