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PRODUCTION AND EVALUATION OF AN
INSTRUCTIONAL SLIDE/TAPE ON LIBRARY ORIENTATION
FOR JUNIOR HIGH SCHOOL STUDENTS

Victor Aronoff

A Thesis
in
The Department
of
Education

Presented in Partial Fulfillment of the Requirements
for the degree of Master of Arts in Educational Technology at
Concordia University
Montréal, Québec, Canada

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ABSTRACT

PRODUCTION AND EVALUATION OF AN
INSTRUCTIONAL SLIDE/TAPE ON LIBRARY ORIENTATION
FOR JUNIOR HIGH SCHOOL STUDENTS

Victor Aronoff

An experimental production, designed to be entertaining as well as instructional, introduced 12 and 13 year old high school entrants to basic rules and information on library usage. An evaluation study was conducted to test the hypothesis that students receiving instruction through a dramatic slide/tape presentation would learn the cognitive components of the subject at least as well as those given a strictly expository lecture with overhead projectuals. The experiment used a sample of 102 Ss in 5 intact groups including 2 controls. The experimental groups served to evaluate the cognitive effectiveness of 3 instructional treatments: slide/tape, illustrated lecture, and combined presentations. Learning and retention were assessed by written multiple choice posttests given after 3 weeks vis-à-vis posttests after 1 day. T-tests (at $p = .05$) applied to pre- and posttest results showed that the slide/tape, illustrated lecture, and combined presentations all produced significant learning effects of approximately equal dimensions. This supports the hypothesis that the slide/tape would be at least as successful as the illustrated lecture, and suggests that the effects of the two treatments combined are not summative as shown in score gains. Despite some forgetting, the learning gain remained significant over the medium term (3 wks.) for both illustrated lecture and slide/tape treatments.

This thesis also includes the slide/tape presentation,
"This is your Library", available at the library of
Concordia University.

TABLE OF CONTENTS

	<u>page</u>
Abstract	i
Acknowledgments	ii
CHAPTER ONE - INTRODUCTION & OVERVIEW	1
CHAPTER TWO - MEDIA PRESENTATION	12
General Aim	12
Educational Objectives	13
Target Audience and Users	16
Outline of Content and Form of Presentation	17
Content Validation & Instructional Design	21
CHAPTER THREE - PRODUCTION EVALUATION	37
Purposes of Evaluation	37
Related Research on Instructional Media	40
Rationale and Hypotheses	46
Theoretical Concepts & Operational Definitions	48
Sample of Target Audience	50
Research Design	53
Within Group Analysis	56
Inter-group Comparisons	57
Instrumentation	58
Data Analysis	60
Time Requirements for Production and Evaluation	61

TABLE OF CONTENTS (Cont'd)

	<u>page</u>
Experimental & Instructional Conditions	62
CHAPTER FOUR - RESULTS & CONCLUSIONS	65
Cognitive Effectiveness	67
Assessment of Affective Impact	74
Implications and Concluding Remarks	77
BIBLIOGRAPHY	87
APPENDIX I Script for Instructional Slide/Tape "This is Your Library"	(1)
APPENDIX II Illustrated Lecture	(18)
APPENDIX III Quiz on Library Use	(31)
APPENDIX IV Data Summary	(35)
APPENDIX V Statistics	(36)
APPENDIX VI Structured Interview & Feedback	(50)

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CHAPTER ONE
INTRODUCTION & OVERVIEW

When high school librarians of Montreal's largest public school commission strongly requested assistance in giving instruction in library use, their appeal reflected a need almost universally shared, if the research literature is any indication. In a survey of 184 "leaders in librarianship" conducted by Woodworth (1967), library instruction in the schools was ranked as the foremost problem. At the same time, she does report some limited success of existing library orientation programs, confirming that additional instruction given by the school librarian produced significantly more learning than if the classroom teacher was solely responsible for this training.¹ It seems a reasonable inference that the inclusion of a professional specialist would benefit instruction in a subject, especially if as reported by school librarians, most teachers do not possess sufficient interest or knowledge in the field. In her consideration of the problem, Garrelek cites the opinions of school librarians and information specialists to the effect that students generally view their experiences in the library as frustrating and that even teachers and administrators undervalue its importance and misunderstand the central role it can

¹Woodworth, Mary L., "The Identification & Examination of Areas of Needed Research in School Librarianship," Wisconsin University, Madison: Office of Education, U.S.A., Nov. 1970, Abstract p. 188.

play in learning.² However, the solution is not so simple as to turn over the onus of library orientation to professional librarians and urge the collaboration with classroom teachers, although this would certainly help. As underlined by Hartz, librarians are not always equipped to deal with the pedagogical problems entailed in giving orientation sessions, pointing out that "only one librarian in four is sufficiently familiar with classroom activities of her school to analyse the teaching methods employed".³ Ten years later, Stephenson bemoans the same condition saying that perhaps the main problem in library instruction is that most trained librarians are not skilled educators.⁴ So, while the school librarian must be a key figure in giving library instruction, assistance in the form of professional collaboration and instructional support materials are clearly called for. The production and evaluation project is aimed at both these related needs.

The primary production of this study is a dramatic slide/tape presentation introducing students to their library and how

²Garrelek, Yetta, Concordia University M.A. Thesis in Educational Technology (1972), "The Development of a Library Skills Game for Children aged 11 and 12 years to aid in Reinforcing Information-Retrieval Skills and Improve their Attitudes toward the use of Libraries for Data Retrieval," pp. 6,7.

³Hartz, Frederick R., "Library Instruction in the Secondary School", Journal of Secondary Education, V. 41, May '66, p. 201.

⁴Stephenson, M.B., "Education in the use of Information in University & Academic Environments", Aslib Proceedings #28 (1), Jan. '76, pp. 17-21.

to use it. A fuller description, including media selection and design considerations, follows in a subsequent chapter. Suffice to mention that the fundamental purpose is to effectively teach the desired content and to evaluate this experimentally. However, there are other important benefits to consider. Firstly, by involving teachers and library personnel in the development of the support materials, it is hoped that their enthusiasm and competence in this kind of instructional activity might be enhanced, and the basis for continued coordinated efforts might be established. Secondly, it is theorized that by tailor-making the materials specifically for a local situation and by building in interest "hooks" and dramatic techniques addressed to the particular audience, the students would respond with more active interest and negative attitudes reported by the librarians might be significantly modified. So, instead of relying on commercially available materials often with glaring incompatibilities due to time and place of production, it was decided to develop an instructional slide/tape in and for our own setting. The introductory principles of library orientation contained in the presentation are certainly applicable beyond the fifteen high schools in our system, and the program might profitably be shared with other school boards, as has in fact been done. However, generalizability of use was not the deciding factor. The critical features leading to the selection of the slide/tape medium were its potential for dramatic appeal, relative

technical facility, and adaptability to revision and modified application. The latter is threefold. Some schools have rendered the program even more specific to themselves by changing some of the visuals to slides of their own libraries, a heartening if not unhoped-for development. Another aspect of flexibility is more definitely prescriptive, i.e., using the graphic slides without the soundtrack for more detailed follow-up discussions. The third application is for individual auto-tutorial use.

Let us return to a point alluded to earlier -- the need to integrate library instruction with classroom activities entailing the joint efforts of both teacher and librarian. Although this may exceed the immediate scope of this paper, we must acknowledge that no introductory unit in library orientation, however well-designed, can guarantee lasting benefits on its own merits. It must be extended and reinforced by learning activities corresponding more or less directly to classroom work or student interests, preferably both. Perkins corroborates this by concluding from his studies that while introductory lectures are certainly advisable, "the student learns to use the library by using the library".⁵ If he is to do so, he must perceive the utility and pleasures of the action.

⁵Perkins, Ralph, "Realistic Library Orientation -- A Necessity", Library College Journal, Vol. 3 (Fall 1970), p. 20.

The professional literature echoes many of the concerns voiced above. Although the studies deal mainly with library instruction at the college level, this only serves to underline the importance of projects like our own which addresses itself to a gap in the reported research and provides basic library knowledge at an earlier more appropriate stage. Using established journal reference sources,⁶ we will highlight the most relevant work published over the last eight years. In 1972, Griffin and Clark⁷ conducted a questionnaire study with twenty universities revealing the continuing problems of underuse and uninformed use of library resources despite orientation lectures and tours, library guides and handbooks, and other forms of instruction. They stress the importance of increased communication between librarian and teacher, and the development of imaginative programs using new equipment and techniques. Wiggins (1972)⁸ describes a response to this need in the form of an instructional program developed at Brigham Young University on the basis of principles in instructional psychology. The first two in the 5-part program coincide with our own objectives:

⁶E.R.I.C. -- Educational Resources Information Center

L.I.S.A. -- Library & Information Science Abstracts

Library Literature - a specialized index, published by H.W. Wilson Co.

⁷Griffin, Lloyd W., & Clark, Jack A. "Orientation and Instruction of Graduate Students in the use of the University Library: A Survey," College and Resource Libraries.

⁸Wiggins, Marvin E., "The Development of Library Use Instructional Programs," College & Resource Libraries, #33 (6) Nov. '72, 473-479.

- 1) familiarity with the physical layout and specialized facilities in the library;
- 2) competent use of the card catalogue and the understanding of the underlying classification system.

The study is noteworthy because of the designation of specific objectives and corresponding tests to validate effectiveness, a procedure our study will emulate.

Whereas the above used small-format media (e.g. slides, overheads, guides) as did virtually all the other production projects, the library staff at Brunel University (U.K.) have combined their efforts with six studio technicians to develop three videotape programs in library orientation.⁹ They report that the production costs could not be justified if the project had not been coordinated among various university departments. The loss of color which was a feature of the slide/tape version they previously used seemed to be a drawback, and the dimension of motion seemed of no particular benefit for this content. The only advantage cited was the erasability of the videotapes, hardly adequate reason for selecting this medium.

The use of smaller format media materials for the promotion of library instruction is a recurrent suggestion in

⁹Wyatt, R.W.P., "Use of Videotape Recordings in Brunel University Library," in Exploitation of Library Resources: A Systems Approach, ed. R.J.P. Carey, Hatfield, U.K., 1972, pp. 31-37.

the literature.¹⁰ In 1970, D.H. Revill¹¹ surveyed the various teaching methods taken in this area, including lecture, written material; filmstrips, slides and films; ITV; CAI and programmed learning. He concludes that there is no basis for making prescriptive judgments on specific media choices, but he does theorize that whatever form it takes, the instruction should be correlated to the particular educational context so that the problems posed do not appear as mere mechanical exercises. He ends by emphasizing the need for the systematic evaluation of the diverse methods, a declaration in which he is certainly not alone.

Revill followed his own advice when he conducted a comparative study on two forms of instruction for college students in advanced library skills. While both the conventional lecture and the overhead projector demonstration were measurably effective as revealed in objective posttests, the overheads were significantly more so to the .05 level.¹² A similar approach was taken by Kirk in studying library instruction for under-

¹⁰ Thomson, Anthony Hugh, "Use of Audio-visual Materials," Assistant Librarian #69, Jan.'76, pp. 9-10.

¹¹ Revill, D.H., "Teaching Methods in the Library: A Survey from the educational point of view," Library World #71, Feb. 1970, pp. 243-249 (LISA Abstract).

¹² Revill, D.H., Research in Librarianship, 2 (12), Sept.'69, pp. 174-178 (LISA Abstract).

graduate biology students through a lecture-demonstration compared to a form of programmed instruction he calls "guided exercise". He found no differences either in competency training or in appreciative attitudes toward library use, and stresses other factors in choosing instructional methods -- preparation time, flexibility, student time, ease of use.¹³

Boyd et al.¹⁴ conducted another comparison study of instructional modes in library orientation, this time for sixth grade students. The three instructional packages were: 1) an audio-tutorial cassette package, 2) an enquiry game, and 3) a worksheet module. The first and second were both found quite effective, but the cassette package was declared most "cost beneficial" because it required no additional personnel as did the enquiry game. The study is significant because it is one of the very few on library skills in the public school and rigorous evaluations were performed. Questions of attitudes were also given their rightful importance.

Perhaps the most ambitious project to study the instructional design and evaluation problems for library orientation programs was coordinated by R.J.P. Carey.¹⁵ After the develop-

¹³Kirk, Thomas, "A Comparison of Two Methods of Library Instruction for Students in Introductory Biology," College and Resource Libraries, Nov. '71, p. 7. (LISA Abstract).

¹⁴Boyd, G.M. et al., "Resource Centre Oriented Learning Project," Report to the Ministry of Education of Quebec, 1973.

¹⁵Carey, R.J.P., "A Systems Approach to Exploiting Library Resources: Some Experimental factors and problems," in Exploitation of Library Resources: A Systems Approach, ed. R.J.P. Carey, Hatfield, U.K., 1972 (LISA Abstract).

ment of an elaborate twelve-session tape/chart course with accompanying exhibitions and an introductory slide/tape, the more difficult task of evaluation remains to be reported. In the final analysis, it is stressed, the measure of the effectiveness of the orientation program as a whole is the degree to which library use becomes integrated into the teaching curriculum, underlining the importance of the compatibility of such programs with particular institutional settings. To encourage others to develop and/or adapt slide/tapes to their specific conditions, Carey et al. included an introductory guide on the preparation of such presentations. Influenced by the work at Brunel, Sanner¹⁶ developed similar slide/tapes for a Scandinavian college, and emphasized their additional utility for individual study as auto-tutorial materials. These guidelines relating to adaptability and flexibility of application are well-taken in the context of the present study.

In his review in 1972, Kennedy¹⁷ observes that the literature on library orientation abounds with descriptions of the problems and proposed solutions but that there is little of an experimental nature. Scant little has changed since,

¹⁶Sanner, Lars-Erik, "Tape/slide presentation as aids to Instruction of Library Users," Biblioteksbladet 59(2), 1974, pp. 23-25 (LISA Abstract).

¹⁷Kennedy, Kieran, "An Experimental Study of an Audio-tutorial Self-Instructional System as an Aid to Pre-adolescent School Children in Developing a Search Strategy for Locating and Selecting Materials and Information in a Resource Center," M.A. Thesis in Educational Technology, Concordia University, 1972, p. 10.

except that a number of production projects have been undertaken, virtually all at the college level, and mostly paved with the declared intentions of evaluation experiments. But we cannot underestimate the difficulties, as illustrated by the report on our own efforts in the chapters which follow. In an evaluation experiment controlled as far as possible under "field" conditions, we will assess the cognitive effectiveness of two small-format productions (slide/tape, overheads) designed and developed by this researcher. There are other equally important issues, namely, the role of attitudes as related to both instructor and instructed. These will be considered analytically in our production design, although they will not be quantitatively evaluated.

Garrelek's ¹⁸ research along these lines is quite instructive. She cites Rosenberg ¹⁹ indicating that ease of use is one of the most significant factors influencing the attitudes and behavior of library users. This ease must be made apparent to the new high-schooler through competent instruction. Garrelek further reasons quite credibly that factors influencing student attitudes toward learning, school

¹⁸Garrelek, Yetta, Ibid., p. 5.

¹⁹Rosenberg, Victor, "The Application of Psychometric Techniques to Determine the Attitudes of Individuals toward Information Seeking," in Studies in the Man-System Interface in Libraries, Report #2, Bethlehem, Pennsylvania: Center for Information Sciences, Lehigh University, July 1966, p. 196.

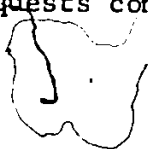
and achievement would also affect attitudes towards the library. Among the operating factors is the influence on attitudes of "important others", including peers, parents, teachers and other adults. This tends to vindicate the pains taken in our slide/tape to dramatize an amiable relationship between two appealing personalities and to present the information in an entertaining fashion. The student is bright but not overly "bookwormish", confident and presumably popular (not cloyingly perfect, however). The teacher-librarian-narrator is helpful, witty and easy-going. If the viewers can identify with these characters and enjoy the dramatic techniques employed, then hopefully their attitudes toward the library and the people in it will be positively affected -- i.e., there might be desirable "modelling" behavior on the part of both instructed and instructor. In this way, we might have an instrument which contributes to the student's knowledge about library use and at the same time increases his desire to learn more.

CHAPTER TWO
MEDIA PRESENTATION

General Aim

The purpose of the slide/tape presentation was to help orient new high school students to the larger, more complex library in their school. These students were moving from elementary schools of 400 to 500 students with small volunteer-staffed libraries often using make-shift systems of categorization, into comprehensive high schools with 1500 to 2400 students and professionally staffed libraries with collections of 17,000 books or more.

Each of the fifteen high schools in the Montreal Catholic School Commission has only one librarian assisted by one or two technicians. Among their duties is to conduct 3 to 5 library orientation sessions with the secondary one classes during their first term in their new surroundings. It was hoped that additional library activities planned in cooperation with classroom teachers would grow out of this formal program. With up to 15 class groups of 30 to 35 students to manage, the librarians found it impossible to schedule a sufficient number of sessions with each group to adequately cover the fundamentals of library organization. As a result, the library staff was overwhelmed with individual student requests for aid in finding books. There is no thought of eliminating such requests completely, but it was considered wastefully repetitious



to have to explain the basics of card cataloguing and the Dewey Decimal System of Categorization on an individual basis. Furthermore, it was feared that many students were underusing the facilities because of their trepidation due to unfamiliarity with the more complex set-up.

Adding to the difficulties was the library staff reductions imposed by revised provincial norms for school personnel. Schools of 1500 to 2400 students saw their library help cut from 4 or 5 to 2 or 3. Obviously this magnified the burden of student orientation and every other aspect of the library's functioning.

To help overcome these problems, it was decided to provide instructional aid material with which librarians could introduce the basic concepts of library organization to groups of 30 to 70 secondary one students, and at the same time encourage a positive disposition to further instruction given in two or three follow-up sessions with class groups. This motivational consideration was important, since the librarians unanimously expressed concern about student apathy, especially difficult to deal with in the larger group introductory sessions. The relative inexperience of librarians in teaching situations and their limited personal contact with students underlined the need.

Educational Objectives

The objectives of the instructional presentation were

twofold. First, there was the cognitive aspect by which the instruction sought to impart the fundamental knowledge necessary for the student to be able to track down a library book through the use of the card catalogue and the call number code of the Dewey Decimal System. The informational content this necessitated was determined by extensive consultation with professional school librarians (Sr. Eileen McConomy and Ms. Zdenka Fonda particularly) and is reflected in the script and quiz included in appendices. It can be summarized as a knowledge of the main areas of the library, a basic understanding of the Dewey System of Categorization and how to find out more about it, and recognition of the three basic types of cards found in the card catalogue and how to use them.

The second aspect, the motivational component, is more difficult to specify, and to measure with precision. Librarians complained of the poor attitude or apathy of students when brought to library orientation sessions. They, the librarians, felt ill-equipped to deal with this problem and when they turned to commercially prepared sound-filmstrips, they reported a negative student response because, although the informational content was more or less appropriate, the students reacted against the "tone" of the material. This is not a blanket criticism of commercially produced audiovisual aids available on this subject. The problem is that the cartoon or real characters and the general approach used in the American

material are frequently geared to elementary students, since in the U.S., the libraries at that level are considerably more evolved in their size and system of organization. Canadian producers, notably N.F.B., have distributed nothing to date for our specific needs.

Another motivational problem was to overcome the students' uncertainty in facing a new, more complex system by leading them to realize that with a basic understanding of the logic underlying the system, they could find their own way around, and that if they needed special help, someone would be there to help them figure it out rather than simply to hand out books. At the same time, the presentation sought to motivate students to view the library as a place of relaxed reading as well as study and to make some headway in breaking down the negative "bookworm" stereotype.

So, with respect to motivational considerations (the affective domain), the objectives of the slide/tape presentation were to reduce student apprehension or apathy regarding the library and its personnel, and to foster a relaxed, confident attitude leading them to a more frequent utilization of these resources. Similarly, the presentation would seek to promote a corresponding positive attitude on the part of the users, i.e., the librarians who seemed to require attractive and highly motivational materials to lend a strong start to the library orientation program, and to encourage their own production of follow-up materials in collaboration with teaching personnel.

There have been two instances to date in which librarians have cooperatively produced or modified A.V. support materials reportedly because of the interest stimulated by this slide/tape. Along the same lines, important side-benefits seemed to be initiated in the form of student participation in audiovisual projects. In the formative trials of our production, the students expressed such interest that four classes began slide/tape projects on topics of their own with only one or two sessions for technical assistance from the writer. Although no systematic attempt has been made to estimate such benefits, which are not directly related to our library orientation objectives, we believe this may contribute to broader learning goals and to the evolution of our libraries into true media resource centers.

Target Audience and Users

The presentation was intended for use by school librarians with first year high school students, 12 and 13 years of age, in the English sector of the Montreal Catholic School Commission. This represents approximately 3,300 male and female students per academic year at this point in time.

Another school board in Montreal and the Communication Arts Department at the Loyola Campus of Concordia University have asked for copies, but we are not able to indicate their precise application other than to say that in the first instance, the purpose approximated our own, and in the second, the pro-

duction was used for illustrative purposes with media students.

Outline of Content and Form of Presentation

The instructional content was determined by close consultation with the library consultant for the Montreal Catholic School Commission and the library staff at Marymount Comprehensive High School consisting of a fully-qualified librarian and two library technicians.

The first information that had to be conveyed concerned the physical layout of the high school library -- the reference section, reading area, periodicals room, circulation desk, and card catalogue. Although the precise disposition would vary somewhat from school to school, the library at Marymount High School was considered typical enough to be representative and meaningful to the students of the other secondary schools in the system (the relevant section of the script is from slide 26 through 47).

Secondly, the use of the card catalogue had to be explained. Basically this consisted of the functions of the 3 types of cards (title, author, subject), how to use the call numbers on these to find the books on the shelves. Special attention was given to the subject card because of its importance in research projects, since most students would not be overly familiar with specific title and author data (slides #48 to #71 cover this).

Next, the borrowing procedure is illustrated step-by-

step referring to the card catalogue, finding the book on the shelves following the numbering system, charging it out at the circulation desk, and returning it at the appropriate time and place (slides #72 to #82).

Fourthly, the Dewey Decimal System of book classification is outlined in its ten main categories. Only enough information about the numerous subcategories is discussed to explicate the overall rationale. Sources of more complete details are indicated (slides #83 to #94).

Fifthly, how to find fiction material classified alphabetically apart from the Dewey System is demonstrated (slides #95 to #99).

Lastly, there is a graphic review of the ten Dewey categories and a light "signing off" (slides #100 to #110).

The script for the slide/tape was written in the form of a dialogue between an adult male representing a teacher or librarian and an adolescent female in the role of a student. Dialogue was chosen over simple narration for a number of reasons. There is the advantage of voice variety together with the added dynamism of an interaction between two characters. Furthermore, in the interest of promoting easy communication between student and librarian, it seemed appropriate to illustrate such a relationship dramatically. As touched on in the section concerning educational objectives, librarians were seeking to improve their rapport with the students who all too often either avoided the library completely

or came only to ask for a book their teachers had assigned. It was hoped that the students would identify with the younger character in the dialogue who engages in light-hearted exchanges with the narrator-librarian and that this might influence their attitudes towards their own library and its personnel.

Of course, the above could not be accomplished at the risk of obscuring the informational content. The dialogue format provided a very suitable vehicle for this as well. The main body of the script is built around the steps the student must follow to find a book given one of three pieces of information, i.e. title, author or subject. In order to understand these steps, the student must absorb a fair amount of theory about card catalogue organization and the Dewey Decimal System. While maintaining a logical order of presentation, this theoretical information is revealed by detailed answers given by the narrator-librarian to the practical questions posed by the student. In this way, we hoped to combine the tight organization of a straightforward exposition with the relaxed informality of a simulated dialogue.

Structurally the slide/tape presentation is comprised of three main sections, although it is to be viewed in a continuous 15 minute showing. The first minute consists of 25 slides of color abstracts shown to the rhythm of a very explosive rendition of Berlioz' "Symphonie Fantastique". This is designed as an attention-getter which would allow the

students numbering up to seventy the opportunity to settle in their seats and hopefully to perk up, asking themselves "whazzat". In other words, the intention was to arouse attention and focus it on the sights and sounds of the presentation. Secondly, we wanted to show that classical music could work very well with an age-group normally thought of as exclusively pop-oriented.

The second section is the main body of the work, taking up to 13 of the 15 minutes, and consisting of 74 live-action and graphic slides depicting the steps in finding and borrowing a book through the use of the card catalogue, which is organized according to the Dewey Decimal System. An itemized summary of the informational content is given at the start of this heading. The majority of the slides depict the step-by-step book search and borrowing procedure. The model representing the student in the dialogue was a 14 year-old, female student. There are five slides picturing the model, just enough to establish identification and maintain continuity. The narrator-librarian remains unseen. The other "live-action" slides are of other students engaged in different activities in the library as seen during the student's visual tour. This serves to heighten the realism and generalize identification for the student viewers.

The remainder are 17 copy stand visuals: close-ups of the book used as an illustration, displays of catalogue cards,

and a series of 10 graphics with cartoons borrowed from Charles Schultz' Peanuts and printed listings of the Dewey categories and subdivisions. The drawings provide memory hooks for the ten Dewey categories and serve to enliven student interest. The graphic slides could be used in follow-ups going into more detail on the Dewey System.

The sound track for this main section consists of the dialogue and background music from Dave Brubeck's "Take Five". The style of the dialogue is, as stated, a relaxed question and answer with some humorous asides (e.g., slides 38, 52, 84) to relieve the dryness while always staying within context.

The final section is a minute-long review of the Dewey categories by showing in close-up the same cartoons associated earlier with each of the ten categories. The conclusion of "Take Five" fades up to full volume to provide musical accompaniment.

Content Validation & Instructional Design

As Baker ²⁰ points out, it is important to confirm that the content selected is accurate and properly representative of the range of data possible. Unconscious prejudices of content planners must be avoided by submitting prototype scripts to other experts. In this study, the verification

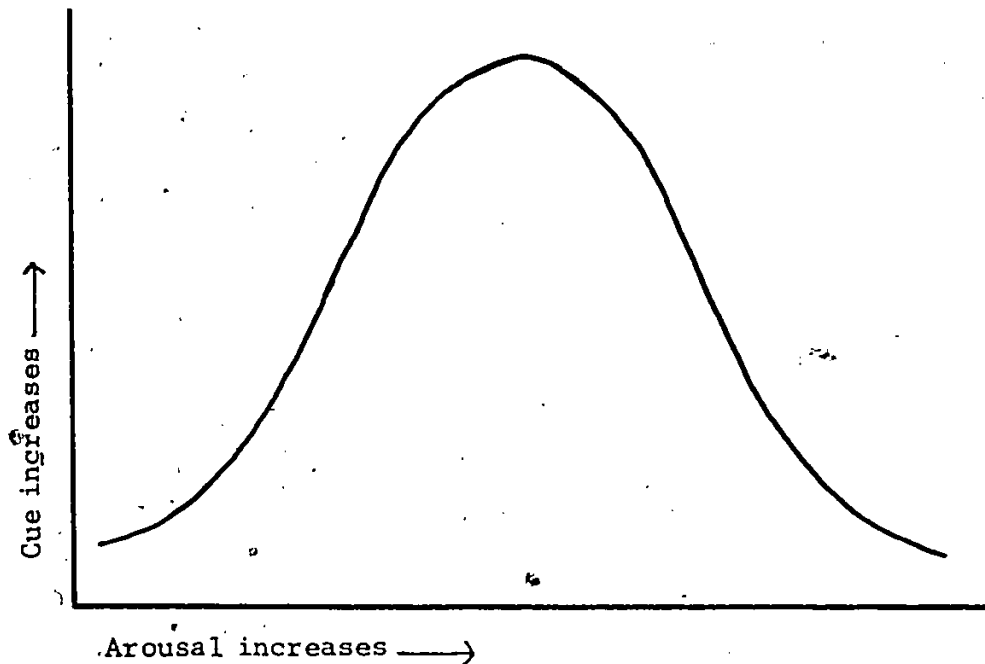
²⁰ Baker, Eva L., "Formative Evaluation of Instruction", in Evaluation in Education - Current Applications, W. James Popham, ed., McCutchan Publ. Corp., Berkeley, California, 1974, pp. 546-7.

procedures were quite thorough. The first draft of the script developed by the writer was based on information provided by a group of three librarians headed by Zdenka Fonda of Marymount High School. It was then submitted to the library consultant for the Montreal Catholic School Commission, Sr. Eileen McConomy, for her recommendations, and finally to a general meeting of all fifteen high school librarians in the commission (M.C.S.C.). The consequent revisions were quite minor -- e.g. the "See Also" card was explained more fully.

The instructional content is described in some detail under the previous heading. What remains is to identify basic principles of instructional design underlying the structure. The first section is the one-minute "light show", if we can call it that. In lay terms, this was intended to wake up the deadheads. Pedagogically, we speak of "arousing" the student's curiosity, or capturing his attention with "interest hooks". This is all pretty fuzzy language, and so it is interesting to find approximate counterparts in the clinical world of physiological psychology. At McGill University, Donald O. Hebb, R.B. Malmö²¹ and colleagues have been conducting experiments on constructs labelled "cue and arousal functions". We do not see the need to report the specifics here, and neither do we

²¹Malmö, Robert B., "Activation and Arousal", in B.B. Wolman (ed.) International Encyclopedia of Psychiatry, Psychology, Psychoanalysis and Neurology, Vol. 1, New York, Van Nostrand & Reinhold, 1977, pp. 213-221.

suggest electroencephalographic measurement of the brainwave activity of students watching the slide/tape presentation. But it is instructive that cue and arousal correspond quite closely to our concepts of learning and attention, and that the trends in the research indicate that there is an optimal middle range of arousal level (attentiveness, alertness to stimuli) which facilitates the cue function (instructional input). The theorized interaction of the two variables can be graphically illustrated in the following figure.



The implication is that the brain processes specific information (cue) most efficiently at moderate levels of general neural activity (arousal) between the extremes of somnolence and over-

excitation from panic or other stimulus overload. For practical purposes, this adds little to guide the instructional designer that common sense does not already dictate. Obviously we try not to put our students to sleep with droning lectures, and we avoid trying to teach over the din of an acid-rock band or under threat of high voltage shock treatment. If, however, the research succeeds in delimiting the optimal range and type of brainwave activity for human learning and which kinds of stimuli can achieve this condition, we might witness the fruitful convergence of two often distant disciplines in the psychology of learning. For the present, we simply cite this research as another reminder of the fundamental importance of devising techniques of arousing and maintaining student interest to create the "teachable moment".

The "light show" is just one instance of what we have referred to as dramatic devices to "entertain" the viewer. Others include the use of humorous dialogue, visual jokes and other photographic effects, and the use of popular cartoon characters. The contention is that these pleasant associations would tend to bring viewers back to the situation voluntarily and with a positive disposition toward the people and objects found there. Despite the preponderance of behaviorist thinking which largely ignores the behavioral effects of internal states, P.T. Young is one respected theorist who would support our emphasis on affective determinants of behavior. Our approach

is compatible with his "hedonic theory of drive".²² In a sense, when we speak of devices to make our presentation "entertaining", we are referring to all the various techniques to enhance the cognitive content by association with pleasurable experiences and aesthetic appreciation. Or as Young might say, we are trying to establish a positive affectivity which will direct future behavior.

The most pervasive of these techniques used in the slide/tape production are the dramatic elements of character and dialogue. To relate these literary concepts to the realm of instructional design, we cite the construct of "human modeling" as studied by Bandura.²³ This is an indirect method of facilitating attitude-learning through the agency of another human being, real or imagined, as in the case of the slide/tape dramatization. The appealing characterizations of the student and narrator-librarian roles may influence viewers, instructor as well as instructed, toward similar constructive attitudes and friendly patterns of interaction. The process by which this occurs is referred to as "vicarious reinforcement" whereby the learner sees that the actions of the model lead to personal satisfaction and will therefore tend to imitate his behavior.

²²Mowrer, O. Hobart, Learning Theory & Behavior, John Wiley & Sons, New York, 1960, pp. 187-8.

²³Bandura, A., Principles of Behavior Modification, New York, Holt Rinehart & Winston, 1969.

Gagné and Briggs²⁴ consider this approach in discussing instruction in the affective domain. This study adopts their definition of attitude as "an internal state which affects an individual's choice of action toward some object, person or event." In the case of the slide/tape production, the affective aim is clear: to provide the student with pleasurable associations of the library experience so that he might form positive attitudes disposing him to attend the library voluntarily, relate constructively to its personnel, and be more receptive to instruction during structured visits.

Notwithstanding the affective considerations, as much care was taken with the cognitive aspects. As in most efforts in designing curriculum, we must acknowledge an underlying debt to Piaget²⁵ for basic principles of cognition, namely, progression from the simple and concrete to the more complex and abstract. For a classification of types of learning to analyse our instructional program, we return to Gagné and Briggs (op. cit. pp. 40-60). Their model suggests various kinds of intellectual skills in an ascending order of complexity and abstractness. Highlighting a few along this continuum, we have concrete concepts, information, rule-learning, problem-solving, and cognitive

²⁴Gagné, Robert M., Briggs, Leslie J., Principles of Instructional Design, New York, Holt, Rinehart & Winston, 1974, pp. 61-66.

²⁵Piaget, J., The Psychology of Intelligence, New York, Harcourt, Brace, Jovanovich, 1950.

strategies. The two which seem most pertinent to our instructional presentation are information and rule-learning. Information, when it is given as a body of meaningfully interrelated facts, is often referred to as knowledge. The data on the physical organization of the library in the first half of the slide/tape falls into this category. Then there is rule-learning, defined as the ability to apply certain knowledge to classify objects and events. When the instruction deals with the functions of the three types of catalogue cards and the Dewey Decimal System, we are in the rule-learning phase and perhaps even entering the area of problem-solving. The latter differs only in degree to the definition of rule-learning, implying the additional ability to apply and adapt a learned rule to a somewhat different situation. The problem of thinking of variations of subject headings to find more relevant data is touched on in the slide/tape presentation, but to move significantly into this intellectual territory would require active follow-up exercises preferably related to classroom curriculum.

In the presentation itself, the cognitive data is sequenced in a logical order dictated by a hypothetical assignment requiring the student to go to the school library to find a book on a given topic. At the same time, it is arranged according to the principle of increasing complexity as seen from this list of questions outlining the cognitive components:

Information or
Fact-learning

Where is the library?
What is found in the different areas?
What can the student do there?
Who is there to help the student?

Rule-learning
(& problem-solving?)

How can he find information for himself:
a) if the title is known?
b) if the author is known?
c) if the subject is known?
How does he find the book in the shelves?
How is the book checked out from the library?
What do the code numbers mean?

We have moved in logical progression from the physical to the theoretical basis of library organization.

At critical points, the slide/tape recapitulates the essential information. This occurs several times in the presentation of material on the card catalogue. It is most obvious in the graphic review of the Dewey Decimal System at the conclusion. This is consistent with the survey of the research done by W.H. Allen ²⁶ which attests to the effectiveness of redundancy in the presentation of basic knowledge. Editorial skill as well as

²⁶Allen, W.H., "Intellectual Abilities and Instructional Media Design", Stanford University, California, E.R.I.C. Clearinghouse on Information Resources, 1974. Draft copy on microfiche.

educational expertise is called for to select what is essential from the larger body of knowledge so that it may receive the attention due its importance to future communication. To avoid informational overload, other explicative material is presented less emphatically and without repetition, indicating nevertheless how the data may be retrieved as the need arises. In the slide/tape, the cognitive content is structured in the time-tested tradition: introduce, explain and review. By so doing, it conforms to another precept of instructional media design derived by Allen (op. cit. pp. 17-19): "The structure or organizational outline of the content of an instructional communication may increase the learning of the content for learners of all abilities." There is, of course, no single agreed-on formula for this. He goes on to point out the apparent benefits of special cues and devices, employing novel and varied stimuli, in order to dramatize essential material. The light show at the beginning and the Peanuts graphics at the end of the presentation exemplify this principle. We have come full circle. The techniques discussed earlier in relation to dramatic devices and their affective benefits reappear in our consideration of cognitive effectiveness. Hopefully, this signifies the integrity of our instructional design.

Rationale for Media Selection

Before contemplating the time and expense of a production effort, the use of commercially available materials was considered.

Samples of small format (slide/tapes, filmstrips) and 16 mm. film productions from various suppliers have been evaluated and tried in our schools with mixed results. Two sound film-strip series ("The Library or How I Learned to Love Melville Dewey", Prentice Hall; "Your Library -- How to Use it", Moreland Latchford) were problematical because they were addressed to the more educationally progressive segment of the U.S. market. The first was geared to nine or ten year olds whose elementary school libraries were as sophisticated as those only encountered by our students at the secondary level. So, while the informational content was applicable enough, the younger models and language utilized created a tone our high schoolers found offensively childish. The second series was addressed at American high schoolers and included material appropriate to full-fledged media centers, an unattained goal in our context. In addition, the library research illustrations were blatantly culturally biased. Britannica has put out a silent filmstrip series which is usable, but only for follow-up application because of the complex detail.

If some of the above-mentioned bruises adolescent or patriotic pride, much of what is available in 16 mm. dating back to the early 1960's jars the funny bones of students to whom crewcuts are as outmoded as the model-T. Uninspired narrations and conceptual designs were also common. However, one highly recommended film called "Library World" (Barr Films, California) was released in 1976. Though it has been added to

the school board film library's lending list, the cost of approximately \$400 precludes each school having its own copy. For this and other reasons detailed below, it was judged that even well-designed 16 mm. films could not fulfill the same functions as locally produced and readily available materials in adaptable smaller format media.

So, the decision was made to produce our own materials tailored to the specific characteristics of our secondary schools. By so doing, it was hoped that the sense of immediacy on the part of the viewer would be heightened and that combined with the exact applicability of the information, this would produce substantial learning benefits. Furthermore, there were potential benefits for the users as well, in that the consultative procedures during the production and evaluation stages might encourage further collaborations between librarian and classroom teacher which would in turn profit the student.

The production facilities of the media office of the Montreal Catholic School Commission limited our choice to the following media formats: $\frac{1}{2}$ " videotape, overhead transparencies, audio-cassettes or tapes, and synchronized slide/tape presentation. Posters, handbooks, worksheets and other "paper" media can also contribute to library instruction. In fact, the first two already play a supportive role and the worksheet format has been recommended as a means of integrating classroom assignments with library exercises or learning games, not unlike Garrelek's.

"Library Skills Game" (op.cit.). However, the immediate need was to introduce students to the library orientation program, the body of which would include a variety of activities. An audiovisual medium, it is thought, would carry a stronger impact in providing this informational overview and initial stimulus than would a single channel format.

In support of a multi-channel system over sound-only instruction, Allen (op.cit., p. 9) cites a 1974 study by Becker finding that a slide/tape introducing literary concepts to junior high school students had a greater effect on posttest and retention test scores than audio tapes, especially for those with low verbal ability. We couldn't conclude from this that the slide/tape format is superior under all conditions, but the content, introductory purpose and audience are sufficiently comparable to lend some validity to our selection of this medium.

The advisability of videotapes for library instruction was alluded to in the opening chapter (p. 6). Although such a production was feasible in the ½" format, cost efficiency and media attributes hardly point to this choice. As already mentioned, the additional aspect of motion does not especially benefit this kind of instructional content. In fact, Allen (op.cit., p. 7) has cited some evidence that while lower ability individuals profit as much as the higher ability group from slide/tape instruction, they benefit significantly less than the more gifted from motion pictures, leading to the supposition

that still slides are less likely to overtax information processing abilities. Although not entirely conclusive, we have some grounds for assuming that there would be little to gain from the additional time and expense of producing a film treatment of the subject. As far as a video version goes, the same argument holds, in addition to which there are the factors of inferior image size and definition, and the lesser availability of the necessary hardware at the school level.

A series of overhead projectuals was seriously considered since the material might well be presented through schematic illustrations such as flowcharts which are well-suited to this medium. Low production costs and easy duplicability were other positive features. In fact such a series was subsequently produced, providing the basis for a comparative study. However, the decisive factor favoring the slide/tape format was its capacity to incorporate dramatic devices aimed at maximizing positive affectivity. As indicated earlier, one of the important objectives was to stimulate student receptivity to the subject and to provide an encouraging start to the orientation sessions. The librarians were comparatively inexperienced in teaching class groups and it was hoped that an easily-administered, high-interest presentation would ease their apprehension and provide the "fast start" they needed with the students, who had generally exhibited indifference or even resistance to library instruction.

The following are the criteria considered best-satisfied

by the slide/tape medium in this situation.

1. Production Capabilities:

The media center at the Montreal Catholic School Commission has available a good range of 35 mm. photographic equipment and very adequate sound-mixing facilities. The techniques of slide/tape production fall more easily within the existing personnel and material capacities than either video or film.

2. Ease of Presentation:

Carousel slide projectors and cassette players with incorporated synchronizers are readily available in the schools and easy to operate. By facilitating the task in the opening phase of the orientation program, we hoped to aid in overcoming the librarians' self-professed apprehension of instructional situations.

3. Adaptability:

Some librarians expressed the desirability of a tailor-made document identifying the areas of their own particular library. Adapting the slide/tape would only require that the school replace the library scenes with 35 mm. slides of their own setting. The sound track remains untouched. A more important kind of adaptability concerns its flexibility of usage in follow-up classes. The graphic slides in particular are useful separately to illustrate the Dewey categories in more detail. Thirdly, there is

the opportunity for auto-tutorial use by individuals or small groups.

4. Moderate Unit Cost:

Original Production Costs:

Materials (film, processing, tape)	\$ 75.00
Scripting (man hours for research, consultation, writing: \$75/day)	\$375.00
Secretarial	\$ 40.00
Studio technician (1 day)	\$ 60.00
Photographic technician (2 days)	\$ 90.00
Graphics (labor and materials)	\$ 60.00
Subtotal	\$700.00
Reproduction and distribution of 15 units	\$900.00
Total cost	\$1,600.00
Unit Cost (all inclusive)	\$107.00

As shown above, the costs for the original production are quite substantial at \$700. This would increase still more if professional narration and more complex graphics were required. However, the unit cost when 15 copies are needed

is approximately \$100 which is comparable to the price of a commercially produced sound-slide presentation. The expense is more than justified first by the number of users (3,300 in 1976-77 school year) and the lasting relevance of the subject matter. Furthermore, in terms of physical durability, the slide/tape format is perhaps the most durable with a physical life expectancy of at least five years in the schools.

5. Affective Potential:

Given a competent script and properly exposed slides, the medium of slide/tape can have a strong inherent appeal, by exploiting various dramatic techniques in the instructional design as discussed earlier (See "Content Validation & Instructional Design"). This was of overriding importance for this project, because of the unanimous concern of school librarians over student apathy. The dry approach taken in commercially produced materials, including 16 mm. films, left something to be desired in dealing with the problem. We hoped to overcome it by the immediate relevance of the setting and situation, the stimulating use of color, and a light approach in the dialogue among other dramatic devices. Not only did we hope that these qualities would stimulate attention and positive attitudes during one teaching session, but also that it would have a motivational carry-over into subsequent orientation sessions with the librarians.

CHAPTER THREE

PRODUCTION EVALUATION

Purposes of Evaluation

The importance of evaluating the cognitive effectiveness of an instructional presentation in bringing about the intended learning is unquestioned. In this instance, we must assess whether the students acquire from the slide/tape presentation an improved knowledge of library science enabling them to better utilize library resources. We have constructed a test and an experimental design to evaluate this. In addition to this, however, is the motivational question: does the presentation engender more favourable attitudes on the part of librarian and student alike, disposing them to more contacts with each other so that further learning may be promoted? Our preliminary use of the slide/tape presentation, outside the experiment but under similar conditions, gave strong indication of a highly positive motivational impact. The librarians using it reported applause and generally enthusiastic responses improving both the quality and quantity of their subsequent interactions with students. Clearly, it would have been desirable to substantiate these motivational benefits as objectively as possible, but the study has had to limit itself to informal observation and inferential data.

In the general context of instructional media in public education, there are signs of a backlash against what critics

might call 'education by entertainment'. The danger in this 'back to the basics' trend is the underlying assumption that attention to affective considerations obstructs or at least obscures cognitive objectives, adding uselessly to the cost and complexity of preparing instructional materials. So the onus is on the educational media specialist to show that productions designed largely for motivational appeal or other affective factors can instruct at least as successfully in the cognitive area as more straightforward production designs, while having the significant advantage of stimulating positive attitudes toward the subject and more practice of the desired behavior.

Our slide/tape production was designed to introduce students to the basics of library usage in such a way as to overcome the negative attitude or apathy cited by librarians giving orientation programs. The librarians themselves were apprehensive about giving the instruction, and they would be encouraged by a highly motivational and easy-to-use presentation to start off the program. Given their limited contact with individual groups of students, they felt it was very difficult to 'break the ice' in a formal lecture situation, and initiate a positive atmosphere which would increase the likelihood of the student's voluntary presence in the library and the additional learning opportunity this represents.

In order to defend our selection of the slide/tape

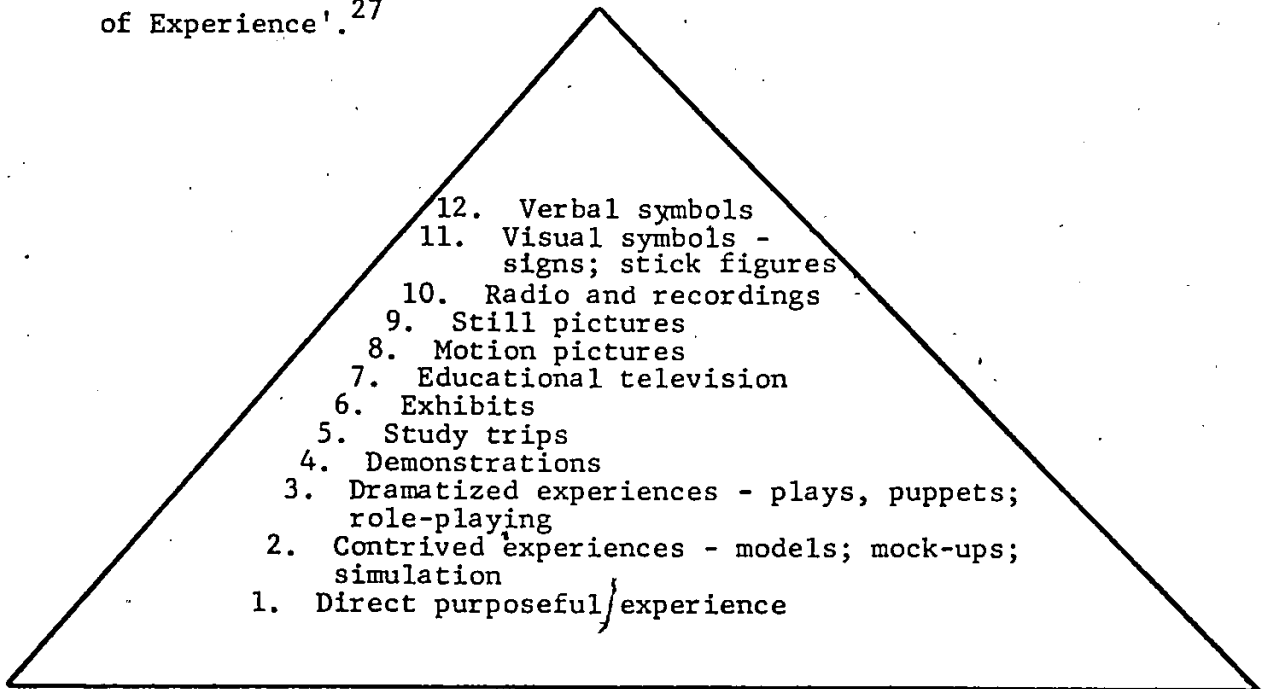
medium to overcome these problems we must reconsider media attributes comparatively. We already discussed our rationale for media selection and the circumstances narrowing the choice to two realistic alternatives -- the slide/tape and a series of overhead projectuals. Presented in a well-prepared lecture, the latter is judged to be probably as effective in the cognitive area as the slide/tape production. Overhead transparencies are very convenient for illustrating layouts of physical organization, outlining procedures and presenting systems of classification. Indeed every effort was made to exploit these characteristics in developing the overheads we used for comparative analysis in our study. However, the decisive factor favoring the slide/tape format and justifying our choice of this more complex medium was that it is far superior in motivational potential through means of various dramatic techniques and the aesthetics of sound, color and image.

To sum up, our first purpose of evaluation is to establish through testing and statistical analysis that the slide/tape can at least match a lecture illustrated by overheads for cognitive effectiveness. Secondly, we will try to ascertain whether we have succeeded in converting the superior motivational potential of the slide/tape medium. It was judged unfeasible because of the demands on the library personnel to evaluate this by direct measurement of the criterion response -- i.e. more frequent and competent use of the library. Therefore, we

will seek to do so by observing and interpreting immediate responses to the presentation in order to assess its motivational effectiveness.

Related Research on Instructional Media

In order to evaluate the choice of production format, we examined the literature on instructional media selection. A common starting point in such deliberations is Dale's 'Cone of Experience'.²⁷



As seen in the figure, the cone contains twelve categories of media and learning activities starting from the base level with

²⁷Dale, E. Audiovisual methods in Teaching, 1969, New York, Holt, Rinehart & Winston.

direct experience and moving up by degrees of abstractness to verbal symbols at the peak. The instructional designer decides where on the scale is the optimal point, considering stage of intellectual development and production limitations. Dale's guide for using the cone is, "Go as low as you need to in order to insure learning, but as high as you can for the most efficient learning." The same rule applies to the categorization given by Gagne & Briggs (op.cit., p. 150) reproduced below.

<u>Type of Stimuli</u>	<u>Media Options</u>
1. Printed words	books; programmed instruction; hand-outs; charts; slide projectors; posters; chalkboard; checklists;
2. Spoken words	teacher; tape recording;
3. Still pictures and spoken words	slide-tapes; voice slide; lecture plus posters;
4. Motion, spoken words, and other sounds	motion pictures; television; live demonstration;
5. Pictorial portrayal of theoretical concepts	animated motion pictures; puppets and props.

For the introduction to library usage, level three was selected combining still pictures and recording words in a slide/tape (levels 9 and 10 in Dale). Other levels could communicate the content to our audience and would be used at other stages of the overall program. For example, verbal symbols are used in the library handbook for students, and level five in Dale's cone corresponds to the guided tour of the library.

However, for affective as well as cognitive reasons considered elsewhere, the intermediate level in the form of a dramatic slide/tape was thought to be optimal for the first exposure to the orientation program.

A very different source gives us an added perspective on strategies of media selection and design. George L. Gropper²⁸ points out that in choosing and designing instructional media, it is equally important to classify objectives by stimulus and response modes as by type of learning. Traditionally, most instructional specialists have been too exclusively "stimulus-oriented" basing their message designs on their internal properties and interrelationships, and not on their capacity to elicit the specific, predetermined responses to be learned. This message orientation fails to distinguish between "cues" and "criterion stimuli", and defines response behavior in terms of the message design rather than in the mode of the "criterion responses", which gives more emphasis to active practice and the responses made throughout the learning experience.²⁹ This behavioral approach has implications for a critical evaluation of our instructional presentation and its place in the overall library orientation program.

²⁸Gropper, George L., "A Behavioral Perspective on Media Selection", A.V. Communication Review, Summer 1976, pp. 157-186.

²⁹Ibid., pp. 161-2.

Also pertinent is Gropper's classification of media in two broad categories: passive and active carriers, based on whether or not the critical attributes of the media intrinsically necessitate active practice and feedback (op.cit., pp. 170-8). The obvious leaning is toward the latter, but we take issue with any reductionist interpretation. Firstly, we cannot discount the appropriate use of media designed to achieve internal responses influencing later behavior rather than immediately observable and quantifiable ones. Secondly, there is nothing inevitable about a medium having an active or passive character. It depends on the design. Written or other external responses can be required in a slide/tape as in programmed instruction.

The journal literature has been studied for systematic procedures of media selection accentuating practical considerations. Such guidelines, together with detailed flowcharts are provided by R.H. Anderson, an instructional designer for Bell Telephone.³⁰ A similar exposition is given by E.F.J. Holden, in which he lists eight factors for selecting media and situates each medium within a matrix indicating the degree of response control, among other variables.³¹ While we do not entirely concur with any schema rating each medium only according to its

³⁰ Anderson, R.H., "Selection of Media - Another Perspective", Improving Human Performance: A Research Quarterly, 1974, 3, 3, 81-107.

³¹ Holden, E.F.J., "Selection of Instructional Media Systems", Programmed Learning & Educational Technology, Vol. 12, no. 5, Sept. 1975.

most obvious attributes and/or its most typical applications, such writings can provide some guidance.

The final main area on which the literature must be examined concerns the methodology for evaluating the effectiveness of instructional media, or more precisely, instructional units employing technological media. We accept P.D. Mitchell's dictum that "time spent in evaluation is not considered time lost whereas labor and materials expended in producing non-evaluated materials must be considered wasted unless evidence is provided to the contrary."³² Accordingly, an effort was made to familiarize ourselves with the general state of affairs in research on educational media with particular emphasis on the methodology of experimentation and evaluation. Our review begins on a discouraging note, or should we say a despondent dirge. Olson summed up the existing research on media by stating that

...We know neither how to describe the psychological effects of ... technologies nor how to adapt them to the purposes of education. The impact of technologies both ancient and modern on children's learning is either negligible or unknown.³³

Salomon and Clark, major contributors on the subject, agree and

³² Mitchell, P. David, "The Discernible Educational Technologist", Programmed Learning and Educational Technology, Vol. 12, no. 5, Sept. 1975, pp. 306-325.

³³ Olson, D.R., Introduction, in D.R. Olson (ed.) Media and Symbols: The forms of expression, communication and education. The Year-book of the National Society for the Study of Education. The University of Chicago Press, 1974, p.6.

point out the support of many reviewers in this assessment. But their critical analysis goes some distance in solving the problems by diagnosing past shortcomings and suggesting new methodological approaches.³⁴ They rightly point out that gross media comparisons were of little practical or theoretical benefit. In such comparative studies, all the variables other than the media themselves -- that is, the content, mode of presentation, structure, didactics, situation -- had to be held constant. Reduced to such a rigid approach where only the least significant aspect of instruction (the "delivery service") were allowed to vary, it should be no surprise that significant differences were rarely found and that even if they were, the results could not be usefully interpreted.

Our own study includes a comparison of two media presentations of essentially the same informational content. However, instead of keeping everything else constant, every attempt was made to exploit the particular potentialities of each medium in designing the two presentations. In so doing, we follow the recent trend favored by Salomon (op.cit., p. 103) and focus on the instructional potential of specific media attributes. We are particularly interested in what he calls the "psychological effects and functions" which comprise the mental and emotional states incurred, as well as the information processing activities.

³⁴Salomon, Gavriel, and Clark, Richard E., "Examining the Methodology of Research on Media & Technology in Education", Review of Educational Research, Winter 1977, Vol. 47, no.1, pp. 99-120.

Rationale and Hypotheses

As indicated earlier in discussing the educational objectives and media selection, the purposes of the instructional presentation are both cognitive and affective. Strictly in terms of the cognitive component, it seemed obvious that the information and rules of library organization and book cataloguing could easily be communicated using straightforward techniques already at our disposal or readily prepared -- e.g. expository lecture, printed material, support visuals such as overhead transparencies, question period. However, as the problem was posed to us, it was the motivational or affective component which stood out as most challenging. The eventual users, the school librarians, complained about the general lack of interest in the library shown by their junior high school clientele and the difficulty they had in capturing their attention during conventional library orientation sessions. It was equally clear to this observer that the fifteen librarians were by and large apprehensive or passively resigned about their duties in this regard. So, a motivational 'booster' was needed both at the level of instructor and instructed. However, the additional cost and effort in designing and producing a presentation to serve this affective function could only be justified if it also succeeds in its cognitive purposes.

In order to consider this, it became apparent that a straightforward unit of instruction dealing with the same

cognitive content but without special attention to affective considerations was required as a basis for comparison. For this purpose, we developed a standardized lecture presentation illustrated by overhead transparencies. Now we could demonstrate that an instructional presentation is not necessarily less effective in the cognitive area because it simultaneously addresses itself to affective concerns. Specifically, we hypothesize that students given an automated slide/tape presentation designed to entertain and motivate as well as to instruct will learn rules of library organization at least as well as students receiving the same cognitive content through a strictly expository lecture illustrated by overhead transparencies.

Should this be confirmed in our evaluation, we could then proceed to assess complementary affective benefits. Our follow-up hypothesis would be: when exposed to an entertaining instructional unit depicting the library as both interesting and useful, and suggesting the probability of friendly relationships with its personnel, students will be more highly motivated to use the library than if the instruction given were colorless (affectively neutral) and strictly cognitive. In the context of our study, we could not assess this proposition statistically. However, observed student responses to the slide/tape were strongly indicative of motivational effectiveness. Spontaneous applause, eager questioning and a higher level of arousal were attested to by librarians both in and out of the experimental

setting. Although this remains somewhat inferential, it bears systematic consideration because of the light it sheds on our overall rationale which highlights the importance of motivational factors in designing instructional materials.

Theoretical Concepts & Operational Definitions

The two broad conceptual areas of interest to this and many other studies are the cognitive and affective domains familiarized by Bloom.³⁵ Without delving too deeply into this well-tilled and fertile soil, we will simply describe as cognitive any component of intellectual skill, knowledge or information, particularly as it may accrue from planned instruction. Affectivity is ascribed to internal states such as attitudes and feelings which motivate the individual toward (positive) or away from (negative) a given stimulus situation. Other concepts such as motivation and attitude are implicit here and/or defined elsewhere in this paper.

What remains is to provide the operational definitions required by the evaluation experiment. The intervening variable of our major hypothesis is the process of learning which we define as "the process of acquiring modifications in existing knowledge, skills, habits or action tendencies."³⁶ The content

³⁵Bloom, B.S. (ed.), Taxonomy of Educational Objectives: Handbook I Cognitive Domain, II Affective Domain, New York, David McKay, 1956.

³⁶Gagné, Robert M., "Domains of Learning", Interchange, Vol. 3, No. 1, 1972, p. 1.

of this learning is dealt with at length under relevant headings in Chapter II (pp. 17, 18, 27, 28). For present purposes, we can synthesize this into an operational definition of learning as competency attainment in library usage indicated by the ability to identify basic rules and information of library usage in three related areas: (1) the physical layout of a high school library situating the main sections and their uses; (2) the procedures to follow using the card catalogue to search for and borrow books; (3) the major categories of the Dewey Decimal System of book classification and how this helps us find books on different topics.

The independent variables in our experimental treatments are 'instructional presentations', i.e. didactic units or lessons designed in different modes and media having the common purpose of communicating cognitive data to improve competency in a given skill or subject area. In our follow-up hypothesis we label a particular type of instructional presentation 'enter-taining'. This variable refers to the inclusion of various dramatic devices -- dialogue, character, conflict, humor, music, special effects -- to give the presentation an affective appeal due to pleasurable associations hopefully promoting favourable attitudes toward the object of instruction. This brings us directly to the dependent variable of the follow-up hypothesis, 'motivation'. Operationally defined, the student is motivated if he tends to consider the library a pleasant and useful place

which he will choose to exploit more often. In other words, he has internalized a 'positive affectivity' regarding the library which will attract him to repeated experiences of it leading to additional learning.

Sample of Target Audience

Our primary target audience is the secondary one students, twelve and thirteen years of age, entering the English high schools of the Montreal Catholic School Commission. In the 1976-77 school year, these numbered 3,300 entering fifteen high schools throughout the urban community of Montreal. The M.C.S.C., together with the majority French schools, comprises the largest school system in Canada with a total enrolment of approximately 180,000 including 41,500 English-speaking students. The eventual audience might expand, since a French version of the presentation has been requested and other school boards have shown interest. And of course, it can be used for students coming into the secondary level for years to come, since the subject matter is not overly susceptible to obsolescence.

For our research sample, we selected five classes from William Hingston Comprehensive High School in a lower middle income area with a student population of some 2,300. Marymount Comprehensive, where the instruction was developed, had to be eliminated as the source of our sample because of prior exposure to the material and because the results might have been biased upwards by dint of its being the actual setting of the dramatic

slide/tape. Furthermore, William Hingston Comprehensive more nearly typified the conditions encountered by the target schools. Being one of the largest and most recent (1974) comprehensive high schools, the library was well-equipped with close to 20,000 volumes but a staff of only a librarian and one library technician. The students were from a largely immigrant population perhaps less familiar with community libraries than middle-class anglo-saxon groups. This contributes to the sample's relevance since it is largely typical of the English schools in the M.C.S.C.

The five intact groups from this school gave us 155 subjects for the experiment, but the mortality rate due to absenteeism was considerable, especially since there were multiple testing and treatment procedures. A net total of 102 students remained, 56 female and 46 male. This proportion is neither even nor constant across the groups, but as can be seen from the relevant data table in the appendix, the divergences are not so great as to cause undue concern about the applicability of results. For the logistical considerations of conducting the research with a minimum of disruption in the school schedule, we had to be content with keeping the classes intact rather than randomizing subjects or establishing precise intergroup equivalence.

Of course, we tried to avoid gross inconsistencies in basic factors such as age and aptitude level. All subjects

were secondary one students aged twelve or thirteen as of October 1, 1976. A somewhat ill-fated attempt was made to control for academic "stream" by selecting classes in English 120, the intermediate of three first year courses to which the student is assigned on the basis of scores on the Metropolitan Reading Test, numerical grades in sixth year English, and consultation with the student's teacher in his final year of elementary school. The scoring in the standardized reading test is given according to grade level norms with those at the fifth and sixth levels tending to be placed in the average stream, those above in the enriched course, and those below in the 'general' group. The intention was to optimize inter-group comparability and generalizability of the findings by concentrating the study on 'average' subjects, but as the researcher learned only after the fact, an enriched class had been substituted due to last-minute scheduling changes. Thus we had two experimental groups (III & IV) with presumably superior entering skills and this was reflected in higher test scores, as we shall see in the report of results. Since comparative gain scores on the test instrument were the primary object of analysis, this is not considered fatal to the validity of our findings. We might even interpret this development as an unexpected confirmation of test performance as an indicator of intellectual competence as pertaining to library skills.

In any case, the threat to internal validity posed by

such control problems are not uncommon in field research. A resourceful experimenter may even exploit the circumstances of the groups being intact and under real school conditions to enhance the generalizability of his findings.

Research Design

Because intact groups were used and their equivalence could not be established to our complete satisfaction, the research design can best be characterized as "quasi-experimental", to use Tuckman's term.³⁷ Of the five class groups in our sample, two served as controls, and the remaining three received varying experimental treatments. Pretest-Posttest score gains were then analyzed, compared and interpreted.

Adapting Tuckman's method of summarizing designs, we can represent our research as follows:

Grp. A	O_1	X_0	O_2	
Grp. B	O_{1*}	X_0	O_3	
Grp. I	O_1	X_1	O_2	O_3
Grp. II	O_1	X_1		O_3
Grp. III	O_1	X_2	O_2	O_3
Grp. IV	O_1	X_1	X_2	O_3

³⁷Tuckman, Bruce W., Conducting Educational Research, New York, Harcourt Brace Jovanovich, Inc., 1972, p. 113.

- where O_1 = mean scores on pretest
 O_2 = mean scores on posttest after 1 day
 O_3 = mean scores on posttest after 3 weeks
 X_0 = Hawthorne control, non-treatment
 X_1 = experimental treatment with instructional slide/tape
 X_2 = experimental treatment with lecture and overheads

*The subscripts indicate the timing of the observation only. Following Tuckman strictly, this would be O_3 and so on with each subsequent mean score.

The following table displays our research design somewhat more explicitly.

	<u>CONTROLS</u>		<u>EXPERIMENTAL GROUPS</u>			
	A	B	I	II	III	IV
Day 1	Pretest	Pretest	Pretest & slide/tape	Pretest & slide/tape	Pretest & illus. lecture	Pretest & slide/tape
Day 2	Post-test		Posttest		Posttest	
After 1 week						illus-trated lecture
After 3 weeks		Post-test	Posttest	Posttest	Posttest	Posttest

The two control groups (A and B) served firstly to establish the reliability of the test instrument. Often both were pretested, Group A was posttested one day later, while Group B was posttested after a three-week interval. This would provide us with the basis to compare short and medium-term gains. Furthermore, this allowed us to control for any "history" effect, especially for those posttested after three weeks. It was possible that students could improve their library skills from mere osmosis, i.e. simply by attending school and presumably being in and around the library on occasion over the three-week period. The groups functioned as "Hawthorne" controls, in that they also controlled for any reactive effect of the experimental arrangements. After pre-testing these groups, the experimenter conducted a twenty-minute discussion on media in the school avoiding anything remotely connected with the library theory presented in the instructional treatments. Thus, whatever influence the experimenter's presence may have had with the experimental groups was held constant in the control situation, correcting for any bias due to the Hawthorne effect.

The three classes providing our experimental subjects were divided into four experimental groups. Groups I and II were halves of one intact class. Both were pretested and shown the slide/tape instructional presentation. The only difference occurs in the posttest schedule. Group I was post-

tested one day after the instruction as well as three weeks later, while Group II only received the latter posttest. This allows us to observe the "forgetting" factor and assess the durability of the learning.

Groups III and IV were intact classes receiving comparative instructional treatments. Group III was given an expository lecture using a series of overhead projectuals diagrammatically illustrating the same informational content as in the slide/tape. The subjects were posttested both the next day and after 3 weeks. Group IV received the slide/tape instruction, then the illustrated lecture one week later, and was posttested 3 weeks from the start of the experiment. In this way we might determine whether the redundancy or summative effects of the combined instructional treatments yielded any learning dividends as reflected in superior gain scores.

From the above table (p. 54) we can see all the comparisons possible among and within the six groups. The ones most clearly related to our hypotheses and requiring detailed analysis and interpretation are expressed in the following questions.

Within Group Analysis

1. In group A (non-treatment), do the scores vary significantly from pretest to posttest one day later?
2. In group A (non-treatment), do the scores vary significantly from pretest to posttest three weeks later?
3. In group I, is there a learning effect of the slide/tape

treatment shown by significant score gains from pretest to posttest one day later?

4. In group II, is there a learning effect of the slide/tape treatment shown by significant score gains from pretest to posttest three weeks later?
5. In group III, is there a learning effect of the illustrated lecture shown by significant score gains from pretest to posttest one day later?
6. In group IV, is there a significant learning effect of the combined treatments (slide/tape and illustrated lecture) shown by significant score gains from pretest to posttest three weeks later?

Inter-group Comparisons

7. Does the learning effect of the slide/tape vary significantly from that of the illustrated lecture as shown by comparing the score gains of groups I and III?
8. Does the learning effect of the combined treatments vary significantly from that of the slide/tape alone, as shown by comparing the score gains of groups II and IV?

This list is not exhaustive of the possible questions. For example, related to the third and fifth ones, we can ask whether the forgetting factor reduces the learning effect to insignificance as shown by additional posttesting after three weeks. However, our major hypothesis that a motivationally

designed slide/tape would produce at least as much learning as an illustrated lecture would be illuminated by answers to the last two questions -- i.e. gain score comparisons of I to III, and II to IV. The latter also allows us to evaluate if the illustrated lecture adds to the learning from the slide/tape or if there is a kind of 'saturation effect'.

Instrumentation

In order to evaluate the instructional effectiveness of our presentations, the most obvious method would be direct observation and empirical measurement of the criterion response, that is, student use of library resources. This would entail the monitoring of the library loan records over a period of several months for various groups of students, analyzing for frequency differences and interpreting the data. Even such objective procedures would not reveal the whole story, since we might also want to know the proportion of books borrowed which appropriately filled the student's needs, and to what degree he visited the library on his own initiative. The additional demands on school personnel of this type of evaluation placed it beyond the scope of the present study, although it is not ruled out for further investigations.

So, to serve our purposes, a test instrument was devised and verified through the same consultation procedures used to determine the content of the instructional presentations (see

pp. 17, 22). Since it was to be applied as a pretest within a forty-five minute lesson including the instructional presentation and a question period, time and ease of application were important considerations. The form arrived at was the 'Quiz on Library Use' seen in the appendix, a multiple choice test of ten items with three alternative responses.

Thus test scores became the instrument for the predictive assessment of the criterion response, and the performance objective can be stated as follows: By solving multiple choice problems, the student identifies factual information about the high school library and demonstrates essential principles of library usage. There was no readily available means of establishing a performance criterion in terms of a minimum test score to indicate basic competence in library skills. Such a cut-off point was not immediately necessary, since our analysis was to focus on gain score comparisons.

However, the average control score of almost seven on ten did seem to indicate a level of difficulty that was somewhat low. This is because the instructional context placed a premium on brevity, which restricted the choice of test items to fundamental content. Nevertheless, the test measurements proved sensitive enough to instructional effects to yield differential scores for comparative analysis. At the same time, being geared for basic knowledge and rapid implementation, the test had the benefit of providing an additional pedagogical tool

to pre-cue students to essential material. In most experimental designs which include pretests, the researcher concerns himself with the 'testing' effect. In this instance, not only have we controlled for it by keeping it constant within the experiment itself, but we have even incorporated the 'Quiz' into the instructional package to be used at large.

Data Analysis

For all statistical procedures, $p = .05$ was selected as the point of decision on the null hypothesis.

In order to establish the reliability of our test instrument by the test-retest method, the Pearson product moment correlation index, r , was computed for control groups A and B. To determine the significance of r , a t -test was used. The internal consistency of our test instrument was measured by applying the Kuder-Richardson Formula no. 20 (KR_{20}) to the pretest scores of control group B.

In order to establish learning effects within the treatment groups, we followed the procedure described by Smith³⁸ to test the significance of a difference between the means of two correlated samples.

To determine if there were any differential learning effects between groups I and III, II and IV, we used the t -test for the significance of difference between means of small inde-

³⁸Smith, G. Milton, A Simplified Guide to Statistics, New York, Holt, Rinehart & Winston, 1970, pp. 83-86, 76-82.

pendent samples as described in the same source.

Finally, we applied the method described by Wolf³⁹ to compute $est. w^2$ and interpret whether significant differences were also "educationally important".

Time Requirements for Production and Evaluation

In an earlier section discussing production design, we itemized the costs of producing the slide/tape unit. Script development took up about 35 hours of this writer's time over a period of six weeks in November and December of 1975. The other aspects of production took place over the same time and are approximated as follows:

Secretarial	8 hours
Studio technician	8 hours
Photographic assistant	15 hours
Graphics	8 hours

Labor on production including scripting totalled an estimated 74 hours.

The evaluation experiment was conducted during November, and December of 1976. Approximately five hours of preparatory meetings were involved: three hours with two librarians and two consultants to select test material, and two hours to train

³⁹Wolf, Richard M. in Evaluation in Education - Current Applications, W. James Popham (ed.), McCutchan Publ. Corp., Berkeley, California, 1974, p. 232.

the school librarian in the use of instructional and test materials. The experimenter was present with the school librarian at each of the five pretesting sessions and remained during the treatment or non-treatment applications. The latter handled the posttesting on her own. Test correction and compilation of raw scores took about ten hours. Excluding statistical analysis and research, the evaluation procedures took about twenty hours of the experimenter's working time, six hours of the school librarian's, and three hours of the four consulting participants. School authorities cooperated by providing space and technical facilities as well as the school time required of its personnel; so no budget is calculated for the evaluation phase.

Experimental & Instructional Conditions

A deliberate effort was made to maintain the conditions of the experiment as similar as possible to those met in the general application of library instruction. Circumstances of locale, scheduling, group composition and size were all unaffected by the experimental situation. The classes were brought to a room off the library where orientation sessions are normally given. Of course, the researcher's presence was required to monitor events, but he remained unobtrusive after a brief introduction explaining simply that he was there to "see how the thing works". The quiz, students were told, was in no way a test "for marks", and they were to answer every question without agonizing if they weren't certain of the

correct response. Although the tests were collected after ten minutes, there was no time pressure because everyone could comfortably complete the ten items in this period.

The librarian, who delivered all the instructional treatments, presented the slide/tape without preamble save to say that she was going to show them something about the library. The fifteen minute presentation left a similar duration for questions. We considered excluding the latter for control reasons, but decided that this would be an artificial departure from the standard practice of using such materials in the schools. Furthermore, the exclusion of a question period was thought to be a serious injustice to the comparative instructional mode, the scripted lecture illustrated by a series of schematic overhead transparencies. This seemed to be supported by the greater incidence of what we can call 'fact' questions after the illustrated lecture. We can speculate that this was due to the diagrammatic rather than realistic nature of the overhead visuals which left out many particulars of 'what and where'. This was not considered inherently disadvantageous, since the librarian could demonstrate her responses 'in situ'.

Nevertheless, some controls were needed. Under all instructional conditions, the librarian was instructed to open the floor to questions immediately following the presentation, and to restrict her answers very specifically to what had been asked. This allowed for an equitable distribution of

question time, and controlled for excessive variability of explanatory detail in the librarian's responses without obliterating all semblance to normal didactic dialogue. Similarly, the outline script for the illustrated lecture ensured approximate uniformity of content without condemning it to a hopelessly stilted rendition.

In general, then, we tried to keep experimental conditions consistent with the instructional situation for regular orientation sessions. We also sought to utilize the different instructional presentations in such a way as to optimize the advantages of the particular media attributes they were designed to exploit.

CHAPTER FOUR
RESULTS & CONCLUSIONS

As in any research on instructional programs, our evaluation results must be judged according to the answers they provide to three critical questions:

1. to what extent have the stated objectives of instruction been met?
2. In what ways, and to what degree, is it better than the unit it will supplant?
3. What additional, possibly unanticipated, effects has it had, and to what extent are these better or worse than the supplanted unit?⁴⁰

Assessing the kind and quality of the findings is a more complex matter. Notably, there is the issue of whether our evaluation is formative or summative. It is formative in that the results include "information and judgments to assist in the revision and improvement of instructional programs".⁴¹ The precise utilization of the slide/tape in

⁴⁰Gagné, Robert N. and Briggs, Leslie J., op.cit., p. 232.

⁴¹Baker, Eva L., in Evaluation in Education - Current Applications, Popham, W. James (ed.), McCutchan Publ. Corp., Berkeley, California, 1974, p. 538.

the overall orientation program was not predetermined, and a revised production was not precluded. Indeed, adaptations at the school level were to be encouraged. These are formative characteristics. On the other hand, in support of the summative nature of the evaluation, the basic presentation was intended as a finished product, and the evidence from test measurement can be considered formal, though not definitive. Gagné and Briggs (op.cit., pp. 232-37) identify these as features of summative as distinct from formative evaluation. So, apart from whether the evaluation is designed to assist in the 'formation' of instructional materials or to assess the 'summed effects' of a given unit, the degree to which the evaluation is supported by formal, quantitative evidence must be considered. This implies still other influences on the semantics of assessment which vary by relative degrees, not as absolute distinctions -- the tightness of research controls and formality of methodology. Some researchers like Peter Airasian⁴² would seem to accept less than a true experimental design with results based exclusively on qualitative data as standards for summative evaluation studies in the school. Others may be more exigent, possibly at the expense of findings which may be meaningful and generalizable in an educational content. In the results reported below, we have tried to synthesize a 'clear solution' by combining proportions of various types and techniques of

⁴²Airasian, Peter W., in Popham, W. James (ed.), op.cit., pp. 145-200.

evaluation -- i.e., summative and formative, quantitative and interpretive.

Cognitive Effectiveness

The cognitive objective of the instruction was that students learn the basic rules and information required for the competent use of the school library, as explicated fully elsewhere (pp. 14, 49, 59). The effectiveness of the slide/tape in promoting mastery of the relevant cognitive content was measured by a test instrument designed expressly for the purpose, as described in the previous chapter. To establish test reliability, the Pearson product moment coefficient of correlation, r , was computed for both non-treatment control groups. Group A, tested on two consecutive days yielded r of .523. The obtained value of t exceeds that required for a two-tailed test of significance at the .05 level ($t = 2.68$, $df 19$, $p < .05$). Similarly, Group B, tested again three weeks after initial testing, registered a Pearson r of .610, significant beyond the .002 level in a two-tailed test ($t = 3.05$, $df 25$, $p < .002$). In addition to corroborating test-retest reliability, this result reassures us that no "history effect" is likely to have influenced the scores of experimental groups. The test was also validated for internal consistency by applying the Kuder-Richardson Formula 20 to the pretest scores of Group B yielding KR_{20} of .61, considered acceptable for classroom tests. Together with the strong face

validity ensured by the methodical verification of content, these indices attest to the adequacy and appropriateness of the test instrument, which was the basic tool for the cognitive assessment of the instructional treatments.

The analysis of test results for comparative groups are presented below as responses to the specific questions posed in our discussion of the research design (pp. 56, 57).

1. In Group A, the mean scores on pre- and posttests one day apart do not vary significantly as calculated by the t-test for comparing means of two correlated samples ($t = .124$, $df = 20$, $p > .20$). The computed value of t is only a small fraction of that required for significance at the least acceptable level, indicating that the score difference of .05 (pretest = 6.9, posttest = 7.0) is negligible and most probably due to chance variation. We cannot reject the null hypothesis of no difference between means ($H_0: \bar{\Delta} = 0$).
2. In Group B, the mean scores on pre- and posttests three weeks apart do not vary significantly. In fact they are identical at 6.8 obviating any need for statistical confirmation. This is strong corroboration that no "history effect" was likely to contaminate the results for experimental groups which were posttested for the retention of learning effects over three weeks.

3. In Group I, a learning effect from the slide/tape treatment is indicated by significant mean score gains from pretest (7.4) to posttest one day later (8.6). The difference (1.2) was subjected to the same analysis as in Group A and all similar comparisons which follow. Using the t-table for a one-tailed test of significance ($t = 2.95$, $df = 10$, $p < .01$), we can reject the null hypothesis with a very high degree of confidence and conclude that the score increase was due to other than chance factors. In view of the controls taken for the various factors that could adulterate experimental results (e.g. history, 'Hawthorne', testing effects), it is a credible assumption that the slide/tape treatment was the operative variable causing students to learn more about library rules and information as shown by improvements in test performance. For further support, we used Wolf's (op.cit., p. 232) method to calculate and interpret w^2 . By applying the accepted formula ($w^2 = \frac{t^2 - 1}{t^2 + N_1 + N_2 - 1} = .259$), we arrived at a value considered as indicative of a differential result which is "educationally important" as well as significant. Wolf reports that only one third of studies using analysis of variance published in 1964 issues of two leading journals in educational research yielded values of $w^2 > .201$. So, although the magnitude of the raw score gains are not over-

whelmingly conclusive, there is substantial support for the instructional effectiveness of the slide/tape in the cognitive aspects of library orientation. As implied elsewhere (p. 59), the score gains would likely have been more dramatic had the test been of a higher level of difficulty.

4. In Group II, a learning effect from the slide/tape is also indicated by a significant mean score gain on posttests (7.7) three weeks after pretests (6.6) suggesting benefits lasting at least over the medium term ($t = 2.29$, $df 9$, $p < .025$). The computed value of $est. w^2$ is .175 which falls below the .201 level cited by Wolf as a criterion for interpreting significant differences as educationally important. So despite the high degree of confidence for statistical significance, the score increase on a three-week posttest (1.1) carries slightly less weight than the improvement from the slide/tape in Group I with one-day posttests (1.2). Comparisons between groups I and II must be tempered by the considerable gap in pretest scores (7.4, 6.6). Since Group I started from an already high level, there was less room for improvement. So, it is possible that Group I's modest superiority in gain score (.1) despite having been posttested only one day after the slide/tape as compared to three weeks for Group II is not a fair indication. We will be better placed to assess

the time variable when we analyze groups I and III longitudinally in a subsequent section. The salient result here is that the slide/tape registers a measurable and significant learning effect for subjects posttested as much as three weeks after the instruction.

5. In Group III, a significant learning effect from the illustrated lecture is indicated by a significant mean score gain on pretests (7.6) to posttests the next day (8.5). The magnitude of this increase is lower than one test item (.9) and, like Group I, this may be due to the low difficulty of the test combined with the above average entering skills of this group of students. Nevertheless, the difference is significant to a very high degree of confidence ($t = 2.94$, $df 16$, $p < .005$), and $est. w^2 (.183)$ falls just below the .201 level considered indicative of educationally important changes.
6. In Group IV, there is a learning effect from the combined treatments (slide/tape followed by illustrated lecture one week later) as shown by score gains on posttests (8.6) given three weeks after pretests (7.7). The difference between the means of .9 is significant to a high level of confidence ($t = 2.51$, $df 15$, $p < .025$) and is comparable in magnitude to the other treatment groups.
7. The learning effect of the slide/tape seems greater in terms of mean gain score (1.2) compared to that of the

illustrated lecture (.9) on one-day posttests, but the difference is not statistically significant. The gain scores were compared by the method for the calculation of t for small independent samples of unequal size as described by Smith (op.cit. pp. 82, 83). The results do not allow us to reject the null hypothesis of no difference with any acceptable level of confidence ($t = .61$, $df = 26$, $p > .20$). However, the result does support our primary hypothesis that students viewing the automated slide/tape, which was designed to entertain as well as instruct, would learn the cognitive content at least as well as those receiving an expository lecture illustrated with overhead transparencies.

8. The learning effect of the combined treatments (slide/tape followed by illustrated lecture one week later) is not greater than that of the slide/tape alone as shown by the lower mean gain score of Group IV (.9) compared to Group II (1.1). Using the same procedures as in the previous section, the difference was found to be statistically nonsignificant ($t = .38$, $df = 24$, $p > .20$) and in the opposite direction to indicate summative benefits. This unexpected result can probably be explained by the disparity in entering skills with the slide/tape group recording a pretest mean of 6.6 compared to the combined treatment group's 7.7 on a possible 10 giving the former far more room for improvement. Nevertheless, the t -test to compare the two

pretest means indicated no significant difference, and the groups may be considered approximately equivalent in terms of pretest performance ($t = .35$, $df 24$, $p > .20$). Group I which had the slide/tape and a posttest after three weeks as did the combined treatment group recorded a more nearly identical pretest score (7.4), but it also had a posttest the day after the instruction. If we could assume that this would not influence further posttesting as suggested by the remarkable stability of scores in the control groups, we might then cite the similarity of gain scores ($I = .8$, $II = .9$) as further contraindication of cumulative effects for the combined treatment. Even without this, however, we clearly have grounds for disclaiming any additional learning effects by following the slide/tape instruction with the illustrated lecture, which tends to corroborate the adequacy of the slide/tape in presenting the relevant cognitive content.

The durability of the learning effects of the slide/tape and the illustrated lecture is attested to by the fact that increases from the pretests remain statistically significant on three-week posttests as well as one-day posttests. The score trends for groups I and III are predictable in that there seems to be some forgetting from the first to the second posttest but the net increases indicate learning retention over the three-week term. It may even be inferred that if there

were follow-up exercises and instruction as we recommend but could not include for control reasons, then the learning would be augmented rather than slightly eroded over this period.

For a tabular and graphic representation of these results tending to support the cognitive effectiveness of the instructional treatments, the reader is referred to the Data Summary in the appendix (p. 35).

Assessment of Affective Impact

Having provided experimental evidence for the cognitive effectiveness of the slide/tape, it is left for us to assess the complementary affective benefits which the various dramatic techniques incorporated in the production design sought to engender. To recapitulate our earlier discussion, the premise is that if a presentation can motivate both student and librarian alike through positive attitudes and associations relating to the instruction, there is a greater likelihood of renewed contacts and further learning opportunities. It was conceded from the start and borne out in the experiment that a simpler illustrative medium such as overheads presented in an expository lecture could be just as effective instructionally in terms of the immediate cognitive content. However, the apprehensions of the instructor-librarians and the apparent negativism of student attitudes called for motivational measures to ease these difficulties so that future orientation sessions at two or three week intervals might be more productive and that voluntary use of library resources would be

promoted. So, it was important that as well being clearly structured and standardized as to basic content, the presentation needed to inspire confidence and have strong interest appeal without relying too heavily on the instructor's pedagogical "charisma" to give initial impetus to the program. Our discussion in Chapter Two details why we chose to produce a dramatic slide/tape to fulfill this dual purpose.

The experiment responds satisfactorily to our major hypothesis concerning the cognitive component. Our assessment of the motivational aspects is perforce more informal and inferential, but noteworthy nevertheless due to its importance in justifying media selection and production design. It was based on a survey through structured interview of five librarians who used both instructional presentations and direct observation of student behavior immediately afterwards. The librarians from different schools reported their comparative judgments on three main questions. Asked to rate the two presentations of a four point scale from "very effective" to "not useful", all five gave the slide/tape the highest rating compared to only two for the overheads illustrating the standardized lecture. So a higher opinion of the former is indicated, although the overheads did receive some support with a total of four ratings as "very effective" or "effective". The second question which dealt with personal preference, saw four selecting the slide/tape as more convenient and pleasant to use compared to none for the overheads (one stated no

preference). This is not surprising since there was much more effort involved in giving the lecture even with supportive illustrations. Nevertheless, at the risk of being accused of catering to a "copout" on the part of the librarians, there is something to be said for automating a basic introductory lesson and building in "entertainment" appeal when the instruction consists of a standard content to be delivered to large numbers by the same individuals week after week, year after year. The third question asked for the librarians' opinions as to which presentation the students responded to more enthusiastically. All five named the slide/tape, citing a high level of student attention, laughter at appropriate spots during the presentation, and applause at the end. In the subsequent question period, there were more factual questions after the illustrated lecture, possibly because there were more details left out of the diagrammatic overheads. On the other hand, the general stir of student activity (arousal level) and the tenor of the commentary were higher after the slide/tape. These impressions were confirmed by our own observations in the course of the experiment. Every group receiving the slide/tape responded with spontaneous applause, and while this might have been attributed to the presence of the experimenter who they may have guessed was the producer, this would not explain the same reaction elsewhere.

Admittedly, our methods of assessing the affective impact of the slide/tape presentation were not sufficiently

rigorous to draw any but the most tentative conclusions. However, the inferences from the largely subjective observations do tend to justify a recommendation for more systematic efforts to explore this area in future experiments. Showing no indication that the dramatic techniques, incorporated into the instructional design for their affective potential, interfered with our major cognitive objectives, our results suggest that we now address ourselves more emphatically to the problems of assessing the motivational benefits and identifying the operating factors.

Implications and Concluding Remarks

The whole field of evaluating instructional materials is in need of refinement, and the present study does not pretend to offer any definitive directions. Stolovitch,⁴³ among others, points to a host of learner verification and revision variables which require careful consideration including: the initial quality and type of prototype materials, the types and numbers of evaluators needed, the means for translating evaluation data into revision prescriptions, the cumulative effects of expert appraisal and learner verification, the types of data required, the types of instruments to be employed, and the appropriate analytic tools. We would like to remark on how this study has influenced our views on some of these issues and possible im-

⁴³ Stolovitch, Harold D., "The Intermediate Technology of Learner Verification and Revision (LVR)", Educational Technology, February 1978, p. 15.

plications for the design of future research projects.

Firstly, we should like to reaffirm the importance of empirical research conducted in the school setting as unchanged as possible by experimental procedures. The control problems this incurs may attenuate unequivocal evidence, but there is the compensating benefit of greater generalizability to similar learning environments. Without studies in and of natural settings, we could never achieve a situated knowledge about a field as opposed to a collection of isolated facts. Becker⁴⁴ echoes John Dewey's emphasis on the pervasive influence of situational conditions. Since our experience of all objects and events occur within a contextual whole, rather than in isolation, as they are often dealt with in laboratory experiments in the SR mold, it is imperative that educational research reflect this reality.

In any field research, it is difficult to achieve "unambiguous proof", and we must frequently be satisfied with studies which simply "reduce ambiguity".⁴⁵ This is eminently true in our case where we were trying to determine if by designing a dramatic presentation, we were not merely indulging in an exercise of educational cosmetics which might possibly undermine instructional efficiency. The empirical demonstration

⁴⁴Becker, Anne De Vaney, "Alternate methodologies for Instructional Media Research", AV Communication Review, Vol. 25, 2, Summer 1977, pp. 181-93.

⁴⁵Airasian, Peter W., in Popham, W. James (ed.), *op.cit.*, p. 159.

of cognitive effectiveness, in support of our major hypothesis, and the partial indication of motivational benefits provide substantial reassurance, but the results are not entirely conclusive. We have already alluded to shortcomings in our evaluation of the affective components included to enhance motivation. To some degree this was inevitable, but there are techniques to assess this aspect with greater certainty. The first instrument that suggests itself is a questionnaire on student attitudes toward the library to detect any motivational trends that might be generated by the instructional presentations. Considerable subtlety would be required in devising test items so as not to be overly explicit, eliciting responses biased by the students' striving to provide what is "expected". In commenting on the threats to validity in direct observation, Hebert⁴⁶ describes a reciprocal effect between observer and observed that can distort results. When the experimenter is known to the subjects, or they have some definite view of his role (real or imagined), even an "objective" questionnaire can incur such a bias, especially if the attitudes under study are transparent through the test items.

Direct measurement of the "criterion" response, to use behaviorist terminology, would provide the most unassailable index. In our case, incidence of library use, particularly voluntary, would give a most convincing measurement of motivation-

⁴⁶Hebert, J., "Direct Observation as a Research Technique", Psychology in the Schools, 1970, 7 (2), pp. 127-37.

al effectiveness. Yet, the collection of such statistics is not always feasible, and more indirect and interpretive methods must be resorted to. Quantifiable data on overt behavior need not be the only basis for sound instructional judgments. Despite the central importance of empirical research, "(f)actual evidence does not represent the sole criterion or even the only 'rational' criterion for making school related decisions".⁴⁷ Some see behaviorism as a mechanistic and reductionist theory of human behavior attempting to explain the macro problem of learning in microphysical terms. Anne De Vaney Becker⁴⁸ underlines the importance of taking into consideration the interior antecedents of behavior -- e.g., attitudes, emotion, motivation, intention -- and that both "inner" and "outer" acts may be described in nonquantifiable terms. Among behavioral acts, this view designates those which are inner directed by the term action, as distinct from reaction to stimulus or result of reinforcement, which accounts for virtually all behavior in a rigid SR model. Overemphasis on observability and objective measurement may lead, in practice if not intent, to the undue conclusion that overt behavior is of greater importance to human learning than more implicit and complex factors. Since these are not readily measured with the same apparent precision, they are often

⁴⁷Airasian, Peter W., in Popham, W. James (ed.), op.cit., p. 151.

⁴⁸Becker, Anne De Vaney, op.cit., pp. 181-93.

relegated to the status of secondary afterthoughts or ignored entirely. Becker (op.cit., pp. 187-90) points out that in many cases, it could be the quantifiable part of the act is the least important part of the action. She recommends techniques of field research to investigate the multivarious effects of technology in education, including the classical question of how children learn through media. Studies could include interviews, surveys, direct observation, participant observation, or any combination of these, without exclusive reliance on quantitative measures but using the interpretive potential of descriptive reports as well.

To a limited extent, this approach is corroborated by our own experience in assessing the motivational effectiveness of the instructional presentations which was conducted mainly through structured interviews with the users. Without disclaiming the wider access to user and audience responses which an attitude questionnaire would have given, there are kinds of feedback more attainable by other methods. In following Eva Baker's⁴⁹ advice and keeping a relaxed atmosphere but within a clear structure, the open-ended question concluding the interview brought some noteworthy observations. Furthermore, this afforded the opportunity to interpret nuances of response from facial cues and other relatively implicit manifestations.

⁴⁹Baker, Eva, in Popham, W. James (ed.), op.cit., p. 568.

connoting variable intensities of attitudes and opinions. In future studies, we could make a systematic effort to observe and report on these, but for the present we can only submit the overall impression that they seemed to underscore the gist of the explicit responses. For instance, one remark, made without apparent enthusiasm but more as a polite offering, was that having the two presentations was not "wasted effort" and "sort of handy for review". It is perhaps significant that the experiment does not bear this out since there are no measurable benefits from combining the presentations. On the critical side, there was the comment that the conclusion of the slide/tape showing the girl reading Peanuts might be anti-cultural. The mention by one librarian that the 'Quiz on Library Use' was useful in "finding out where the kids stand" was instrumental in our decision to retain the test as part of the instruction even outside the experiment. To be sure, the verbal and nonverbal responses of subjects can also be instructive, notably the students' applause after the slide/tape presentation. Such observations can allow inferential judgments related to affective issues which may otherwise be difficult to anticipate or assess. Interpretive techniques applied to interviews, reporter observations and the like, give greater freedom to analyze the subtleties of variable responses in the wider context of behavior for a fuller understanding than normally accessible by testing methods alone. Certainly there is the risk of biased or mistaken interpretation,

but alternatives, such as attitude questionnaires, may be no less susceptible to similar dangers. No matter how statistically reliable and significant are the test results, there always remain numerous unspecified influences on the respondents which may account for the trends, and the unspoken feelings which might be sounded by the more flexible techniques of what we term descriptive analysis. In our future studies, especially those in which the objectives are primarily affective, we plan to use such methods more extensively.

Notwithstanding the criticisms of an overly mechanistic approach based solely on quantifiable observation, it is impossible to ignore the importance of basic behaviorist principles in any instructional program. In the final analysis, "students may be said to have learned when, presented with a criterion stimulus, they can respond appropriately."⁵⁰ Gropper reminds us that in formulating instructional strategies, it is equally essential to classify objectives by stimulus and response mode as well as by type of learning to guide us in media selection and design. He cautions the stimulus-oriented media specialist against designing messages based primarily or solely on their internal properties and interrelationships without due regard to their capacity to elicit the predetermined responses that are to be learned (op.cit., pp. 159-61). While we do not take this to mean that every cue requires a corresponding overt

⁵⁰Gropper, George L., "A Behavioral Perspective of Media Selection", A.V. Communication Review, Summer 1974, p. 164.

response to justify its relevance, it is clearly desirable that an instructional program provide specific occasions calling for the active practice of the criterion behavior. This underlines the need to integrate our instructional productions into the overall library orientation program so that they be complemented by exercises, preferably coordinated with classroom work, in book retrieval starting from the various informational leads. Since in most cases students will be using the library to follow up assigned research topics (i.e. criterion stimuli), a major ability to develop would be that of formulating alternate subject headings leading to relevant cards in the catalogue. The slide/tape presentation devotes very little to the problem solving skills this entails. If there are no planned activities whereby students are instructed in and required to apply these skills, then the whole production and evaluation effort goes largely for naught. Although it is fitting that the media specialist contribute to the framing and elaboration of such a program, the development and utilization of specific worksheets and practice assignments must ultimately rest with the librarians and teachers directly involved. It is believed that the instructional units produced and evaluated for this study may stimulate substantial progress in this regard.

While acknowledging the utility of SR theory in clarifying and implementing objectives, we would like to propose an alternate model for a mentalistic behaviorism, if we can allow the apparent contradiction. Instead of postulating a direct

S-R connection, we would represent the whole intervening complex of interactive internal states with both cognitive and affective components by a symbolic "Pandora's box":
S — [?] — R (i,o). Another added dimension, indicated by the subscript for R, is the recognition of internal as well as overt responses. The resulting model is not as clear-cut, but perhaps truer to psychological realities. It can also accommodate the media designer's rational inclusion of various devices to trigger certain internal reactions (e.g., associations, attitudes, emotions) which may or may not have immediately observable effects on external behavior, but which generate desired action tendencies. Baker (op.cit.) and others stress this.

Our experiment indicated that the integration of motivational devices in a media design may provide additional benefits without losing cognitive clarity and learning effectiveness. The comparative procedure used differs from that of other studies which vary only the communication carrier itself without substantially adapting the form and content to the different media (e.g., sequence of still images on T.V. compared to slide show of same scenes; live lecture vs. videotaped version). This is because we were more concerned with design features exploiting particular media attributes rather than gross comparisons between technologies of transmission. We saw little reason to expect significant differences, either cognitively or affectively, had the slide/tape merely been an exact versioning of the illustrated lecture. More relevant

are the comparative benefits from different media treatments designed to take full advantage of the potentials specific to each one. The challenge is to formulate ways of ascertaining which individual or combination of design features and media variables are operative in eliciting the target behaviors or tendencies, and how these might best be coordinated to learner characteristics. Richard E. Clark⁵¹ has made theoretical inroads into this complex area by proposing a three dimensional matrix of subjects, behaviors and attributes, by which inter-correlations among these factors may be analyzed and assessed. If such a framework were to be developed and validated through systematic research, it would be invaluable to the design, production and evaluation of instructional media. It is a line of investigation which is suggested by the present study, and which we intend to follow further.

⁵¹Clark, Richard E., "Constructing a Taxonomy of Media Attributes for Research Purposes", A.V. Communication Review, Summer 1975, pp. 197-211.

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APPENDIX I

Script for Instructional Slide/Tape

"This is Your Library"

General Aims: To introduce basic concepts of library organization and to initiate favorable attitudes at the start of the orientation program.

Target Audience: Secondary One Students of the
Montreal Catholic School Commission

Specifications: 110 color slides
15 min. cassette soundtrack
1000 hz. synchronization

VICTOR ARONOFF

THIS IS YOUR LIBRARY

FEBRUARY, 1975

IMAGE		TEXTE	SON
no	1-25		Music #1 up Symphonie Fantastique Berlioz
	sec		Music #1 fade under voice
no	26	Narrator: This is... (overdramatically)	
	sec		
no	27	N: your library.	
	sec		
no	28	Student: Big deal! It can't be that different from the one in grade school. Bigger maybe.	
	sec		
no	29	N: Probably. And this little tour is to help you get used to it.	
	sec		
no	30	S: What's there to get used to. I just come here and ask for the books the teacher tells me to get. N: Sure you can ask the librarian for help. But you should know how to find books for yourself	
	sec		Music #1 fade out Music #2 slow fade in under voice Dave Brubeck's "Time Changed"

POOR COPY

SON

TEXTE

IMAGE

no 31

sec

REFERENCE SECTION
OVERVIEW

S: You don't have to tell me where to find the encyclopedias.

no 32

sec

SHELVES OF
ENCYCLOPEDIAS

N: That's true most people know that the reference section contains different sets of encyclopedia.

no 33

sec

STUDENT
PORING OVER
ENCYCLOPEDIA

... These are for research work in the library.

no 34

sec

DICTIONARY STAND

S: Same goes for the big dictionaries

no 35

sec

ATLAS STAND

... and atlases. What else is new?

no 36

sec

STUDENTS WORKING
STUDIOUSLY

... The next thing you're going to tell me is that the library is a place I can come to read.

(4)

TEXTE

N: You're too smart for me. Sure you can read here, whether it's a school book, a library book, a newspaper or anything else for that matter,

... well almost anything -

S: A foldout! (That's disgusting) Male chauvinist pig!

N: Really? You're sure you weren't thinking the fold-out was about another kind of biology.

S: Well, you must admit it's kind of fishy.

N: Seriously though, the library does subscribe to over 140 periodicals or magazines.

... Some of general interest

... and some on special subjects.

IMAGE

STUDENTS
READING
CASUALLY

no
37

sec

C.U. STUDENT
STUDENT
OPENING NAT.
GEOG.
FOLD-OUT

no
38

sec

OVER STUDENT'S
SHOULDER
SHOWING FOLD-OUT

no
39

sec

PERIODICAL ROOM
GENERAL VIEW

no
40

sec

SHELVES IN
PERIODICAL ROOM-
MAGAZINES

no
41

sec

SHELVES IN P.R.
- BOUND
PERIODICALS

no
42

sec

POOR COPY!

SON

(6)

TEXTE

S: Can I take magazines out of the library.

N: Not as a rule, but if you want copies of some of the pages, our
Zerox machine makes them cheaply.

... It's located near the circulation desk.

S: Ah! That's where I go to get someone to find the book I need.

N: Well certainly, there are people here who are happy to be of ser-
vice. But by the time we're finished here you should be able to
find what you need mainly on your own.

... This is the "self-service information center", the card catalogue
for every book in the library.

S: There must be a million cards in there. How do you expect me to
find the one I need?

N: Don't get discouraged. All you have to know...

IMAGE

STUDENTS
READING IN
PERIODICAL RM.

PHOTOCOPI
MACHINE

CIRCULATION DESK
GENERAL VIEW

CIRC. DESK
DIFFERENT ANGLE

L.S. CATALOGUE
CABINET

BOY LOOKING
IN CARD CATALOGUE

no
43

sec

no
44

sec

no
45

sec

no
46

sec

no
47

sec

no
48

sec

POOR COPY

SON

TEXTE

IMAGE

no 49

C.U. OF
TITLE CARD
RED BACKGROUND

sec

no 50

C.U. OF AUTHOR
CARD
RED B.G.

sec

no 51

C.U. SUBJECT
CARD
RED B.G.

sec

no 52

C.U. SIGN
A TO R

sec

no 53

M.S. DRAWERS
SHOWING
LABELS

sec

no 54

THREE CARDS

sec

... is the title

... or the author's last name

... or the subject of the book you want.

... Oh yes, one more thing - the alphabet.

S: Funny.

N: The cards are all in alphabetical order. Simple huh!

S: Hold it a second...

... It may seem simple to you, but you're going too fast. You've
/already mentioned three different cards.

(5)

POOR COPY

SON

(8)

TEXTE

N: Okay. You're right. Let's take it step-by-step. Say for example you're interested in model ships.

S: Wow - really turns me on! (sarcastic).

N: As I was saying for example, you know the title of a book on the subject. The first word in the title (aside from words like "a" or "the") guides you...

... to the appropriate drawer in the catalogue...

... and then to the right card. It's the same as using a dictionary.

S: But what if I don't know the title?

N: Well, if you only know the author's last name, you find the author card for the same book by using his last name to guide you to the...

... proper drawer...

IMAGE

C.U. BOOK COVER

no 55

sec

C.U. TITLE CARD

no 56

sec

C.U. OF HO DRAWER

no 57

sec

DRAWER OPEN AT RIGHT CARD

no 58

sec

C.U. OF AUTHOR CARD

no 59

sec

C.U. CARD CATALOGUE DRAWER

no 60

sec

POOR COPY

SON

TEXTE

(9)

no 61
DRAWER OPEN AT
NORDNER CARD

sec

no 62
C.U. SUBJECT
CARD

sec

no 63
THREE CARDS
CIRCLED NUMBER

sec

no 64
SUBJECT CARD

sec

no 65
"MODEL SHIPS"
CARD

sec

no 66
"SHIPS-MODELS"
CARD

sec

... and card...

... There's even a third card for the same book.

S: That's overdoing it isn't it?

N: Not really. Each of the three cards guides you to the same book from different pieces of information. In other words the fact that there are three cards gives you a better chance of finding the book you need.

S: Okay, how does the subject card work?

N: Well, first decide on what you think the name of the subject matter would be. Your first try might be...

... "Model Ships". Under this heading you find a card telling you to look elsewhere - under "Ships-models".

... This is an important card for research projects. Because if you wanted to find other books related to...

SON

TEXTE

IMAGE

no 67	sec	"SHIPS" CARD	... the same subject, you'd find the cards for them here. If you have trouble thinking of a subject heading, ask your teacher or librarian
no 68	sec	LS OF CATALOGUE	S: So to find a card for a book...
no 69	sec	THREE CARDS	... all I need to know is the title or the author or the subject. Not all of these. Right?
no 70	sec	M.S. BOY LOOKING THROUGH DRAWERS	N: Right!
no 71	sec	THREE CARDS WITH WORDS CIRCLED	S: And then, I look for it in alphabetical order just as I would in a telephone book. Right?
no 72	sec	BOOK SHELVES-UP ANGLE BLURRED EFFECT	N: Basically. The cards are arranged in alphabetical order according to the first word in the top left hand corner.
			S: Great! Now I know how to find the cards, but how do I find the book I need, in all those shelves?

PEXTE

THREE CARDS & BOOK

no 73

sec

SHELF NOS.

no 74

sec

600'S SIGN

no 75

sec

SHELF WITH "HOW TO-BUILD MODEL SHIP"

no 76

sec

STUDENT REMOVING "HOW TO..."

no 77

sec

STUDENT HANDING BOOK TO LIBRARIAN

no 78

sec

N: Good question. Well you notices that the three cards we've seen all have the same code number 623.82....

... This is because they all refer to the same book and this number tells us where to find it.

S: So by finding the shelves for the 600's...

... I can track down the book by following the numbers.

N: Right. You read the numbers in the same way you'd read the words on a page...

... Each section of shelves is numbered from left to right, top to bottom.

S: Then I go to the Librarian and she stamps the date I have to return the book.

TEXTE

N: More or less. But the librarian at the circulation desk will also need to pass your I.D. card through a special machine, to keep record of the loan.

S: So finally, the book's mine for a couple of weeks.

N: Usually, but check because it may be due earlier if many students need the same book. So don't forget to bring

S: I know I return it here on the date stamped on inside of the back cover. I want to check on something you said before.

N: Sure. What's that?

S: This book, it would go with all of the three cards we saw from the catalogue.

N: Now you're getting it.

S: Not completely. Can I know what group of numbers goes with what subject?

N: Great, you're getting curious. Well, the books are numbered according to the Dewey Decimal System which gives each book a 5-figure number, like 023.59. The first digit tells you the broad subject category, the second gives you the more specific subdivision.

S: Boy. I'm sorry I asked. I'll have trouble remembering what you have up there now. And you're saying that each subject has a bunch of sub-subjects.

IMAGE

C.U. CARD BEING PROCESSED

no 79 sec

STUDENT WALKING AWAY WITH BOOK

no 80 sec

DESK SHOWING RETURN SLOT

no 81 sec

DISPLAY OF THREE CARD NUMBERS CIRCLED AND BOOK

no 82 sec

DEWEY CHART

no 83 sec

no sec

TEXTE

N: Don't worry. You don't really have to memorize any of this. Once you understand the main principles you'll begin to learn the subject categories as you use the library.

S: Hey Charlie Brown. Great. But what does peanut's cartoons have to do with this.

N: Frankly not too much. Except that they make for cute slides - cuter, say, than pictures of some students.

S: Don't get personal. Besides, smartie, there's more to it than you say. The world globe and the book on the right are supposed to remind you of general knowledge.

N: That's right. The O section contains encyclopedias and other reference material.

S: Now you've got me. Philosophy - I've heard the word but I'm not sure what it means.

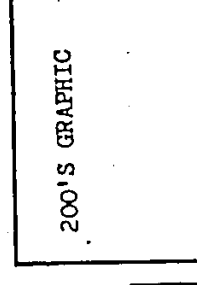
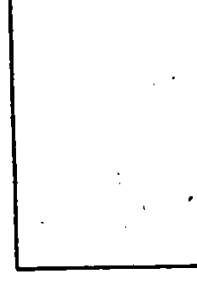
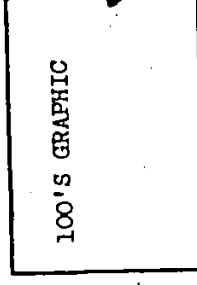
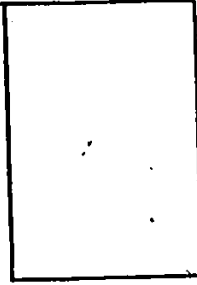
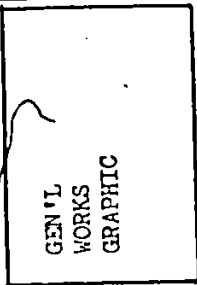
N: Yes, that's the 100's section. Well it's heavy stuff. Philosophy enquires into the meaning of life. Psychology concerns itself with the human mind.

S: Right now, that turns me on as much as it does Shroeder in the cartoon...

... Oh that's cute. Obviously the 200's have to do with religion.

N: Right and don't worry too much about fancy words like theology. It only means the study of God...

IMAGE



no

sec

no 84

sec

no

sec

no 85

sec

no

sec

no 86

sec

TEXTE

IMAGE

no 87	300'S GRAPHIC
sec	
no	
sec	
no 88	400'S GRAPHIC
sec	
no 89	500'S GRAPHIC
sec	
no	
sec	
no 90	600'S GRAPHIC
sec	

N: The 300's. The social sciences. It's worth looking at the subdivisions here. Notice that the section includes political science, law, social welfare and folklore.

S: I get it. Even though the subjects are different they're the same in the sense that they all have to do with man and his neighbors.

N: Right - the society he lives in.

S: 400's Language - I think I can handle this one, Different languages, n'est-ce-pas?

N: Muy bien.

S: The 500's Pure science. I can see how studying plants (botany - right?) can be "pure" but math and chemistry are "dirty" subjects.

N: I know what you mean. I'm no Einstein either but the subjects here are called pure because they are concerned with the physical nature of the world and its life forms. Anthropology for example is about evolution of human life. But there's also information about cultures - so I guess you're right - this category is not so pure.

S: The 600's Useful arts - that's a useful title.

N: Right it's easy to see that medicine, engineering and mechanical trades have practical uses for man...

TEXTE

IMAGE

700'S GRAPHIC

no 91

sec

no

sec

no

sec

800'S GRAPHIC

no 92

sec

900'S GRAPHIC

no 93

sec

no

sec

... The Fine Arts (700's) are the opposite. Beauty, not usefulness is the common denominator. Painting and sculpture are obvious examples of this.

S: Yeah but architecture is in there. Now don't tell me houses and buildings aren't useful.

N: Good point. You might have mentioned printing too. The art or skill can also be of useful benefit, but appreciation or recreation must be involved.

S: Recreation. Well I bet the books are only about classical music and ballet - things like that. I wouldn't mind learning about these things, but what about real entertainment like rock music and sports?

N: Don't worry. There are many books on popular forms of entertainment in the 780's and 790's. Books on the Beatles, Bobby Hull, etc.

S: Literature. I suppose I'd find stories here.

N: Actually, although it's literature, the 800's section doesn't contain fiction. Fiction has a section of its own which I'll describe later. This section, the 800's, contains drama, poetry and criticism in different language groups. Naturally, in our library, the British and American sections are the largest.

S: Funny, the first subdivision for history is geography.

N: Well, it's really hard to separate a place from its past. So it makes sense that the 900's contains both history and geography. The 920 subdivision, biography, is included here because it's a kind of personal history, the story of some one's life. However, some biographies are classified by subject. For instance, Bobby Hull's biography is in 790 for entertainment. See, that's all there is to it.

TEXTE

S: I get the idea but I'll never remember half of it.
 N: Don't worry. Posters like this should be around the library. Besides the librarian can inform you and even give you a little handbook reviewing all this. So, I think it's time now...

S: Not so fast. You said you'd tell me about my favorite books - stories.

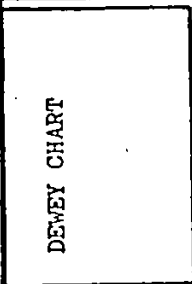
N: That's right. Well, since fiction can be about almost anything, its not in any of the Dewey categories...

... Instead, fiction books are simply catalogued in alphabetical order by the writers's last name.

S: Look, I hope you don't mind, but I've had it. I think I'll just flop down some place with a book...

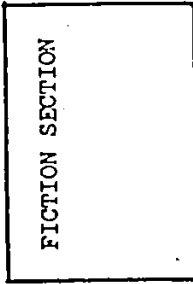
... a comic book, that is - it's all I can take after this.

IMAGE



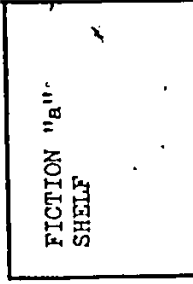
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sec



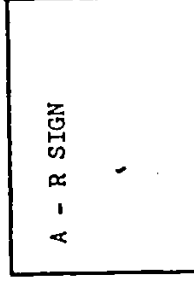
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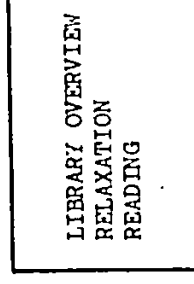
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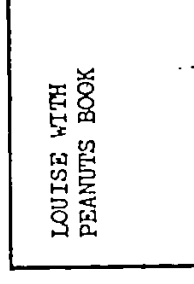
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SON

TEXTE

IMAGE

no	100-109	sec	PEANUTS SEQUENCE AND SUBJECT NAME
no	110	sec	HAPPY READING PEANUTS
no		sec	
no		sec	
no		sec	
no		sec	

APPENDIX II

Illustrated Lecture

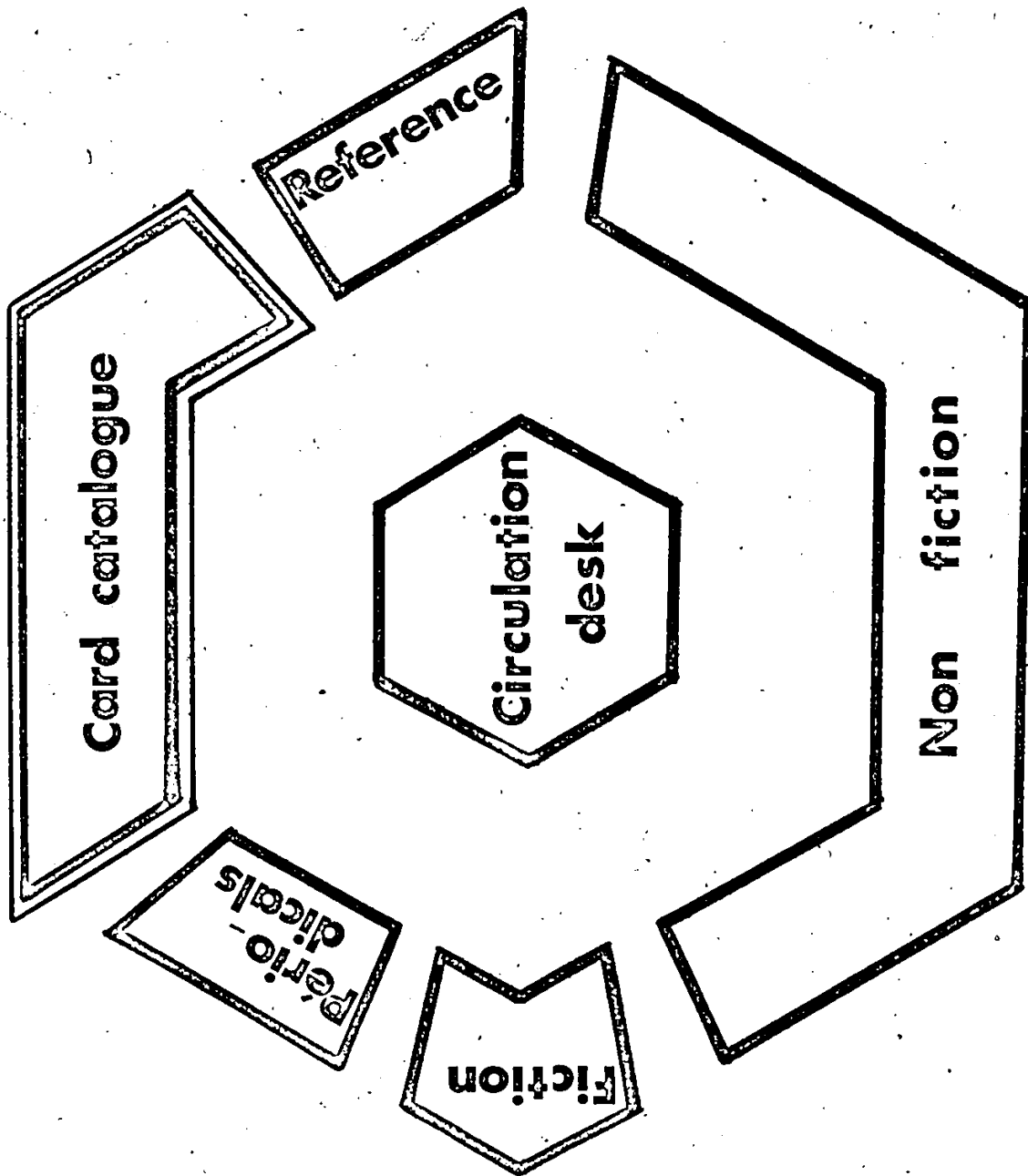
General Aim: To introduce basic concepts of library organization.

Target Audience: Secondary One Students of the M.C.S.C.

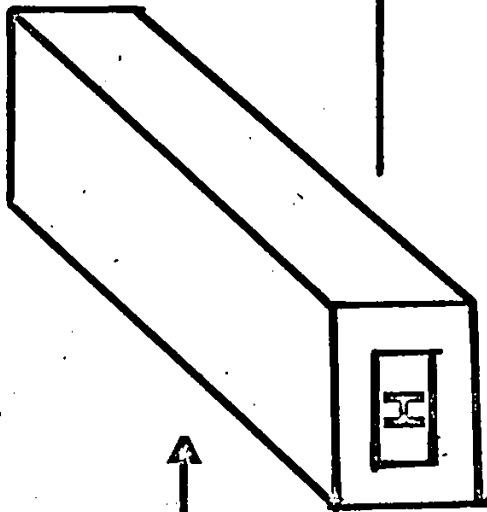
Specifications: 11 overhead transparencies

- Outline:**
- 1.a) The library has two information centers -- the circulation desk, and the card catalogue.
 - b) The material is divided into four main areas -- reference, nonfiction, fiction, periodicals.
 2. Cards are filed alphabetically according to the first word excluding 'a' or 'the'.
 3. Knowing the title, one finds the right drawer and card which gives the code number identifying the shelf section for the book.
 4. Knowing the author's last name, one finds the author card also alphabetically filed...
 5. in the right drawer with a card showing the same code number bringing one to the right shelf and book.

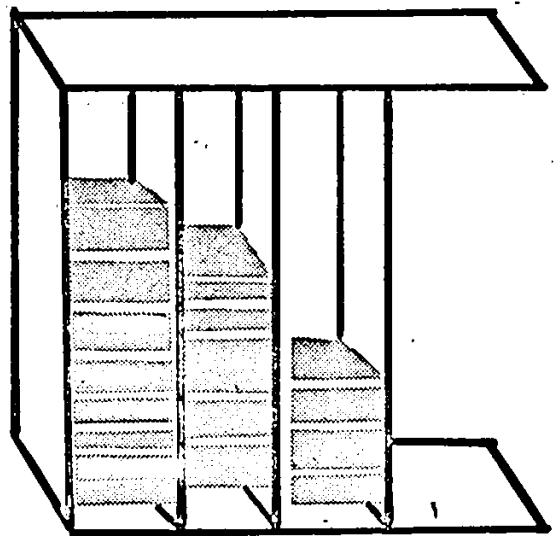
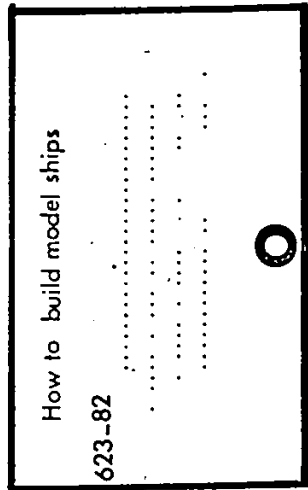
6. Knowing the topic will give yet another card with the same code. Sometimes you have to follow up various subject headings before finding the right one.
7. Again, this brings us to a drawer with the subject card guiding us to the shelf and book.
8. The shelves are in code number sequence. The order in each section reads from left to right, top to bottom.
9. One of three possible items of information gives the code leading to the book on the shelf.
10. Code is determined by Dewey Decimal System dividing books into 10 broad categories (Fiction books apart. These are alphabetically arranged on their own shelves).
11. Each category is itself divided into 10 "sub-subjects" -- e.g., Fine Arts. (A booklet detailing this is available).



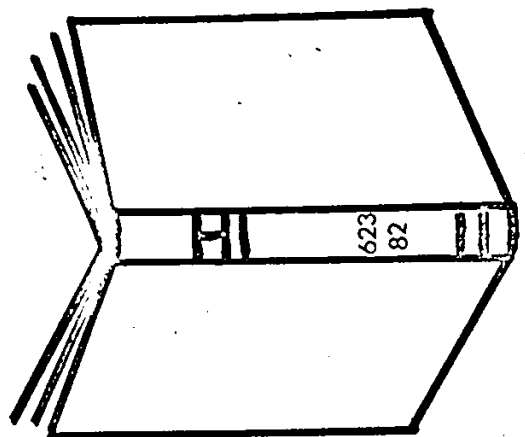
FINDING A BOOK



TITLE



OR



AUTHOR

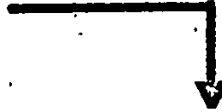
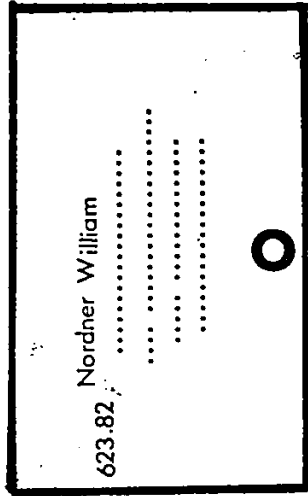
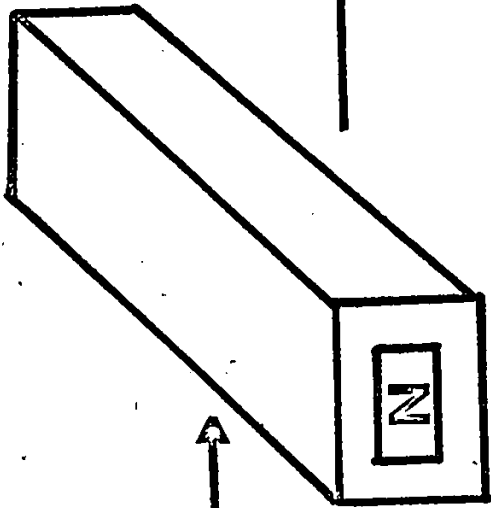
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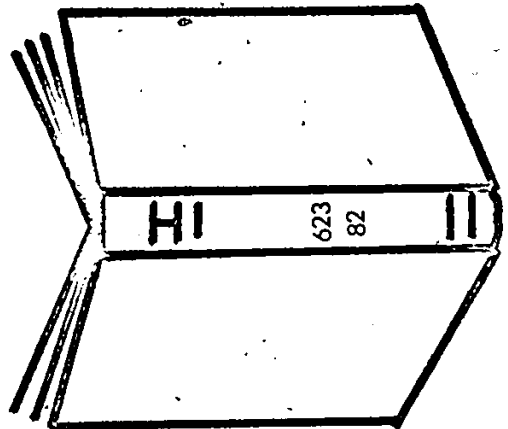
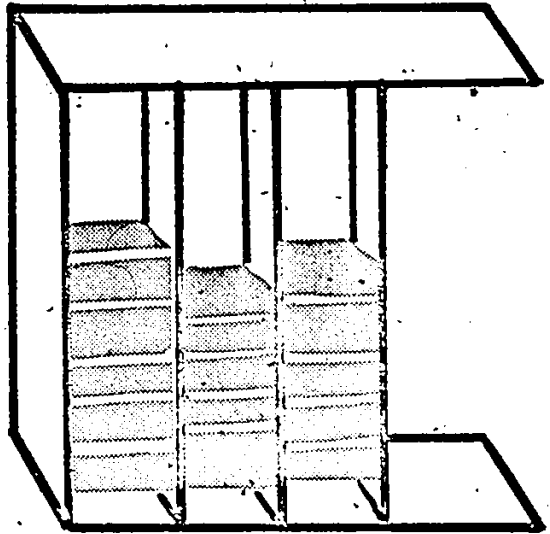
O

FINDING A BOOK

AUTHOR



OR

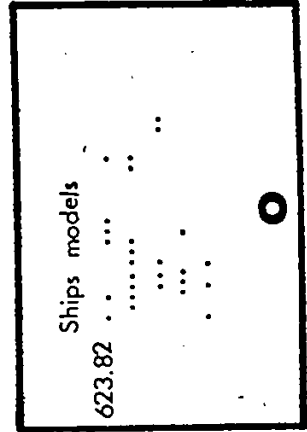
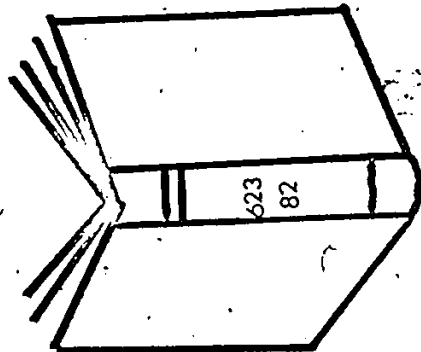
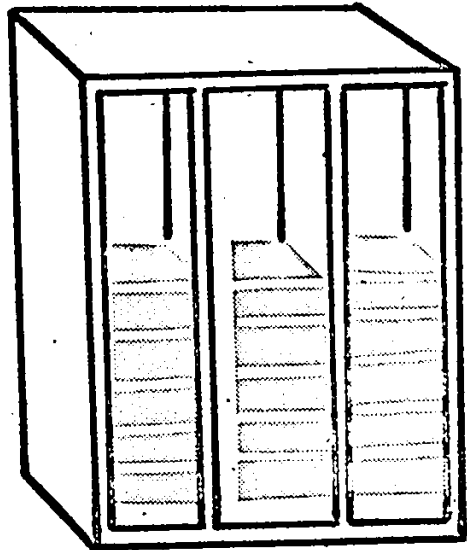
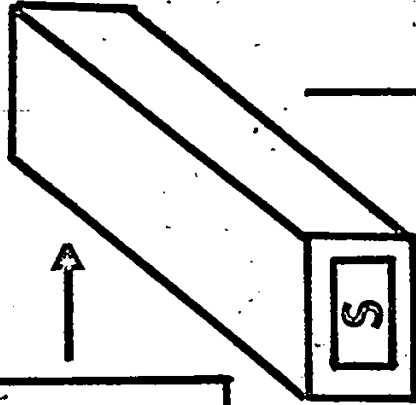
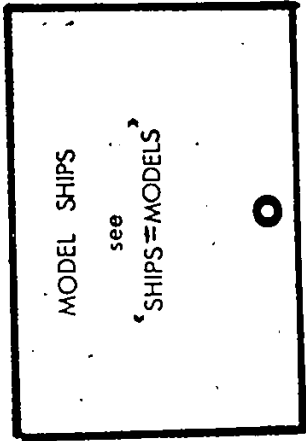
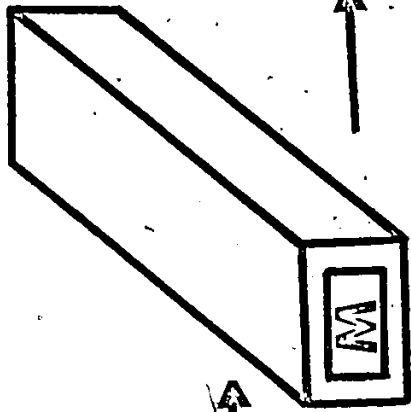


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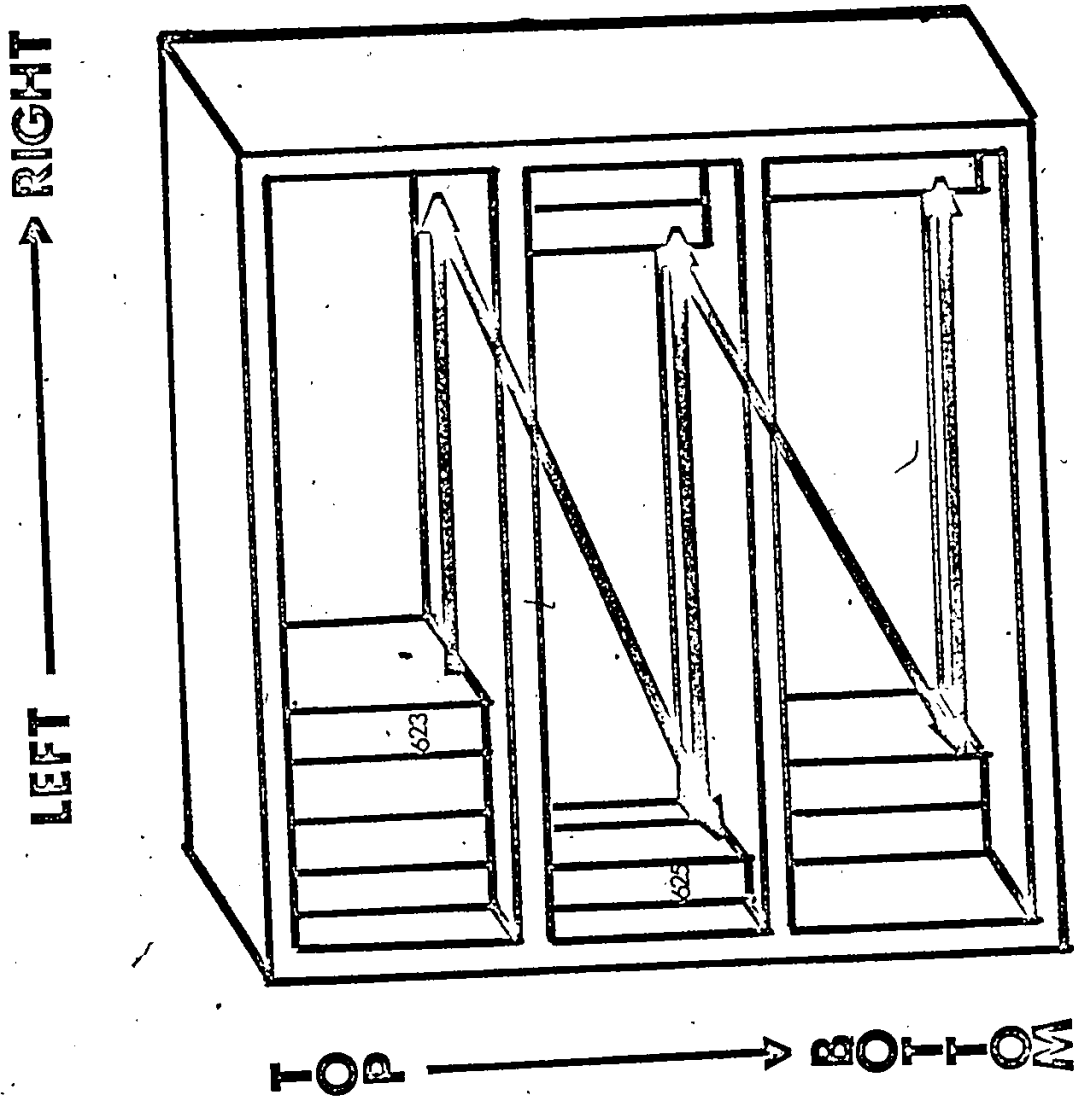
FINDING A BOOK

SUBJECT

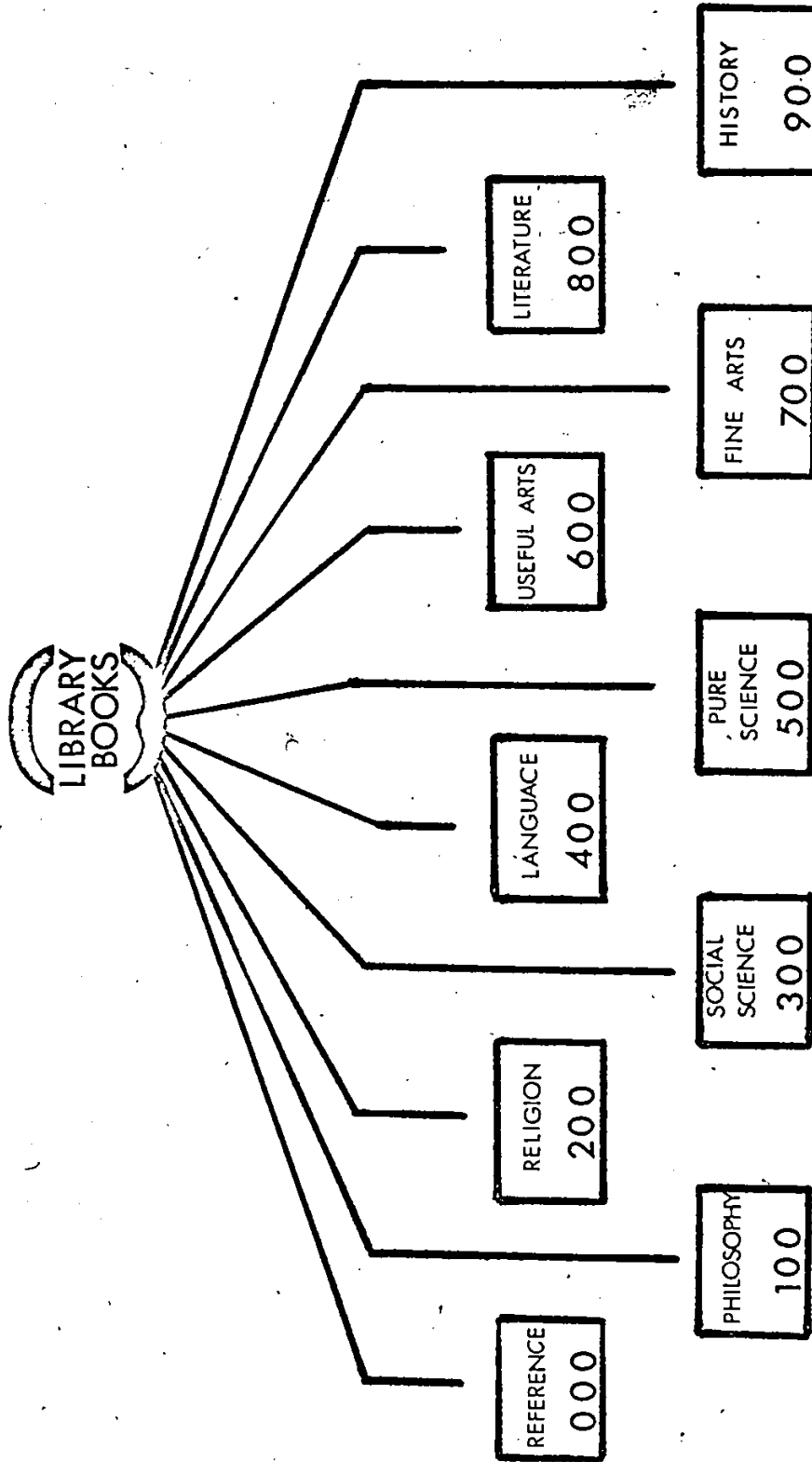


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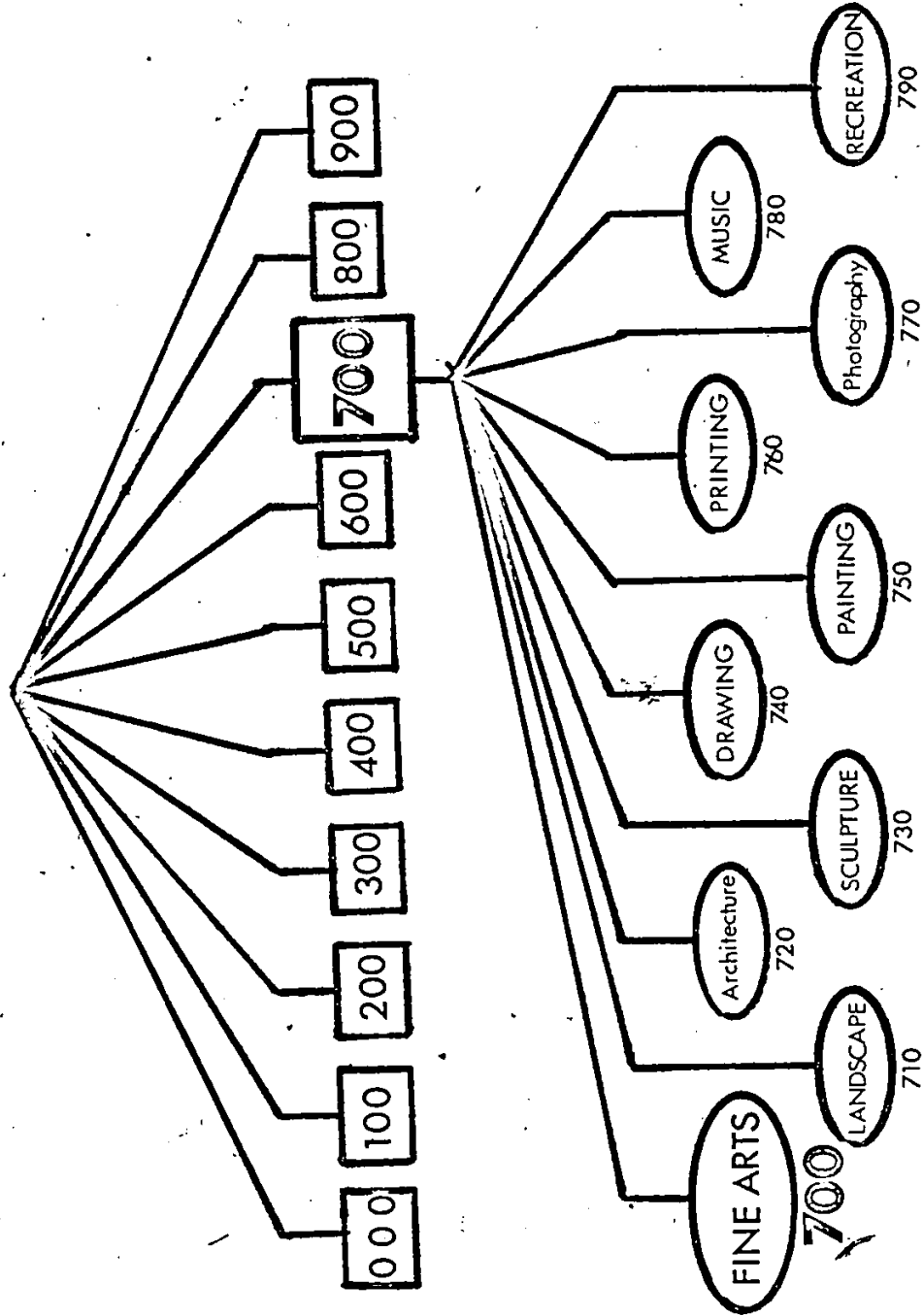


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DEWEY DECIMAL CLASSIFICATION

LIBRARY BOOKS



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APPENDIX III

QUIZ ON LIBRARY USE

INSTRUCTIONS: Answer the following multiple-choice questions by underlining the letter beside one of the three options.

If you are not certain of the correct response, underline the one you think most likely.

1. I would find the encyclopedias in the section of the library known as:

- a) periodicals room;
- b) reference;
- c) fiction.

2. The first place to go if I need a book from the library is:

- a) the circulation desk;
- b) the card catalogue;
- c) the shelves.

3. When I need an atlas or a dictionary, I would go to the:

- a) reference section;
- b) geography shelves;
- c) periodicals room.

4. The card catalogue is arranged:

- a) numerically;
- b) alphabetically;
- c) topically.

5. The information on the card which tells me exactly where to find the book on the shelves is:

- a) the code or call number;
- b) the author's name;
- c) the subject.

6. The books themselves are arranged on the shelves in:

- a) alphabetical order of the first word of the title;
- b) numerical order according to the code number;
- c) alphabetical order according to subject.

7. If I am doing a research project, but I don't know any particular author or title, the best thing to do would be:

- a) think of a subject heading and refer to the card catalogue which will give me the code numbers for several books. I can then find the book(s) on the shelves.

b) ask the librarian which section of shelves I should go to, and hunt for a book which seems likely according to the title.

c) find out which broad Dewey category my subject belongs to, and look in the corresponding section of shelves. For example, if it is a math project, I would go to the 500's shelves for Pure Sciences.

8. The Dewey Decimal System divides the books into how many broad categories:

a) three;

b) ten;

c) twenty.

9. If I were looking for an adventure story to read for relaxation I would:

a) look in the Literature section (the 800's);

b) look in the Fine Arts section (the 700's) which includes popular entertainment;

c) look in the card catalogue under the writer's last name if I knew one, or browse through the fiction section in the library.

10. How do I know when I should return a book I have borrowed from the library?

a) I look at the date the librarian stamps on the inside of the back cover and return it the circulation desk area.

b) I return the book in exactly two weeks to the shelf where I found it.

c) I return the book within a month.

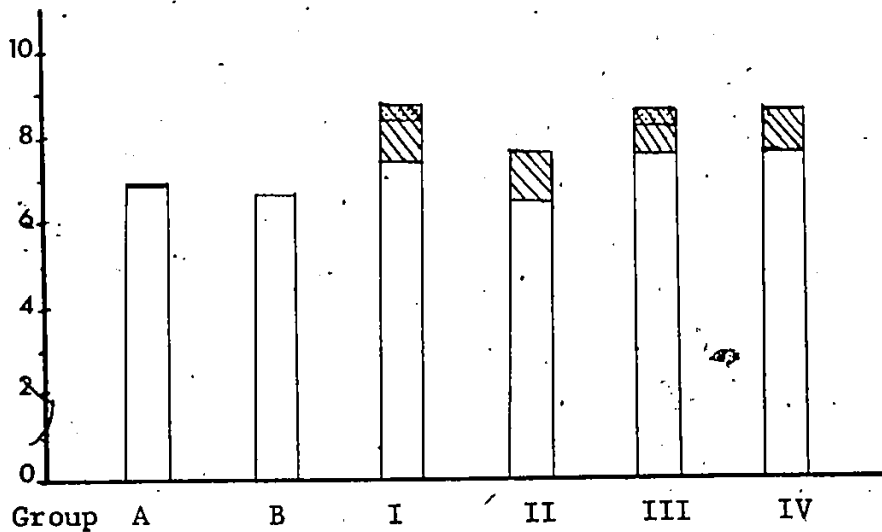
APPENDIX IV

DATA SUMMARY

	n	male	fem.	English course	Pre-test (O ₁)	Post-test 1 day (O ₂)	Post-test 3 wks (O ₃)	Gain 1 (O ₂ -O ₁)	Gain 2 (O ₃ -O ₁)
Controls									
A	21	10	11	120	6.90	6.95		.05	
B	27	10	17	120	6.78		6.78		0
Slide/tape treatment									
I	11	5	6	120	7.45	8.64	8.27	1.19	.82
II	10	5	5	120	6.60		7.70		1.10
Illustrated Lecture									
III	17	10	7	130	7.59	8.47	8.24	.88	.65
Combined									
IV	16	6	10	130	7.69		8.56		.87

Totals: 102 46 56
 (45.1%) (54.9%)

where n = net number after mortality losses from 155 subjects



Score on pretest
 Increase first posttest
 Decrease first to second posttest

APPENDIX V

STATISTICS

Test-Retest Reliability for Group A

$$r \text{ Pearson} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}} = \frac{691}{1322.26} = .523$$

$$t = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}} = \frac{2.28}{.852} = 2.676 > 2.09 \text{ (critical value at } p = .05, \text{ df } 19)$$

In a two-tailed test of significance at .05 level of confidence, r of .523 is significantly different from 0.

Test-Retest Reliability for Group B

$$r \text{ (Pearson)} = \frac{828}{1388.37} = .610$$

$$t = \frac{3.05}{.792} = 3.85 > 3.45 \text{ (critical value at } p = .001, \text{ df } 25)$$

In a two-tailed test of significance at .001 level of confidence, r of .610 is significantly different from 0.

The values of Pearson r are adequate indications of the test's reliability for our purposes.

T test for difference between pretest
means of Groups A and B

Between sum of squares:

$$\sum x^2 = \sum x^2 - \frac{(\sum x)^2}{N} = 1285 - \frac{(183)^2}{27} = 44.67$$

Within sum of squares:

$$\sum x_1^2 = \sum x_1^2 - \frac{(\sum x_1)^2}{N} = 1079 - \frac{(145)^2}{21} = 77.81$$

T test:

$$t = \frac{\bar{x} - \bar{x}_1}{\sqrt{\frac{x^2 + x_1^2}{(N_1 + N_2) - 2} \left(\frac{1}{N_1} + \frac{1}{N_2} \right)}} = \frac{.12}{\sqrt{\frac{44.67 + 77.81}{(27+21) - 2}}}$$

$$t = .255, \text{ df } 46, p > .05$$

The obtained value of t (.255) is far less than needed to reject the null hypothesis of no difference, even at the .20 level of confidence, df 46.

T test for difference between means
of pretest and 1 day posttest in Group A

$$(1) \bar{D} = \frac{\sum D}{n} = \frac{1}{21} = .048$$

$$(2) \sum d^2 = 63$$

$$(3) S_{\bar{D}} = \sqrt{\frac{\sum d^2}{n(n-1)}} = .387$$

$$(4) t = \frac{\bar{D}}{S_{\bar{D}}} = \frac{.048}{.387} = .124, \text{ df } 20, p > .20$$

In a two-tailed test, the obtained value of t is much smaller than needed to reject the null hypothesis ($H_0: \bar{\Delta} = 0$) even at the .20 level of confidence.

∴ In Group A, the posttest mean does not vary significantly from the pretest mean (Ref.#1, p. 56).

N.B. For Group B, no similar analysis was needed since the pretest and posttest means were identical at 6.78.

Analysis for internal consistency of
test using KR₂₀ on Group B pretests

To determine the internal consistency of our measuring instrument, the Kuder Richardson Formula No. 20 was used on the pretest scores of one of the control groups (Group B).

$$r_{tt} = \frac{k}{k-1} \left[1 - \frac{\sum pq}{s^2} \right]$$

where k = number of test items = 10

$$s^2 = \text{variance of test} = \frac{\sum (x - \bar{x})^2}{N}$$

p = proportion answering item correctly

$$q = 1-p$$

$$s^2 = \frac{77.81}{21} = 3.705$$

$$r_{tt} = \frac{21}{20} \left[1 - \frac{1.68}{3.705} \right]$$

$$r_{tt} = .61$$

∴ r_{KR20} is significant to .01 level for df 20

There is an acceptable degree of internal consistency for classroom tests.

T test for difference between means
of pretests and 1 day posttests in Group I (slide/tape)

$$(1) \bar{D} = \frac{13}{11} = 1.18$$

$$(2) \sum d^2 = \sum D^2 - \frac{(\sum D)^2}{n} = 33 - \frac{(169)}{11} = 17.64$$

$$(3) S_{\bar{D}} = \sqrt{\frac{\sum d^2}{n(n-1)}} = \sqrt{\frac{17.64}{110}} = \sqrt{.16} = .40$$

$$(4) t = \frac{\bar{D}}{S_{\bar{D}}} = \frac{1.18}{.40} = 2.95$$

using t table for 1-tailed test:

$$t = 2.95, df=10, p < .01$$

We reject our null hypothesis with a very high degree of confidence and conclude that $\bar{\Delta} \neq 0$.

∴ The slide/tape treatment results in a significant learning effect as shown by posttests one day later to Group I (Ref. quest. #3, p. 56).

$$\text{est } w^2 = \frac{t^2 - 1}{t^2 + N_1 + N_2 - 1} = \frac{7.70}{29.70} = .259$$

According to Richard M. Wolf's method of interpretation using .201 as critical value of w^2 , we can contend an educationally important as well as highly significant effect.

T test for difference between means
of pretests and 3 week posttests in Group II (slide/tape)

(1) $\bar{D} = \frac{11}{10} = 1.10$

(2) $\sum d^2 = \sum D^2 - \frac{(\sum D)^2}{n} = 33 - \frac{(11)^2}{10} = 20.9$

(3) $S_{\bar{D}} = \sqrt{\frac{\sum d^2}{n(n-1)}} = \sqrt{\frac{20.9}{90}} = .48$

(4) $t = \frac{\bar{D}}{S_{\bar{D}}} = \frac{1.10}{.48} = 2.29$

Using t table for 1-tailed test

$t = 2.29, df=9, p < .025$

We can reject the null hypothesis with a high degree of confidence and conclude $\bar{\Delta} \neq 0$

∴ The slide/tape treatment results in a significant learning effect as shown in posttests three weeks later.

(Ref. quest. # 4, p. 57).

Est. $w^2 = \frac{t^2 - 1}{t^2 + N_1 + N_2 - 1} = \frac{4.24}{24.24} = .175$

According to Richard M. Wolf (Popham, p. 232) a value of w^2 over .201 is sufficient to declare the effect as educationally important. So according to this method of interpretation, we cannot lay claim to a strong learning effect although the score gain is highly significant.

T test for difference between means
of pretests & 1 day posttests in Grp III (illustrated lecture)

(1) $\bar{D} = \frac{\sum D}{n} = \frac{15}{17} = .88$

(2) $\sum d^2 = \sum D^2 - \frac{(\sum D)^2}{n} = 37 - \frac{(225)}{17} = 23.76$

(3) $S_{\bar{D}} = \sqrt{\frac{\sum d^2}{n(n-1)}} = \sqrt{\frac{23.76}{17(16)}} = .30$

(4) $t = \frac{\bar{D}}{S_{\bar{D}}} = \frac{.88}{.30} = 2.94$

Using t table for 1-tailed test

$t = 2.94, df=16, p < .005$

We can reject the null hypothesis with a very high degree of confidence and conclude that $\bar{\Delta} \neq 0$

∴ The illustrated lecture results in a significant learning effect as shown in posttests one day later.

(Ref. quest. #5, p. 57).

Est. $w^2 = \frac{t^2 - 1}{t^2 + N_1 + N_2 - 1} = \frac{7.64}{41.64} = .183$

w^2 falls just short of the critical value (.201) suggested by Wolf as a criterion for claiming educational importance of a difference between means.

T test for difference between means
of pretests and 3 week posttests in Group IV (combined)

$$(1) \bar{D} = \frac{\sum D}{n} = \frac{14}{16} = .88$$

$$(2) \sum d^2 = \sum D^2 - \frac{(\sum D)^2}{n} = 41 - \frac{(196)^2}{16} = 28.75$$

$$(3) S_{\bar{D}} = \sqrt{\frac{\sum d^2}{n(n-1)}} = \sqrt{\frac{28.75}{240}} = .35$$

$$(4) t = \frac{\bar{D}}{S_{\bar{D}}} = \frac{.88}{.35} = 2.51$$

Using t table for 1-tailed test

$$t = 2.51, df=15, p < .025$$

We can reject the null hypothesis with a high degree of confidence and conclude that $\bar{\Delta} \neq 0$

∴ The combined treatments result in a significant learning effect as shown by posttesting three weeks after the first instruction. (Ref. quest. #6, p. 57).

N.B. The effects of the individual treatments do not appear to be additive since the mean score gain from the combined treatments does not surpass those in the other conditions.

We will statistically analyze one such comparison.

$$\text{Est. } w^2 = \frac{t^2 - 1}{t^2 + N_1 + N_2 - 1} = \frac{5.30}{37.30} = .142$$

w^2 is below the .201 level suggested as a critical minimum to claim educational importance.

Group I \leftrightarrow III - T test for
Comparison of Pretest Means

To establish validity of treatment comparisons between the groups, we seek to show relative equivalence of pretest performance.

$$(1) \bar{X}_1 = 7.45, \bar{X}_2 = 7.59$$

$$(2) \sum x_1^2 = 636, \sum x_2^2 = 1001$$

$$(3) S^2 = \left(\frac{\sum x_1^2 + \sum x_2^2}{n_1 + n_2 - 2} \right) = \frac{1637}{26} = 62.96$$

$$(4) S(\bar{X}_1 - \bar{X}_2) = \sqrt{S^2 \left(\frac{n_1 + n_2}{n_1 \times n_2} \right)} = \sqrt{62.96 \left(\frac{28}{297} \right)} = 2.44$$

$$(5) t = \frac{\bar{X}_1 - \bar{X}_2}{S(\bar{X}_1 - \bar{X}_2)} = \frac{-.14}{2.44} = .06$$

Using table for a two-tailed test of significance

$$t = .06, df=26, p > .20$$

\therefore We cannot reject the null hypothesis ($n_1=n_2$) with any degree of confidence and conclude that the groups are effectively equivalent with respect to pretest performance.

T test for comparison of mean score
gains on 1 day posttests of Group I and Group III

$$(1) \bar{D}_1 = 1.18 \quad \bar{D}_2 = .88$$

$$(2) \sum d_1^2 = 17.64 \quad \sum d_2^2 = 23.76$$

$$(3) s^2 = \left(\frac{\sum d_1^2 + \sum d_2^2}{n_1 + n_2 - 2} \right) = \frac{17.64 + 23.76}{11 + 17 - 2} = 1.59$$

$$(4) s(\bar{D}_1 - \bar{D}_2) = \sqrt{s^2 \left(\frac{n_1 + n_2}{n_1 \times n_2} \right)} = \sqrt{1.59 \left(\frac{28}{187} \right)} = .49$$

$$(5) t = \frac{\bar{D}_1 - \bar{D}_2}{s(\bar{D}_1 - \bar{D}_2)} = \frac{.30}{.49} = .61$$

Using t table for a 2-tailed test

$$t = .61, df=26, p > .20$$

We cannot reject the null hypothesis with any acceptable degree of confidence, and we must conclude that $\bar{\Delta} = 0$, i.e. no significant difference between the mean gain scores of Groups I and III.

∴ The learning effect from the slide/tape treatment seems somewhat greater than that of the illustrated lecture as reflected by comparative gain scores, but the difference is not significant. However, we can safely say that the instructional slide/tape is shown to be at least as effective as the illustrated lecture. (Ref. quest. #7, p. 57).

Group II IV - T test for
Comparison of Pretest means

To support the validity of treatment comparisons between the groups, we seek to show relative equivalence of pretest performance.

$$(1) \bar{X}_1 = 6.60, \quad \bar{X}_2 = 7.70$$

$$(2) \sum x_1^2 = 458, \quad \sum x_2^2 = 995$$

$$(3) S^2 = \left(\frac{\sum x_1^2 + \sum x_2^2}{n_1 + n_2 - 2} \right) = \frac{1453}{24} = 60.54$$

$$(4) S(\bar{x}_1 - \bar{x}_2) = \sqrt{S^2 \left(\frac{n_1 + n_2}{n_1 n_2} \right)} = 3.14$$

$$(5) t = \frac{\bar{X}_1 - \bar{X}_2}{S(\bar{X}_1 - \bar{X}_2)} = \frac{-1.10}{3.14} = .35$$

Using table for a 2-tailed test of significance

$$k = .35, df=24, p > .20$$

∴ We cannot reject the null hypothesis ($n_1=n_2$) with any degree of confidence and can assume that the groups are approximately equivalent with regard to pretest performance.

T test for comparison of mean score
gains on 1 day Posttests of Group II and Group IV

- (1) $\bar{D}_1 = 1.10$ $\bar{D}_2 = .88$
- (2) $\sum d_1^2 = 20.9$ $\sum d_2^2 = 28.75$
- (3) $s^2 = \left(\frac{\sum d_1^2 + \sum d_2^2}{n_1 + n_2 - 2} \right) = \frac{49.65}{24} = 2.07$
- (4) $s(\bar{D}_1 - \bar{D}_2) = \sqrt{s^2 \left(\frac{n_1 + n_2}{n_1 \times n_2} \right)} = .58$
- (5) $t = \frac{\bar{D}_1 - \bar{D}_2}{s(\bar{D}_1 - \bar{D}_2)} = .38$

Using t table for a 2-tailed test

$$t = .38, df=24, p > .20$$

We cannot reject the null hypothesis with any acceptable level of confidence and we must conclude that $\bar{\Delta} = 0$, i.e., no significant difference between the mean gain scores of groups II and IV.

∴ From comparative gain scores of the two groups, the learning effect of the combined treatments appears slightly less than that of the slide/tape alone, but this difference is clearly insignificant. It is safe to infer that the learning effects are not shown to be cumulative, since such a conclusion could only be demonstrated by significantly higher gains in the combined treatment group. (Ref. quest. #8, p. 57).

"Forgetting" Issue on Group I:
T test for difference between means
of pretest and 3 week posttest in Group I

$$(1) \bar{D} = \frac{9}{11} = .82$$

$$(2) \sum d^2 = \sum D^2 - \frac{(\sum D)^2}{n} = 31 - \frac{81}{11} = 23.64$$

$$(3) S_{\bar{D}} = \sqrt{\frac{d^2}{n(n-1)}} = \sqrt{\frac{23.64}{110}} = .46$$

$$(4) t = \frac{\bar{D}}{S_{\bar{D}}} = \frac{.82}{.46} = 1.78$$

Using t table for 1-tailed test

$$t = 1.78, df=10, p < .10$$

The posttest scores given after three weeks are still significantly higher than pretest scores, but the level of confidence ($p < .06$) is marginal.

Although there seems to be some forgetting when comparing 1 day posttests ($\bar{X}_1 = 8.64$) to 3 week posttests ($\bar{X}_2 = 8.27$), there is a persisting learning effect from the slide/tape treatment.

"Forgetting" Question on Group III:
T test for difference between means on
pretests and 3 week posttest in Group III

$$(1) \bar{D} = \frac{\sum D}{n} = \frac{11}{17} = .65$$

$$(2) \sum d^2 = \sum D^2 - \frac{(\sum D)^2}{n} = 35 - 7.12 = 27.88$$

$$(3) S_D = \sqrt{\frac{\sum d^2}{n(n-1)}} = \sqrt{\frac{27.88}{17(16)}} = .32$$

$$(4) t = \frac{\bar{D}}{S_D} = \frac{.65}{.32} = 2.03$$

Using t table for one-tailed test

$$t = 2.03, df=16, p < .05$$

The mean score on posttesting after 3 weeks are still significantly higher than the mean pretest score, and the level of confidence remains acceptable ($p < .05$).

Once again, then, although there seems to be some forgetting when comparing one-day posttests ($\bar{X}_1 = 8.47$) to 3 week posttests ($\bar{X}_2 = 8.24$), there is a persisting learning effect from the illustrated lecture.

APPENDIX VI

Structured Interview & Feedback

- In terms of overall instructional effects on the students, how would you rate the two presentations on the following scale:

	very effective	effective	somewhat useful	not useful
Slide/tape	5	0	0	0
Lecture with Overheads	1	3	0	1

- In terms of your personal preference, which presentation did you find easier and more enjoyable to use:

Slide/tape	Lecture with Overheads	No preference
4	0	1

- From your observations of student reactions following the presentations, which do you think they enjoyed more? Please illustrate with some examples of their behavior (e.g., questions, comments among the students...)

Slide/tape	Lecture with Overheads	About the same
5	0	0

- Kindly make any other remarks or suggestions you may have about these instructional materials.

N.B. Comments and interpretation are dealt with in the body of the paper (pp. 75-77).