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Instructional Design and Formative Evaluation of a Self Instructional Aid for Developing a Problem Statement and Literature Review

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ABSTRACT

Instructional Design and Formative Evaluation
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Developing a Problem Statement and Literature Review

Lewis M. Gitelman

Much research in the past has been conducted investigating the effects of library orientation and bibliographic instruction on a variety of dependant variables, such as grade point average, academic performance and attitudes toward library use. This study deals with the design and evaluation of a self instructional aid for conducting research, herein defined as developing a problem statement and literature review, in order to write a research proposal. The instructional aid was designed for use among Masters level students in Educational Technology in a compulsory research design course. The instructional aid was evaluated on the basis of an expert review, one-to-one and a field trial among the target audience. The Kolomogorov-Smirnov one sample test was employed to test goodness of fit between the obtained frequency distribution of responses to a questionnaire from the field trial subjects and a theoretical distribution. The field trial results served as a summative evaluation and are reported along with formative implications.

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CHAPTER 1

Introduction

It is difficult to understand why many students are unable to conduct research when librarians are well trained in bibliographic instruction and offer guided tours. This may not be so when we consider that librarians are trained in information retrieval, whereas graduate students are thought to be trained in research methodology. It is also difficult to understand why faculty are disappointed with the lack of research skills among students when professors seldom provide detailed expectations (Dreifuss, 1981). Stoan (1984) has found there appears little, if any, coordination between faculty expectations and bibliographic instruction provided by reference librarians. Furthermore, Stoan reveals little has been done to differentiate between librarians whose library skills enable "the search for information", and the research skills of scholars, who despite their lack of library skills, "center on the quest for knowledge" (p.105).

Dreifuss (1981) points out there is also a discrepancy between increasing faculty expectations from undergraduate to graduate levels and actual student abilities. As a result the quality of research papers prepared by graduate students can fall short of faculty expectations.

Based on a review of the literature it was concluded that more could be done to link bibliographic instruction with the preliminary phases of preparing a research proposal. This study describes the process used to develop an instructional aid to assist students when completing a research proposal

assignment and the degree to which it was found useful. The product described attempted to go beyond simple bibliographic instruction by combining library and research skills instruction with actual course research requirements. Development of the instuctional aid and its measure of usefulness were accomplished using formative evaluation methods. Expert review and one-to-one sessions were used to formatively evaluate the instructional material before dissemination and testing of its usefulness in a field trial. The results reported confirmed the perceived need for such an instructional aid and provide insight to the formative evaluation process.

Library Skills

Research in the past has sought to determine the effects of library skills instruction on a variety of dependent variables. Wood (1984) sought to determine if a library skills course would improve student performance on a library skills test and improve student attitudes toward their library. Wood used a pretest - postest design with control and experimental groups. The control group received no instruction and was only required to write the pretest and postest. The experimental group received a self-paced course on library (research) skills. Wood found a significant difference between control and experimental groups on the postest measure.

Similar reports have been made by Renford (1978) and Kaplowitz (1986). In both studies library instruction took the form of a course; Renford employed a self-paced workbook program whereas Kaplowitz introduced bibliographic instruction in a compulsory English course. Kaplowitz, using a t-test to compare the difference between means for tests measuring usage, attitude and skills for paired observations, found postest scores to be significantly higher than the pretest scores.

Renford (1978) describes the compulsory completion of a self-paced workbook among students registered in a required English course. Based on a questionnaire, students reported the workbook to be useful. Renford also reports usage of specific library resources increased as well as the sophistication of questions asked of library personnel by students.

Although the above mentioned studies sought to increase library use, basic library competencies, and improve attitudes toward library use among college students, no attempt was made by either study to go beyond library skills and teach research skills for any particular discipline.

Library Skills & Achievement

The impact of library skills instruction on achievement or academic success has also been documented (Harkin, 1971, Mancall, 1985, Walker, 1963). Walker found that the level of high school and public library services available to students, whether high or low, did not contribute to any differences in the students' grade point average.

Mancall provides a thorough review of attempts to correlate library skills with performance on standardized achievement tests. In so doing, Mancall reveals the shortcomings of attempts to isolate library skills as a single variable influencing achievement. Although Mancall recommends alternative tests to measure the impact of library skills instruction on achievement, none of the areas cited by Mancall as fertile ground for further research go beyond basic library skills and their effects on achievement.

Integrated Approaches

Birdsall (1985) concludes that given the most popular methods of library skills instruction, a required credit course would be the most effective means to inculcate library skills. The need to provide an integrated approach is echoed by Dreifuss (1981), Gratch (1985), and Stoan (1984). Dreifuss found there is little consistency between faculty expectations of student library skills and actual skills as perceived by students themselves. Dreifuss reports that, of the thirty-six faculty at the University of Missouri at Kansas surveyed about how they expect students to gain library skills, 42% felt students should already know, 25% felt they should ask the librarian and 19% felt they should learn it on their own. Dreifuss adds that "while the faculty at the graduate level are deferring the responsibility for teaching library skills to the undergraduate level, those faculty at the undergraduate level have already deferred the responsibility to freshman English and High School instructors" (p. 122).

Stoan (1984, p. 105) states that "research skills involve a mastery of the substantive content of a discipline and of its major schools of thought...", whereas "...library skills, though they could be of supplemental use to researchers in a literature search, can be learned simply as a set of mechanical skills, divorced from disciplinary considerations, that enable one to find some information on almost any topic." It is in this manner that much of the past bibliographic instruction has been taught. However, Stoan goes on to suggest that the "objective of bibliographic instruction should be to get students into the primary literature as quickly as possible" (p. 107) and concludes that the best means to do so is by wedding bibliographic instruction with course work and papers.

Rationale

Currently at Concordia University's Master of Arts in Educational Technology program, a 3 hour library orientation tour and lecture is provided by the education reference librarian at the Norris Library. The orientation is provided at the beginning of the semester and is announced or recommended in most classes. Attendance is voluntary. Although the students are shown how to access and use the available resources during the orientation, no attempt is made to provide students with a method for evaluating resources.

Further aggravating the difficulty of establishing a baseline of ability among new entrants to the program are the disparate backgrounds from which many come. Although some graduate students are accepted from Concordia's Psychology department, the remaining students come from other departments or universities. In addition, a portion of M.A. students are working adults, perhaps having long forgotten library use let alone research methodology.

Al-Sadik (1983), in her study of awareness and usage of library resources among graduate students in Educational Technology at Concordia, reveals that forty percent (40%) of students surveyed would not use the card catalogue unless they knew the author of the book. Only forty-four percent (44%) would use the subject catalogue, an indispensable tool when conducting a literature review. The results reported confirm a definite lack of use of library resources essential for research in education. Al-Sadik concludes from her need analysis that not only is there a lack of knowledge among students of the libraries' resources, but there also exists a need for a self-instructional product on library use. Despite having gone to the trouble of

designing such instruction to alleviate these deficiencies, Al-Sadik's design does not appear to be used by the Educational Technology program. Furthermore, although it attempts to teach library use, it does not seek to teach students a method for choosing or evaluating resources or how to synthesize them into a report.

It was felt by this author that another attempt at implementing bibliographic instruction was not the solution to the lack of library skills or research methodology. Rather, by providing a self instructional aid on the use library resources and procedures to follow when conducting research, in conjunction with a research proposal assignment, it was expected that the significance and usefulness of the aid would ease completion of the research proposal assignment.

This study focuses on the formative evaluation of library research skills instruction for education graduate students. It sought to determine the instruction's usefulness based on expert and student responses to a series of questionnaires rather than a measured level of improvement in student research proposal writing skills. Library research skills instruction was provided in the context of a compulsory research design and quantitative methods course taken by all graduate students.

Objectives

Given a research proposal assignment and a self-instructional aid which outlines how to choose a research topic, write a problem statement, conduct and write a literature review, students will use and evaluate the aid such that ninety percent (90%) of students find the aid helpful or useful towards completion of their assignment.

Operational Definitions

For the purposes of this study, research, or research method, is defined as the development of a problem statement and literature review. Library skills are the thorough and effective retrieval and use of relevant resources. Thus, research cannot be accomplished without adequate library skills. Library research skills combine library skills and research method to produce two primary components of a research proposal, the problem statement and literature review.

CHAPTER 2

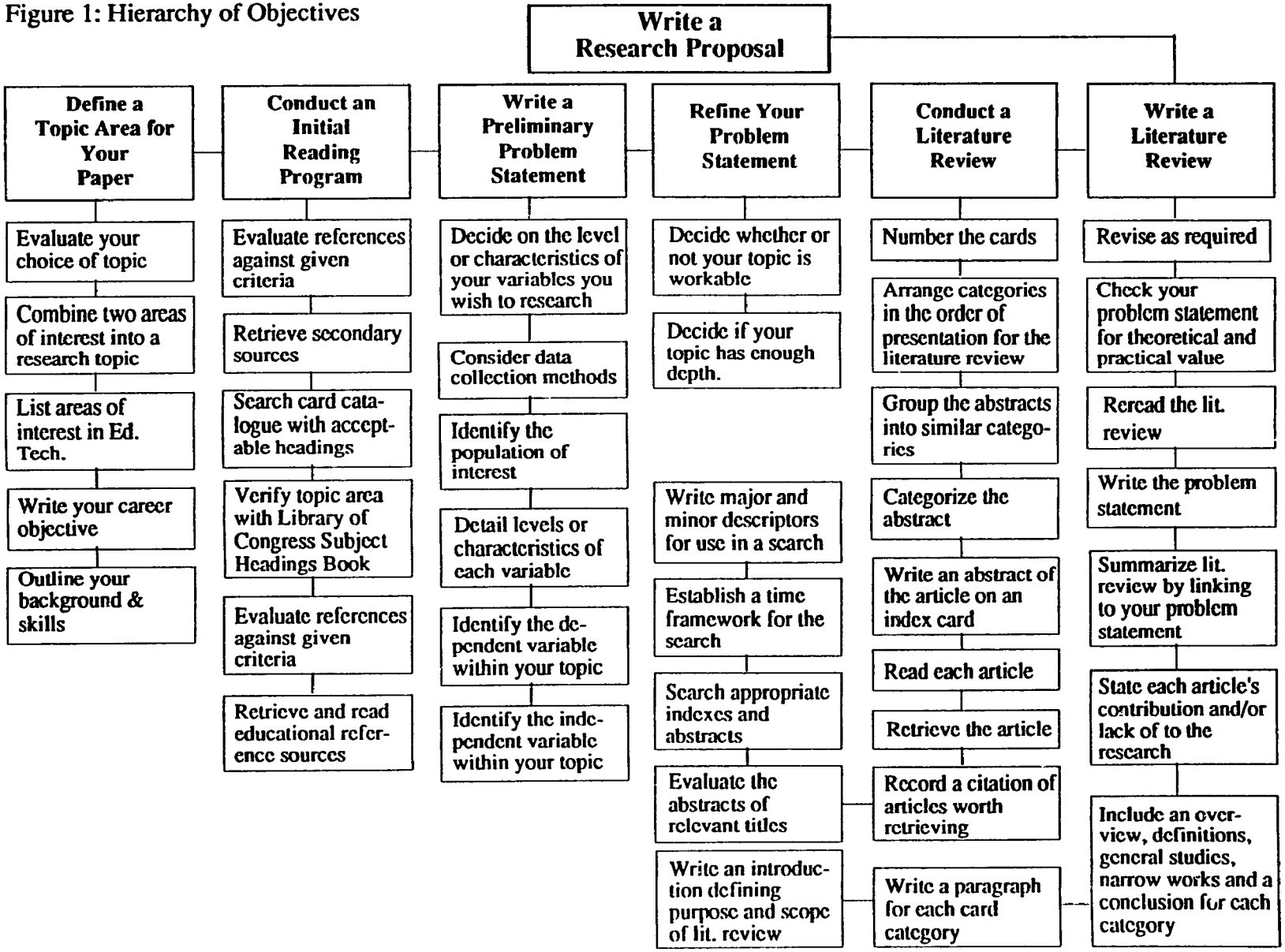
Instructional Design Method

Development of the instructional design was carried out in four major steps. At first instructional goals were established. A procedural analysis (Dick & Carey, 1985) was conducted to derive the subordinate tasks. Performance objectives were then written for the tasks after which the instruction itself was designed and written.

Instructional goals were formulated on the basis of the most recent research proposal assignment in ETEC 640 (see Appendix J). This assignment required that work be done in phases, from topic selection to literature review and research design. As a result, seven enabling objectives (EO's) were deemed necessary to achieve the terminal objective, a well researched proposal. However, the instruction herein developed only aided the learner to compose the literature review and final problem statement. This is so because experimental design is among the course content taught in class, whereas proposal writing is not.

Once having defined the enabling objectives a procedural analysis of the tasks required to acheive each EO was carried out. All subordinate tasks were listed. With the EO's and subordinate tasks defined, the best logical sequence for their execution was arranged as a hierarchy using a flow chart format (see Figure 1).

Figure 1: Hierarchy of Objectives



With the procedural analysis of each EO accomplished, the process of writing performance objectives for each subskill was undertaken. Problems encountered in writing performance objectives often stemmed from improper analysis of the procedure. As a result the procedure would be reanalysed.

The completion of performance objectives for each subskill became an apparently unnecessary task given the intended purpose of the instructional aid and the method of evaluation. The development of the instruction as a concise reference of simple procedures and checklists did not require the delineation of conditions and standards for each enabling objective. As a result the instruction was developed from the procedural analysis of the skills. As a list of performances (verbs) the essence of the steps required to achieve each objective was explicitly expressed. Although the condition and standard for the terminal objective are stated and are among the goals of this evaluation study, they are not central.

An attempt was made to develop algorithms based on the preceding analysis. However, algorithmization of the process, specifically, formulating a problem statement, proved cumbersome to develop and inconvenient to use. As a result the instruction took the form of simple procedures or checklists derived from the content analysis. Appendix B includes a bibliography for the instructional aid.

The medium chosen to deliver the instruction was printed text. As printed text the manual would provide users with greater opportunity for selecting their own reading strategy (Carroll, 1974). Although text is a linear representation of language, it is permanent, reusable and flexible in terms of reading strategy. The bibliographic instruction provided at Concordia University, as an oral presentation with some printed handouts, is far more

difficult to refer back to when in the library three weeks later.

In his discussion of print and its ability to teach through "direct experience" Carroll points out that "printed language, in the form of instruction books, manuals, and the like, is found to facilitate this kind of teaching in an essential and critical way" (p. 156). In fact, whether or not printed manuals are suitable for teaching students 'to do' someting is no longer in question. Rather, research has tended to focus on other issues, "such as whether the explanations are clear and concrete, properly sequenced, and so on" (p. 156) as is the case with this evaluation. As a concise manual, the instruction could accompany the user to the library or any other place of study. Perhaps had there been computer terminals available to students within close proximity to the stacks and reference area, computer based instruction may have been considered. However, given the nature of the task for which the instruction was developed it was concluded that a printed manual would best serve the needs of the target population and characteristics of the task .

In order to provide quick, easy and effective assistance to the student, the manual would have to adhere to the standards of printed text design. As Horn (1982) states, "the properties of organization and structure are the most important factors in improving text and in making it a uniform, high performance product that a learner can always count upon" (p. 342). The application of structure and organization to the text are important properties that permit the document to be perceived by the reader. Structured writing "refers to a process that has a specific set of principles to guide major writing and graphic choices" (Horn, 1982, p. 342).

For example, the instructional aid (see Appendix A) discussed here follwed an established format. At the top of each page a running header

would appear. The header would state the individual module's objective by using a performance verb, such as 'Define a Topic Area for Your Paper". An introductory paragraph would follow, explaining the purpose of the particular module.

For each module an objective was included. A bold, all caps heading indicates the objective. Placed at the begining of the module, objectives are, as Waller (1982) confirms, "useful overview devices" that provide an orienting function (p. 147). The objectives, as they appear in the headers, were also included on the introductory page to the modules.

The following structural element of each module is the procedure, also indicated in bold capitals. In the procedure all actions and procedures to be carried out were listed in temporal sequence (Hartley, 1982). The written text of the objective and procedure were written using an "active voice where possible" (p. 203) in simple short sentences.

At a macro level, generous use of white space was applied since there is no need to fill each line & each page. Consistent line spacing was used to prevent splitting paragraphs on two separate pages. Below each sub heading (the header/title, objective and procedure) a line of space was added. Unjustified text (left justified, right ragged) was also used. It is generallly felt unjustified text is easier to read than fully justifed text because the former has more characters per line, whereas the latter more blank space instead of characters.

Instructional Design Description

The objective of the instructional aid was to help the student fulfill each aspect of the research proposal assignment, except for the final portion of proposing an experimental design. Written instruction or procedures were used for the tasks that required one to perform a series of steps in order to achieve the objective of the module. Checklists and criteria lists were provided in the procedure to aid students with decision making required throughout the steps. They were also added to serve as a means of self-check during the various steps of preparing the proposal. The checklists and criteria lists did so by ensuring that each student ask him/herself specific questions necessary to formulate a research problem.

Specifically, instruction was broken down into seven objectives. In some cases pairs of objectives were grouped within one module to correspond with the assignment. The first module of instruction ensures that students consider appropriate criteria when defining a topic. The module does so by asking students to define their background and skills, career objectives, and research interests, past, present, or future.

The second module guides students while conducting a preliminary reading program necessary for further defining the topic area they have chosen in the first module. It does so by providing a step by step approach to retrieving secondary sources useful in gaining the necessary foundation in their topic area. The second module also provides a list of criteria for evaluating the usefulness, authoritativeness, and relevance of secondary sources.

Following the preliminary reading program a third module provides instruction and a checklist that assists the student researcher in writing his/her problem statement. It helps students break down the components essential

to the research problem, such as population, independent and dependent variables.

Using the checklist provided, the fourth module encourages the student to refine his/her problem statement prior to proceeding with the topic any further. Much of the items on the checklist are critical to the logistical success of thesis proposals, such as determining the availability of a sample, time, money, faculty or departmental cooperation, etc. Although the research assignment is a mock research proposal, these criteria are nevertheless essential to the thesis process. Although not all students may wish to pursue their mock proposals as theses, many students may use the instructional aid as a reference tool while conducting research for their thesis later on during their studies. Additional items are included in the fourth module as both criteria for evaluating their topic and criteria to be kept in mind while conducting the literature review in the following modules.

The fifth module guides the student through a review of the literature by providing criteria with which to evaluate the individual contribution and suitability of research articles for inclusion in the review. The module's stress is placed on the support journal articles provide for an understanding of the evolution and rationale of a research problem. It also helps students organize their sources for actual presentation in the literature review.

The final module provides instruction for writing the literature review once all the sources have been retrieved and ordered. A checklist is included as a self check of the literature review's integrity along with brief instructions regarding revision.

All modules were designed so that work done for the module is the same work necessary to accomplish the research proposal assignment. Accompanying modules 1-5 inclusive is a worksheet which serves as work-

space for students and a record of their use of the module. The instruction, in the form of a checklist presents the content expositively. Students simply followed the directions provided by the aid. However, because the check-lists are comprised mostly of questions the students must ask themselves, a degree of interaction between student and research proposal was facilitated by the aid.

CHAPTER 3

Evaluation Methods and Results

Following the completion of the instructional design a method of formative evaluation was employed as part of the development process of the instruction. Below are the methods used for the three stages of the evaluation along with the results obtained from each stage. Discussion will center first on the expert review, the method used and the results obtained. This format will be followed for two subsequent stages of evaluation, one to one and field trial.

Expert review method

Weston (1986) delineates a variety of "common variants of formative evaluation" (p. 7). Among the methods outlined are two referred to as expert review and The 3 Stage Model. This author employed an evaluation of the instructional aid combining these two evaluative methods.

Upon completion of the instructional prototype copies were submitted to a panel of expert reviewers as the first step in the evaluation. Exposing the instruction to experts increases the likelihood that the material is sound on a variety of levels prior to presentation to learners (Stolovitch, 1982, Thiagarajan, 1978, Weston, 1987). Weston synthesizes the various experts outlined by others into five types. They are, subject matter, pedagogical, instructional design, presentation and curriculum experts. This evaluation

employed the expertise of three of those types of experts, an instructional design, subject matter, and curriculum expert. An instructional design expert from McGill University was invited to evaluate "clarity of objectives, sequence and relationship of ideas within content". This entailed a thorough check of each module's stated objective, the order of tasks to be performed in each procedure, and the general manageability of the instructional aid. The instructional design expert was also employed to evaluate the method of evaluation prepared for the field trial.

The subject matter expert, Concordia University's education reference librarian, judged the instructional aid based on "content accuracy, up-to-dateness, comprehensiveness". Specifically, her role was to evaluate the integrity of the bibliographic instruction contained in the modules. References made to the use of library resources, such as the secondary sources mentioned in module 2, were within her evaluation mandate. The subject matter expert was also asked to include comments pertaining to the possible exclusion of any library resources in education relevant to the completion of a research proposal.

Finally, a curriculum expert was chosen to provide feedback on "compatibility of materials with program and other instructional materials in use" (Weston, 1987, p. 46). This individual was selected based on his familiarity and previous experience as an instructor with the same quantitative methods course, ETEC 640. The curriculum expert's role was to simply evaluate whether or not the modules were compatible with the course objectives and course content.

All expert reviewers were contacted by the author prior to submission of materials in order to explain the project and receive their consent to participate. All three experts targeted as potential participants agreed to provide

their expertise. Each expert reviewer received an introductory letter (see Appendix C) briefly outlining the instructional aid, its intended use and and his/her role as an expert reviewer in this stage of the evaluation. Individual questionnaires were also provided to each expert to focus their evaluations based on their assigned subject matter expertise. As Thiagarajan (1978) points out, this reduces any redundant and superfluous feedback from the expert reviewers. A schedule was provided to the reviewers to ensure that feedback was received by a certain date so subsequent stages of review and revision (eg; one-to-one review) could be carried out prior to commencement of the field trial and the student's research assignment.

Expert review results

Instructional design results. Instructional design review of the modules was exhaustive and infinitely helpful. Feedback was provided from the instructional design expert to the author in three stages, modules 1 and 2, 3 and 4, and finally 5 and 6. Reviewer and author met to discuss the reviewer's feedback each time a set of modules was completed.

Originally the author had included background information on the introductory page of the modules (see Appendix A) briefly explaining how this instructional design had evolved from the same research proposal assignment it intended to address. It was suggested to make the introduction and instruction more generic by removing references to how the product related to this author's research. This reduced the introductory page to only bare essentials. A statement of the modules' objectives and the importance of student feedback for its development remained. References made to the six goals of the instruction were changed to the six modules of instruction. Mention of the phases of Group 1's research assignment were removed to

Figure 2: Summary of Revisions to Modules Based on Expert and One to One Review

	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
Expert Review						
Instructional Design	Rephrase objective. Procedure condensed. Examples added. Eval. Questionare redesigned. Instructions clarified	Definitions added to introductory para. Examples added. Procedure's intent clarified and order revised. Criteria list incorporated into procedure.	Objective reworded. Procedure condensed. Checklist embedded in procedure. Page layout revised.	Objective rephrased. Checklist embedded in procedure.	Procedure streamlined. Checklist embedded in procedure.	Procedure streamlined. Checklist embedded. Typo's.
Subject Matter	Date & time of library orientation added to intorductory page.	Revisions to reference (research) tools listed.	Found by SME not to be applicable to library (BI).	Found by SME not to be applicable to library (BI).	Library research tips (BI) added.	Found by SME not to be applicable to library (BI).
Curriculum	Content congruent with objectives. suggested revision sentence structure.	No incompatability found.				
One to One Reviewers						
Reviewer 1	Typo's. Added to procedure area of interest one has had no previous experience with.	Added the list of secondary resources on page 2 to the appropriate step. Revised procedure. Removed redundancy in steps 4 &5.	Added extra example. Procedure condensed (steps 7-11) into a checklist.	No changes suggested	Step 2 of procedure revised. Step 10, explanation added. Step 11, rephrased.	Typo's.
Reviewer 2	Typo's. Found objective ambiguous	Typo's	Step 8 revised by adding instruction to define the variables of one's research	No changes suggested	Graphic illustration added to steps 14-16.	Typo's
Reviewer 3	Nothing suggested	Nothing suggested	Nothing suggested	Nothing suggested	Added note to step 2 that time frame for search be flexible. Step 9 revised. Type o's	Step 3's outline for organizing lit. review added to module 5 step 15 as advance organizer.

avoid confusion for students in Group 2, who did not receive their assignment in the form of phases. As a result, the modules appeared more flexible by not imposing upon the user the restriction of using two or more consecutive modules for any particular phase of their assignments. The suggestions were all well received by the author and promptly incorporated.

Instructional design review of the modules also helped point out unclear objectives. Feedback from the reviewer also highlighted potentially confusing sections of the instruction assumed clear by the designer. Typically, steps in the procedure section of the modules either needed some elaboration, clarity of expression, further illustration or some reorganization. This holds for each module reviewed.

Module 1 was revised by providing an explanation of why two topic areas of interest were helpful in order to arrive at a research topic. In addition, the reviewer pointed out that the portion of step 5 that explained the need for two variables in most research could be moved to an earlier portion of the module because it helped explain the rationale behind the steps to follow. As a result, steps 1-3 were expanded to include examples and step 4 was eliminated. Among the encouraging comments was the ease with which the instruction could be read and the clarity of the presentation, despite the needed changes.

Comments made to module 2 were also of immense help. The introductory paragraph was found by the expert to be confusing because no definition of primary and secondary sources was provided. Revisions were made to include a short definition of primary and secondary sources. The logic of the steps was also questioned in addition to inappropriately placed references to other steps and the criteria list that accompanied the module. Based on the reviewer's comments, instructions were revised, steps consoli-

dated, and errors removed thereby trimming module 2 from seven to six steps.

Feedback on module 3 reduced steps 7 to 11 inclusive to one step with three simple substeps. The suggestion to revise the wording of the objective was incorporated. All other aspects of the module were found satisfactory.

Originally module 4 consisted of a two step procedure which required the user to go to a separate page with a checklist. This checklist contained items for module 4 and 6. Based on the expert's feedback the items on the checklist relevant to module 4 were added to the procedure section of the module. This eliminated the need to flip from one page to another. The objective of module 4, which at first directed students to use the checklist, was revised to instruct them to use the checklist to arrive at an honest appraisal of their problem statement.

The same design change was also instituted for modules 5 and 6 which previously had required users to refer to checklists on separate pages. Steps 5, 7 and 11 of module 5 and step 8 of module 6 were revised to include checklist items previously contained on other pages. During the second meeting between author and reviewer it became apparent that the expert reviewer's comments for modules three and four centered on the same type of suggestions made for the previous modules. As a result the author was able to anticipate the reviewer's comments in preparation for the final meeting. As a rule, instructional design problems noted by the reviewer were of a specific nature as mentioned above and usually consistent throughout the modules.

Evaluation questionnaires provided with the modules to be used in the field trial consisted of questions requesting yes or no answers with comments. The instructional design expert suggested they be redesigned with

statements and scaled responses to facilitate easier interpretation of feedback and a greater response rate. Another recommendation was to reduce the questionnaire from two pages, twelve questions, to a single page of a maximum of ten questions. Brief instructions were also added to encourage their completion. In addition to the expert's belief that these changes would improve the questionnaire, a four point scale was employed instead of the frequently used five point scale to avoid middle of the road or indecisive answers.

Although the expert had also suggested the worksheets be incorporated into the procedure of each module, (thereby making the instruction resemble a workbook), the author chose not to do this. The objective of the module was to act as a reference tool for the students and not appear to be burdening them with additional work.

Subject matter results. Subject matter review of the modules was broken up similarly to instructional design review, however materials were transmitted and returned through the author's mail box. The telephone served as the medium for receiving further clarification from the expert when needed.

For each module, the subject matter expert was asked to evaluate the instruction based on the following criteria; accuracy of content related to library skills, up-to-dateness of resources used and comprehensiveness of resources used.

Due to the content of module 1, feedback from the reviewer was minimal. Although the expert suggested mentioning in the introductory page that the Concordia University Library Owner's Manual is available in the library, this suggestion was not taken because the information is readily available in

the library tour and/or from the reference librarian at any time.

Feedback for module 2 pertained mostly to step 2 of the procedure, where a list of resources for secondary source material appears. Comments from the reviewer helped improve the extent of the list from four items without explanation to six with explanation. Other comments helped improve the accuracy of references made to library resources in the module (e.g., the subject card catalogue instead of the card catalogue).

Modules 3 and 4 were not found by the subject matter reviewer to be applicable to library skills. As a result the subject matter reviewer withheld comments because her mandate was to examine the materials on the basis of their bibliographic instruction. Modules 3 and 4 deal with research skills and made no direct reference to any use of library resources.

Feedback for module 5 provided revisions to steps 1, 4 and 7 of the procedure, each dealing with various library resources available to the student. Use of the Thesaurus of ERIC Descriptors, as suggested by the subject matter expert, was added to step 1 of the procedure so students could better derive major and minor descriptors from their problem statement for a search of the literature. Of particular interest was the suggestion to include the use of Current Contents, a weekly update of the contents of key social science journals. This reference tool makes available to the researcher the most current journal articles in a variety of fields before they are listed in the indices.

Additions to module 5 based on feedback from the reviewer also include the suggestion to consult the reference librarian to ensure that no useful reference has been omitted. The use of interlibrary loan was also added as one method of obtaining materials not available at Concordia University libraries.

Module 6 was not applicable to the subject matter expert's role either. It deals with preparation and organization of the literature review.

Curriculum results. The curriculum review expert was asked to evaluate the modules based on the following criteria; compatibility of instructional objectives with course objectives, appropriateness and appeal of the instructional medium, and level of language.

Module 1 was found compatible with course objectives. The medium was found appropriate for the situation and target population. When asked if the level of language was suitable for the target population the curriculum reviewer commented that many of the sentences were too long or employed contorted construction. Module 2 was found to meet all criteria satisfactorily. Unfortunately, feedback was only obtained from the curriculum expert for modules one and two. Although deadlines were provided within which to submit the feedback, the curriculum reviewer failed to do so. The production schedule dictated immediate revision of the modules based on the feedback from all expert reviewers in preparation for the subsequent stage of evaluation, one-to-one review. As a result, a completed evaluation by the curriculum reviewer was forgone.

Two components of the Three Stage Model as outlined by Dick and Carey (1986) were used for the remainder of the evaluation. Following the evaluation and completion of the proposed revisions based on expert review, one-to-one testing was arranged with a sample of three students who participated in ETEC 640 the previous year.

One-to-one method

The purpose of the one-to-one evaluation, as Dick and Carey (1985) explain, is to iron out unclear or difficult concepts in the instruction. One-

to-one testing should ideally include at least three students of mixed aptitude, above average, average, and below average. This ensures the greatest array of feedback and opens the instruction up to scrutiny at a variety of levels.

It was felt that students who had experienced the research proposal assignment would provide the best evaluation of the product's clarity, completeness and relative usefulness. Three students who had completed the ETEC 640 research proposal assignment of the previous year were used as evaluators. They were each of either average or above average ability. Despite their homogeneity of academic achievement, they each brought varying backgrounds and attitudes to the review. The reviewers were made up of a NORAD air weapons controller, a language arts teacher and an audio visual producer, all of which were masters students in Educational Technology at Concordia University.

The framework for the evaluation of each module by the one-to-one participants is shown in Appendix C. Comments were encouraged on the materials, in addition to completion of the student evaluation provided at the end of each module.

One-to-one results

The one-to-one review typically provided typographical and grammatical corrections. Other suggestions also dealt with further clarification of terms and examples used in the instruction. Assumptions the instruction made about the user's entry level skills were also questioned by the one-to-one reviewers. The author, as a result, was required to explain the exclusion of examples (usually related to library skills) to the one-to-one group. Nevertheless, this provided the author with the intended thorough check of

unclear or difficult concepts in the modules prior to its distribution for the field trial.

Revisions to module 1 included the addition of a second example to step 1 of the procedure in order to provide variety and further illustration to suit the varying interests of the users. The original document (prior to expert review) did not provide any examples for steps 1- 4. An example was added following expert review. Based on the one-to-one, the example was found satisfactory although thought to reflect a particular orientation. Therefore another example was added to appeal to the varying backgrounds of the users. Otherwise, all reviewers found the objective and the procedure of the module to be clear. Two of the three reviewers commented that step 5 (a checklist) was a good self check for that step of the assignment.

Feedback for module 2 pertained to the structure and language of steps 2-6 of the procedure and the criteria list that accompanies the module. Step 2 originally contained five examples of secondary sources (with little explanation). Confusion in the intent of steps 2 and 5 noted by one of the reviewers led to revision of the steps and the criteria list.

The criteria list provided an explanation of types of secondary sources and a means for evaluating secondary sources. The suggestion was made (and taken) to improve upon the design by incorporating the explanation of the types secondary sources into step two of the procedure. By doing so step 2 was improved and the criteria list streamlined to only a list of items to consider when using secondary sources. All reviewers thought the criteria list would have been helpful if they had had it at their disposal when doing the assignment.

The bulk of revisions to module three actually resulted from revisions made to module 1. The addition of a second research topic area as an ex-

ample in module one required the example also to be included in module 3. As a result module 3 provided two parallel examples of the development of problem statements which originated in module 1. One reviewer also commented that she found the steps which helped her identify the different components of a problem statement to be very helpful.

Recommendations for revisions to module 4 based on review from the one-to-one were few. However, the reviewers did question the applicability of the checklist to the assignment. Since the research proposal assignment was a mock proposal, the reviewers asked whether it was necessary for students to consider the questions asked in the checklist. The author decided to leave the module intact because it included criteria believed to be crucial to the success of a research propsal.

Comments made by reviewers about module 5 led to minor yet necessary revisions. One reviewer's suggestion led the author to revise step 2 of the procedure to encourage students to broaden the time frame of their literature search should their original parameters prove to narrow. A second reviewer mentioned that step 2's reference to the previously conducted search of secondary sources should link back to the module in which this took place. Feedback also revealed unclear intent in step 10. Further explanation was added to clarify the intent of the step. Step 14 was also expanded to include more detail and an illustration of a sample index card. Revisions to module 5 were also made by incorporating step three (organizing subsections of one's literature review) into step 15, which helps the user sort and order their references for the literature review of their proposal. It was felt this improved the intended purpose of step 15, module 5.

Based on one of the reviewer's comments step 1 of module 6 was removed because it was already included as the final step of module 5. While

module 5 organizes the references of the literature review, module 6 directs the writing of the literature review. Discussion with the reviewer led to the inclusion of the outline provided in step 3 of module 6 for organizing one's literature review in step 15, module 5. Overall, the one-to-one was helpful in revising clarity of expression in the module, verifying the motivation behind certain steps, and correcting typographical errors.

The two stages of evaluation mentioned above constituted the formative aspect of the evaluation. In this case, Expert review and one-to one review were methods of evaluation used as formative tools to improve the instruction during its development (Scriven, 1976).

Field Trial Method

The self -instructional manual was handed out during classtime to two classes of students, one enrolled in ETEC 640 (Group 1) and another in ESTU 615 (Group 2), the first of a required two part quantitative methods course for M.A. students in Educational Technology and Educational Studies at Concordia University. This occurred within one week of the assignment of the research proposal. The instructional aid was distributed and its purpose explained informing students that development and evaluation of the aid was being carried out in partial fulfillment of a Masters in Educational Technology.

Wager (1983, p. 7) concludes from her research that "materials revised according to feedback from the one-to-one sessions with the mixed aptitude group were as effective as materials revised according to feedback from a combination of one-to-one and small group sessions". Since the opportunity existed to test the instruction with an entire class of students in the setting for which it was intended, forgoing small group evaluation saved time and

did not compromise the evaluation. Substituting a field trial for the small group evaluation provided data on "the effectiveness of changes made following one-to-one evaluation" and any other learning problems associated with the product, the role Dick & Carey (1985, p. 200) have assigned to small group evaluation. It was thus felt that fulfilling the entire 3 Stage Model was unnecessary.

The field trial represents the summative aspect of the evaluation. It is considered so because all revisions to the instruction were completed prior to the field trial and no other revisions were made following it. Once revised following the one-to-one the instructional materials were distributed among all of the learners with the research paper assignment during the preliminary weeks of class. A period of several weeks was allowed to pass as learners attempted the research assignment with the aid of the self instructional unit.

Throughout use of the instructional aid students were provided with an opportunity to evaluate individual modules as they completed them. This was accomplished by providing students with feedback questionnaires after each module of instruction (see Appendix E).

Student feedback provided a measure of each module's relevance, helpfulness, clarity, and general acceptability to the user. Students were asked to hand in the questionnaire with the completed phase of their assignment. This method sought to ensure that student evaluation of individual modules was of the most recent module used.

The field trial also fulfilled its role by evaluating the product's manageability and overall usefulness within the framework of the course. This was be accomplished by surveying the instructors and the students about their attitudes toward and the usefulness of the instruction upon completion

of the entire assignment (see Appenidx G & H).

To analyze the results obtained from the field trial the Kolmogorov-Smirnov one sample test was employed to test goodness of fit, or, deviation between the obtained frequency distribution for each question and a theoretical distribution. As Seigel (1956) explains "the test involves specifying the cumulative frequency distribution which would occur under the theoretical distribution and comparing that with the observed cumulative frequency distribution. The point at which these two distributions, theoretical and observed, show the greatest divergence is determined" (p. 48).

The author established a theoretical distribution of forty-five percent agree, forty-five percent partially agree and ten percent partially disagree. This reflects the hypothesis that ninety percent of respondents will agree in some form and ten percent will partially disagree in some form with the statements on the questionnaire. Of specific interest are the students' perceptions of the usefulness of the instruction in achieving the entire research assignment.

Modifications to the instruction will only be recommended based on the results of the field trial. Thus, results from the field trial for this group are summative with formative value provided the instruction is revised and reevaluated at some future date using the data obtained.

Field Trial Sample. The Field Trial sample consisted of a combined group of 2 classes numbering 17 subjects. Respondents were either graduate students in Educational Technology or Educational Studies. Table 1 depicts their responses to the student information questionnaire, (Appendix G).

Table 1
Summary of Student Information

1)	Number of courses completed to date.		M = 4.5	
2)	Number of courses concurrent with ET 640 or ESTU 615.		M = 1.5	
3)	Other degrees you have obtained.			
	B.A.	4		
	B.A./B.Sc. Psych.	3		
	B.Sc.	2		
	B. Comm.	1		
	B. Ed.	1		
4)	Have you ever written a thesis proposal before?		Yes	No
			1	11

Note: (N = 12)

The one student who had completed a Bachelor of Education had also obtained a Diploma in Library Science. This individual, coincidentally, was preparing an instructional design and formative evaluation of a library and research paper writing skills course for the institution at which he worked in Kenya. His feedback are among the results section of the field trial. Of the 12 respondents only 1 had written an entire thesis. Her feedback regarding the modules is among the field trial results.

It should be noted at this point that the 2 groups participating in the evaluation each received the same research assignment, however each structured differently. Group 1 received the research proposal assignment divided into 5 phases, each phase due on a different date throughout the entire semester (Appendices J). Group 2 received the same assignment with the same final objective, however the entire assignment was due at the end of

the semester (Appendix K). This situation existed because the two courses were given by different graduate programs within the Department of Education and taught by different instructors. In the latter case submission of the feedback questionnaires occurred as they completed the modules at their own pace. Students with the phased assignment were asked to hand in their questionnaires as soon as they finished each phase. Due to the small sample size of each group a chi-square test was applied to determine if the obtained frequency responses from the two groups were significantly different so as to prevent combining them into one sample.

Field trial results

As previously mentioned, two separate groups of students, enrolled in the same course with the same research assignment, provided a summative evaluation of the instructional design. Application of the chi-square provided no significant differences between the groups for each question of every module's evaluation with the exception of module 5, question 6, $\chi^2 (1, \underline{N} = 11) = 4.48, p \leq .05$. In this case the responses from the two groups were analyzed separately. Otherwise the results from the two groups were combined into one sample.

To analyze the combined results of the two groups obtained from the field trial the Kolmogorov-Smirnov one sample test was employed to test goodness of fit, or, deviation between the obtained frequency distribution for each question and a theoretical distribution. The author established a theoretical distribution of forty-five percent agree, forty-five percent partially agree and ten percent partially disagree. This reflects the hypothesis that ninety percent of respondents will agree in some form and ten percent will partially disagree with the statements on the questionnaire. In the event that

the obtained frequency distribution obviously reflected greater agreement than the theoretical distribution, the Kolmogorov-Smirnov test was not applied.

The objective of this formative evaluation, to have students use and evaluate the aid such that ninety percent (90%) of them find it helpful or useful towards completion of their assignment, was realized.

Results from the field trial using the Kolomogorov-Smirnov one sample test are generally encouraging. It appears that, overall, respondents found the modules helpful, clearly presented and relevant to completion of the assignment. However, for some aspects of certain modules significant differences were found between the obtained frequency distribution of students' responses and the theoretical distribution.

Of all the modules only module 1 was reported to have had an unclear objective, $D\ (\underline{N} = 17) = .35, p \leq .05$. Students also disagreed that module 1, $D\ (\underline{N} = 17) = .40, p \leq .05$ and module 4, $D\ (\underline{N} = 12) = .37, p \leq .05$, taught them new research skills.

Responses to question 6c for module 2 and 4, which asks if the library orientation was insufficient thereby making use of the module necessary, were also significant, $D\ (\underline{N} = 14) = .59, p \leq .05$ and $D\ (\underline{N} = 12) = .37, p \leq .05$ respectively.

In their evaluation of the modules as a whole students agreed they wrote better research proposals with the help of the aid. In their summative evaluation of the modules as a whole students' responses were significant when asked if the modules helped with the originality of their problem statement $D\ (\underline{N} = 13) = .44\ p \leq .05$ and if the modules helped with their methods section of their proposal $D\ (\underline{N} = 11) = .57\ p \leq = .05$.

Each table in Appendix I presents the results of the entire sample for

each question of each module. Sample size for each module is included along with the obtained Kolmogorov-Smirnov **D**.

Instructor Evaluation. Each of the two instructors whose classes participated in the evaluation of the modules were asked to answer a brief questionnaire regarding their students' performance on the research proposal assignment (see Appendices H). The responses received are described below. Instructor A of Group 1 used the phased assignment while instructor B of Group 2 didn't.

When asked if their students' research proposals showed an improvement over past years instructor B partially agreed. Instructor A refrained from answering because this was his first time teaching the course. Neither instructors ventured to answer or comment whether they felt the instructional aid may have improved a variety of aspects of their students' research proposals. Instructor A said he would like his future students to use the instructional aid while the other didn't answer.

When asked if the research proposals were consistent in their presentation, instructor A partially agreed while instructor B fully disagreed. No attempt was made to isolate the extent to which the assignment or the instructional aid was helpful in organizing the entire propsal. Evaluation data was only collected on the helpfulness of the aid when writing the literature review.

Instructor A partially agreed he teaches research proposal writing skills in the course. Comments from his students confirm that time was spent on the research proposal assignment. Instructor B, whose assignment was less structured, fully agreed he teaches research proposal writing skills in the course. However, comments from students in this class report that little if any class time was actually spent on the assignment other than the first class

lecture which outlined the course requirements. Instructor B partially agreed he assumes his students know how to research a topic while instructor A fully agreed. When asked if the research proposals were consistent in research quality instructor A partially agreed and instructor B fully disagreed.

CHAPTER 4

Discussion

The helpfulness of the instructional aid is confirmed by the field trial's results. In addition expert review and one-to-one evaluation methods fulfilled their respective roles as formative tools.

Expert review

All feedback obtained from the expert reviewers was helpful and insightful. However, some of the feedback received led to the realization that an additional expert should have been included among the panel of reviewers. Upon receiving feedback from the subject matter expert it became apparent that two subject matter experts were required. Although the subject matter expert chosen provided invaluable help, her recommendations for revision only centered on the bibliographic instruction or library skills content of the modules. As a result, another subject matter expert chould have been employed to evaluate the modules based on the research method taught. The failure to include a subject matter expert of this nature left modules 1, 3, 4 and 6 unreviewed by a subject matter or content expert in research methodology.

The appropriateness of a reviewer should not based on his or her field of expertise alone. As evidenced by the curriculum reviewer, the ability of the reviewer to provide the time required for the necessary feedback must

also be considered along with expertise. Otherwise, review will not occur based on good intention alone. The author concedes that the time provided, usualluy a week for pairs of modules may not have been enough.

One-to-one

Recommendations for revision from the one-to-one review were similar in nature to those made by the instructional design expert, however were more subtle than the typical format, structural or content changes proposed by the expert reviewers. The value of having typical students review the materials is apparent by the inclusion of additional examples and clarification added as a result of their feedback. This stage of evaluation served to finely tune the modules prior to the field trial.

Field trial

All of the objectives for all of the modules were clear and relevant, with the exception of module 1's objective. Inspection of module 1's objective reveals a somewhat convoluted statement, which students evaluated accordingly. Although module 1 was found to help with topic definition the objective could be rewritten.

Although the library orientation attended by the students dealt with the resources covered in module 2 they were not discussed in the same manner. The library orientation presents the resources, their contents and where they are found whereas the module provided criteria for selecting resources. Despite the lack of agreement on the new skills acquired students still found the criteria list helpful. The module repition of the orientations content may explain the obtained result.

Module 4, a checklist of items used for refining or revising one's problem statement, may not have been considered research by respondents. The items help students weigh the scope of their topic along with the logistical feasibility of their research. Weighing the practicality of the research, cooperation among faculty, etc, are criteria not usually associated with reasearch methods. It is clear some distinction should have been made to differentiate between research skills and library skills for the respondents for the purposes of this evaluation. Limiting our interpretation of this data was the oversight to include such a definition and to verify whether or not students considered defining a topic, conducting and initial reading program and refining a problem statement as research. Confusion or similarity between research skills and library skills may have existed.

Although the significant D obtained for question 2a in the evaluation of modules 1- 6 indicates the modules did not help with the originality of the problem statement it is difficult to understand why. Nevertheless, more attention should be given to modules one, two and three, and their influence on the originality of the research problem.

Despite having not helped with the methods section of their proposal, the instruction in no way attempted to do so. This was material adequately covered in the Research Methods Course.

Conclusion

It appears the instructional aid, after having been developed and evaluated, filled the need assumed to exist among students. Every element of the three stages of evaluation employed provided the type of formative data needed to evaluate and fine tune the instruction. Expert review is and effective method for evaluating the integrity, thoroughness and logic of instrctional materials. One to one reveiw, where recommendations for revision can reflect individual students' learning styles, still provides valuable opportunitites to fine tune instructional material with typical learners prior to wide distribution.

Results from the field trial indicate the helpfulness, relevance, and clarity the instruction had for its users. The Kolomogoraov-Smimov one sample test is a useful statistical tool for evaluating data from questionniares with scaled responses provided a theoretical distribution is hypothesized first.

However, it is clear some distinction should have been made to differentiate between research skills and library skills for the participants in this evaluation. Limiting our interpretation of this data was the oversight to include such a definition and to verify whether or not students considered defining a topic, conducting and initial reading program or weighing the practicality of a research topic as research methodology for the preparation of a proposal. Although the need for research proposal instruction has been established more effort should be made to educate the user concerning library skills, research methods and how the two work in concert. Perhaps this would have helped achieve the objective in its entirety. By so doing we will certainly achieve a better understanding about how to ensure standard and improved research procedure among all graduate students.

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APPENDIX A

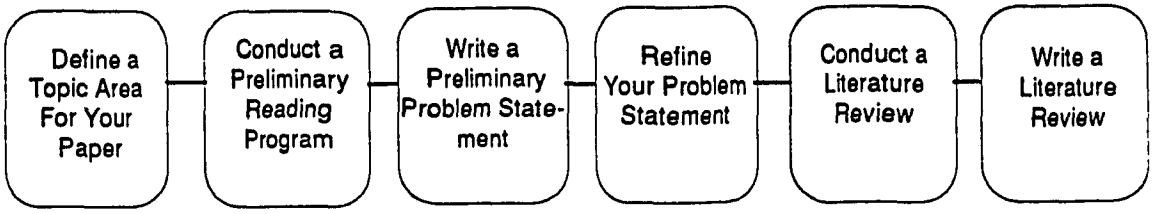
Instructional Aid

Introduction

These self-instructional modules were developed to assist graduate students in the preliminary steps of formulating a research proposal. Your use of the modules will benefit your ability to write a research proposal.

Instructional Objectives

The following instruction has been broken down into seven major goals. They are depicted below in the order they will be presented.



These modules will help you execute all the steps necessary to prepare your proposal up to and including the completion of your literature review.

Using the Manual

The modules are self instructional. They are presented in the order one typically completes a proposal. Included in the modules are procedures, criteria and checklists to help you accomplish your research proposal. Please use the worksheets when provided. They appear in the pages following each module.

Entry Level Prerequisites

Participation in the Library Orientation Seminar offered by the Education Reference Librarian at the beginning of the semester is highly recommended. Do not underestimate the value of the orientation. You may also wish to acquire a copy of the Library Owner's Manual available in the library.

Module 1
Define a Topic Area for Your Paper

Finding the right topic is often hard enough. If you have not yet completed a thesis or do not have a topic, now is a good time to choose one. The procedure below will help you find a topic you would genuinely like to pursue. Preparing this proposal could save you an incredible amount of work (and perhaps frustration) toward completion of your thesis.

OBJECTIVE:

To define in writing two research topic areas such that each topic area is comprised of two areas of interest.

PROCEDURE:

Research topics usually seek to compare the relationship between two variables. Completing steps 1-4 on the worksheet provided will help you outline your skills, background, etc., in order to derive two variables from your areas of interest.

1) Briefly outline your background and skills. Below are some typical examples.

   eg: 1) NORAD air weapons controller, Instructional designer & course evaluator for pilot training, flight simulation, aeronautical testing.

   2) B.Ed., high school math teacher, amateur photography, interested in audio-visual production but no previous experience.

2) Write your career objectives, 10-12 words or less.

   eg: 1) Improve the use of flight simulators in pilot training.
   Design and evaluate flight sim. program.

   2) Work in teacher training, specifically on instructor integration of media in the curriculum.

3) List areas within education or Ed. Tech. in which you have done, are doing and/or would like to do research. If this is your first course, think of your interests or job situation and any education or training problems that you would like to solve as sources of inspiration.

Module 1
Define a Topic Area for Your Paper

eg: 1) Instructional design, learning, transfer of learning, time on task.

2) No previous or present research experience, would like to pursue teacher training in use of media in the classroom.

4) From your answers to steps 1-3, pick two areas of interest you would like to combine into a research topic. By doing so you will ensure that your research topic will be comprised of at least two variables. Write them down on the worksheet in the space provided. (Try to derive *two* research topic areas from areas of interest so you'll have a choice). See example below.

eg: 1) Does the difference between non simulator and simulator fidelity effect training pilot performance.
Determining the reliability of evaluation methods on simulator training.

2) Measure the effectiveness of multimedia curriculum on learning in math students.
Methods for training math teachers in the integration of media in the math curriculum.

5) Now, ask yourself the following questions.

- Are the topics I've chosen of genuine interest to me?	Yes	No
- Will pursuing this topic complement my career goals?	Yes	No
- Will I enjoy researching this topic?	Yes	No
- Would I like to pursue the topic as a thesis?	Yes	No

N.B. You should answer yes to each of the four questions above. Do not underestimate the convenience of writing a mock research proposal assignment that could be used as your actual thesis proposal. Every *no answer* may compromise your interest, happiness with the

Module 1
Define a Topic Area for Your Paper
Worksheet

1) Background and skills.

2) Career objectives.

3) Areas of past research.

4) Other research areas.

5) Research topic areas.

Module 2
Conduct an Initial Reading Program

A preliminary reading of secondary sources will provide you with a sound basis in your topic area with which to conduct your research. Secondary sources are defined as works that review or synthesize the research or ideas of others. Primary sources are original research reports or other documents written by those who've conducted the research or conceived of the ideas. Primary sources are usually found in journals.

Do not underestimate this step. Jumping to primary sources will leave you without a foundation.

OBJECTIVE:

To conduct a preliminary reading program of secondary sources in order to gain an understanding of and define your topic area.

PROCEDURE:

The following steps can only be accomplished in the reference area of the library.

1) Whenever taking notes from any of the secondary sources you will use for this module, include an APA style citation with your notes in order not to forget from where the information came.

2) Obtain a copy of the Educational Technology Selected Reference Sources from the library. Consult the following secondary source material listed below for the purpose stated. By browsing through the education reference area you may stumble upon additional resources.

- Dictionaries: to define your topic area further.
- Encyclopedias: eg: Encyclopedia of Educational Research
  For topic overview, definitions and references.
- Annual Reviews and Yearbooks: eg: Educational Media Yearbook.
  Brings research up to date, provides a variety of reference material, book reviews.
- Bibliographies: eg: Bibliography of Research in Instructional Media.
  Acquaints you with research in a field through topical organization, good for book reviews, references.
- Handbooks: eg: A Handbook of Educational Technology.
  Summarize, analyze past research, in depth introduction to a field or subject area.
- Guides to the Literature: eg: A Bibliographical Guide to Educational Research.
  Comprehensive, provides bibliographic resources for research and bibliographies.

Module 2
Conduct an Initial Reading Program

Completion of this step will help you retrieve and read other books more critically. Use the criteria on the following page as a guide to determining the relevance and usefulness of references encountered. List secondary and primary sources on the worksheet.

3) Verify subject headings of your research topic area with the Library of Congress Subject Headings Book. Write down acceptable Library of Congress subject headings on the worksheet.

4) Search the subject card catalogue with acceptable subject headings. Use the criteria outlined on page 6 to help you decide on the relevance and usefulness of titles listed in the subject card catalogue. Obtain call numbers for all relevant and useful titles noted. Write them on the worksheet.

5) Retrieve only secondary sources from the stacks. (Primary sources will be retrieved in module 5. Browse, read, and take notes from these sources with the intention to;

- further define terms, topic.
- obtain additional (or more relevant) references, primary and secondary, by reading footnotes, references and bibliographies in the books you have retrieved.

Use the index of each book to direct you to your area of interest.

Module 2
Conduct an Initial Reading Program
Evaluating Secondary Sources

OBJECTIVE:

To provide criteria for evaluating books from catalogue cards and bibliographies.

CRITERIA:

Use the following criteria (with discretion) when searching and considering books for retrieval. They are meant as a guide to finding relevant and useful titles, not the gospel.

1) Date of publication.
   The more recent the more desirable. However this varies according to subject. For areas which have an abundance of research, use the more recent publications. Fewer publications in a topic area over time *may* indicate that it is a young field or that research has not advanced as much as other areas.

2) Classic works.
   Classic works have withstood the test of time. Works can be judged as classics by the following criteria.
   - Familiarity of the author.
   - Frequent use as a reference by others.

   Beware of the classic poor research article.

3) Author's Authority.
   Is the name familiar to you from another bibliography, reading list, your professor, or syllabus?

4) Publisher's Reputation.
   Major publishers (eg: Harvard University Press) have shown some discretion when choosing works. However, publishing often depends on current trends and biases of editors.

5) Bibliographical Note.
   A book with a bibliography is generally more useful for research purposes than one without. In fact, you may benefit more from the bibliography than the book itself.

6) Biographical information to judge an author's competence.

- author's occupation
- education
- status of employer
- rank (prof., associate prof., assistant prof., instructor)
- An author's trustworthiness increases with the amount of publications in the topic area.

These criteria can prove dead wrong! Occasionally brilliant works will be written by someone who is not esteemed for their credentials.

Beware of authors whose only other publication is in an entirely different field.

7) Edition Number.

A revised, enlarged book (eg: 5th ed.) has proven its market value. It is also an indication that the topic has received a lot of attention and work.

Module 2
Conduct an Initial Reading Program
Worksheet

2) List relevant titles

Secondary sources

Call Number	Title: (APA citation)

Primary sources

Call Number	Title: (APA citation)

3) Subject headings

Module 3
Write a Preliminary Problem Statement

Now is your chance to write down a statement that will reflect your research proposal's intention. It is hoped that by following the outline below you will arrive at a well conceived and written problem statement.

OBJECTIVE:

Given the completion of your preliminary reading program, write a problem statement which questions the relationship between the variables in the topic area you have chosen.

PROCEDURE:

1) Refer to the research topic area in which you conducted your preliminary reading program.

   eg: a) Does the difference between non simulator andsimulator fidelity effect training pilot performance.
   b) Measuring the effectiveness of multi media curriculum on learning in math students.

2) Identify the dependent variable (DV). Write down the DV on the worksheet.

   eg: a) Training pilot performance
   b) Learning in math students

3) Identify the independent variable (IV). Write down the IV on the worksheet.

   eg: a) Non simulator fidelity, simulator fidelity
   b) Multi media curriculum

4) Given the DV, specify in detail aspects or characteristics of the variable you wish to examine in your research. Write down these characteristics on the worksheet.

   eg: a) DV = Pilot performance
   - performance on a written examination
   - performance in the simulator
   - performance in the air

   b) DV = Learning in math students
   - performance on a written exam
   - Final course grade

Module 3
Write a Preliminary Problem Statement

5) Given the IV, specify in detail aspects or characteristics of the variable you wish to examine in your research. Write down these characteristics on the worksheet.

eg:

a) Simulator fidelity
- low fidelity
- high fidelity
- number of training hours

b) Multi media curriculum
- print based materials
- video
- CBT

6) Identify the population of interest. Write down these characteristics on the worksheet. Be specific.

eg:

a) Training pilots
- Helicopter pilots
- aircraft carrier pilots
- bomber pilots

b) Math students
- preschool
- elementary
- secondary
- post secondary

7) Now is a good time to think about how you will collect the data from your subjects. This requires the use of an instrument to measure some or all of your variables. Consider one variable at a time.

Ask yourself the following questions.

a) Exactly what is it I wish to measure?
b) What are the sources for this information?
c) From whom can the information most practically and reliably be collected?
d) What is the most reliable and accurate means of data collection?

eg: Questionnaire
interview
observation
exam (written, oral)

8) Write a preliminary problem statement on the worksheet such that the statement questions the relationship (you hypothesize to exist) among the variables you have just described.

eg: a) The purpose of this study is to determine the difference bewteen high fidelity and low fidelity simulators on Canadian Air Force helicopter pilots' performance on an in flight pilot examination.

b) This study will seek to determine the relationship between math skills among grade 6 students and print based or video based instruction. Math skill will be measured by student performance on a written examination.

Module 3
Write a Preliminary Problem Statement
Worksheet

2) The dependent variable.

3) The independent variable.

4) Aspects of the DV.

5) Aspects of the IV.

6) Population of interest.

7) Problem statement.

Module 4
Refining Your Problem Statment

Although you may feel completely relieved having written a problem statement, you should determine how practical it really is.

OBJECTIVE:

Given your preliminary problem statement, use the checklist provided to arrive at an honest appraisal of your problem statement.

PROCEDURE:

1) Answer the questions below.

a) Does the topic have critical mass?

- Is the topic of sufficient scope and depth to fulfill your requirement? Yes No
- Are there enough variables for the study? Yes No

b) Is the topic workable

- Do you have enough time to complete the research? Yes No
- Do you have enough money for the research? Yes No
- Is there a sample (population) available? Yes No
- Will you have all the necessary cooperation from faculty, university, employer, etc. to complete the research? Yes No

2) Write any changes necessary to your problem statement to improve your research problem's workability and critical mass. Do so on the worksheet provided.

Below is the checklist you will use after completing module 5. You may wish to keep the questions in mind when completing module 5. Do not answer them now.

3) Does the topic have theoretical value?

- Does the topic fill a gap in the literature? Yes No
- Is your research publishable? Yes No
- Will it advance research in the field? Yes No

4) Does the topic have practical value?

- Will the topic interest others? Yes No
- Will the topic benefit educational practice? Yes No
- Is a solution to your question likely (possible)? Yes No

Module 4
Refining Your Problem Statment
Worksheet

2) Revised Problem Statement

Module 5
Conducting a Literature Review

This is where you'll dig into the meat of your topic by finding some research related to your topic area in order to give credence to your proposal.

OBJECTIVE:

With your problem statement in hand, search the literature for primary sources relevant to the development of your problem statement. Tuckman (1972) states "the purpose of the literature review is to expand upon the context and background of the study, to help further define the problem, and to provide an empirical basis for the subsequent development of hypotheses." (p. 313)

PROCEDURE:

1) From your problem statement write down on the worksheet major and minor descriptors derived from the Thesaurus of ERIC Descriptors to be used in a search for primary sources.

2) Establish a time framework within which you will limit your search for articles; ie: the last ten years. Work from the present research backward. Your preliminary reading of secondary sources conducted in Module 2 should have provided you with an idea of how extensive research has been in your topic area. (A computer search can be conducted for a specific time period).

   Should the time frame you chose provide only a few articles you may wish to broaden the time frame of your search.

3) Search the appropriate indexes and abstracts manually or conduct a computer search for relevant titles using the descriptors you identified. Obtain as many titles with abstracts from your computer search as possible so you won't have to dig up the journal just to read the abstract.

4) Because there is a six month lag in the indexing of current journals you should either
   a) browse the current periodical section of the library relevant to your topic.
   b) use Current Contents, a weekly update of the contents of key social science journals to obtain the most recent research in the journals.

5) When you find a relevant title, read the abstract. Refer to the checklist below to evaluate the abstract.

a) Are the descriptors provided the same as my descriptors?	Yes	No
b) Does the article deal with the same (or some of) the variables I wish to research?	Yes	No
c) Will this article contribute to an understanding of my research problem?	Yes	No

6) If you answer yes at least once to questions a-c, then the article is worth retrieving for a thorough reading. Record in APA format a citation of the article on the worksheet provided. See example below.

eg:	Call No.	Library	Reference
	LB 1028.5 JE45	NOR	Jones, J. (1987). Simulator fidelity & pilot training, Journal of Aviation, 2(2), 22-28.

7) Repeat steps 3-5 until you have searched all relevant indexes and abstracts for the time period you specified. Double check to ensure that you haven't forgotten any important resources by refering to the checklist below.

Current Index to Journals in Education	Yes	No
Resources in Education	Yes	No
Education Index	Yes	No
Educational Technology Abstracts	Yes	No
Psychological Abstracts	Yes	No
British Education Index	Yes	No
Social Sciences Citation Index	Yes	No

You may wish to consult the Education reference librarian to ensure that no useful reference has been omitted. A thorough search should not exclude any relevant resource.

8) With a complete list of citations, proceed to the serials list to determine the availability and location of periodicals in the library.

Do not limit youself to Concordia Libraries if you are unable to find what you need. Other universities such as McGill may have what you're looking for. Interlibrary loan is an alternative to retrieving resources Montreal city libraries may not have.

9) Retrieve periodicals from the stacks along with other resources.

10) Read each article you retrieve with special attention to all of the items below. Keepnig these items in mind will help you determine whether or not the article merits inclusion in your literature review.

- Purpose and Hypothesis
- Design
- Sample
- Methodology
- Instruments
- Findings, Conclusion

11) Use the checklist below to determine whether the article merits inclusion in your literature review.

a) Does the article contribute to an understanding of my research problem? Yes No

b) Are there recommendations in the article for further research that my research attempts to answer? Yes No

c) Is there any element of the article (outlined in the previous step) that deals with or is related to my research? Yes No

12) If you answer Yes to any question then you can use the article in your literature review. *If a research article deals with a research problem similar to your own, but, fails to contribute to an understanding of the problem then you may wish to include the article in your review for that very reason!* Otherwise discard the article.

Module 5
Conducting a Literature Review

13) Prepare a written abstract of the article on a 5 x 8 index card by writing the following on the card in the order presented below.

- A complete citation in APA style.
- Purpose and hypothesis of the study. Include names of variables, underline them.
- Methodology, including
  - sample
  - materials
  - procedure
- Findings and conclusions.
- Your criticisms (of method, theoretical flaws important to the development of your proposal)

Jones, J. (1981). Simulator fidelity & training pilot performance. Journal of Aviation, 2(2), 123-129.

Hypothesis:	No significant difference exists in performance among pilots who were trained on low fidelity simulators and pilots who were trained on high fidelity simulators.
Method:	Pretest postest control group design. Experimental group received low fidelity training. Control group received standard high fidelity training.
	Sample included 15 training pilots in U.S. Air force. High fidelity simulator used was the HFS-100. Low fidelity simulation was comprised of a broomstick and chair set up in a sound proof room with 16 mm projection of flight path on a 12' x 12' screen 10 feet in front of the subject.
Conclusion:	A significant difference was found to exist between experimental and control groups on standard written and practical inflight exam.
Criticism:	The research typifies the simplified approach taken when comparing low and high fidelity simulators.
	Study could have made more of an effort to vary the level of fidelity rather than compare a 2 million dollar simulator with a broomstick and chair!
	Simplicity of design may reflect Air Force desire to rationalize their purchase of expensive flight simulators.

14) Categorize the card by writing in the top left corner the element of the article which contributes most to your research. This could be any element of the research article such as the dependent variable, an instrument used, the methodology, population, etc. See example below. Should some (or all) of your research articles not lend themselves to categorization you may wish to organize them chronologically.

eg: Trianing pilot performance D.V.

Training Pilot Performance, DV Jones, J. (1981). Sim.....

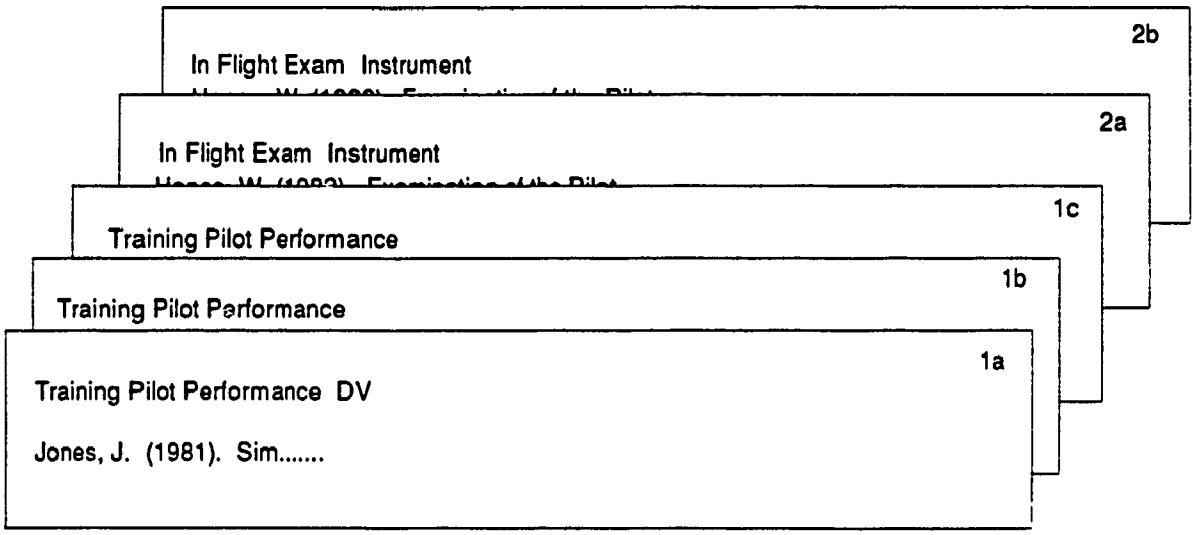
15) Group the cards of similar categories together. Cards in a group should be ordered general studies to specific studies. Once you have your grouped categories, order the separate, grouped categories of cards from general to specific. When arranging the cards, keep in mind the outline below that you'll use when writing your literature review in module 6.

- Overview and definitions of the category
- General studies on the category
- Narrower works
- Short conclusion pertaining to research in this category

This outline applies to your literature review as a whole and the subsections of it.

Module 5
Conducting a Literature Review

16) Now number **all** the cards as follows; for group 1, number them 1a, 1b, etc. Group 2; 2a, 2b, etc. Each grouped category of cards will now serve as a separate section in your literature reveiw. See example below. (This does not restrict you from refering to an article more than once in two different sections of your lit. review).



Module 5
Conducting a Literature Review
Worksheet

1) Major descriptors

Minor descriptors

6) List relevant articles APA style.

Call no.	Library	Reference

Module 6
Write a Literature Review

Writing your literature review will help place your proposed research in its proper context thereby setting the stage for your problem statement.

OBJECTIVE:

Write the literature review.

PROCEDURE:

With all your cards arranged in their proper order you are now prepared to write your literature review.

1) Write a few brief introductory sentences that will define the purpose and scope of the review.

2) For each group or category of card begin a new section or paragraph in your review.

3) Provide the following in your literature review with each new category.

   - Overview and definitions of the category (from primary and secondary sources)
   - General studies on the category
   - Narrower works
   - Short conclusion pertaining to research in this category.

(Secondary sources commonly found in reviews of the literature are reviews of the literature written by others that help delineate the problem)

4) For each research article include either the contribution made to the research by the study or its failure to contribute to the research.

5) Once finished writing up all your articles, summarize your entire literature review by providing a logical link to your problem statement.

Module 6
Write a Literature Review

6) Write your problem statement following the literature review.

7) Reread your literature review carefully and critically.

8) Refer to the checklist below

Does the topic have theoretical value?

a) Does the topic fill a gap in the literature?	Yes	No
b) Will it advance research in the field?	Yes	No
c) Is your research publishable?	Yes	No

Does the topic have practical value?

a) Will the topic interest others?	Yes	No
b) Will the topic benefit educational practice?	Yes	No
c) Is a solution to your question likely (possible)?	Yes	No

9) If your research problem does not fill a gap in the literature you must;

- reivse your problem statement so that it will fill a gap in the literature.
- conduct another search of primary sources to reevaluate the literature.

The above checklist is provided to check your problem statement's originality and as a means of evaluating your proposal as a thesis. The more frequently you answer yes the suitability of your topic as a thesis increases.

APPENDIX B

Bibliography

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APPENDIX C

Expert Review

Subject Matter Review

The instruction you have agreed to evaluate has been developed as an instructional aid for a compulsory research and design course among M.A. students in Educational Technology. The course curriculum includes a research proposal assignment. The instruction you will evaluate is intended to assist students in the many steps required to fulfill the research paper assignment. The instruction has thus taken the form of a manual/workbook intended to accompany the student into the library while doing the assignment.

Three different expert reviewers has been recruited to evaluate the instruction based on their fields of expertise. You have been selected as a subject matter expert. The following questionnaire will provide you with a guide for evaluating the instructional design's content accuracy, comprehensiveness and up to dateness.

Three questionnaires have been designed, one for each of the individual areas of expertise of each reviewer. Reviewers will use the same questionnaire for the evaluation of all phases of the instruction. The questionnaire will be found after each module of the instruction.

On the following page you will find the research proposal assignment. The instruction will begin following the assignment.

Please answer on the space provided below each question. Your additional comments at the end of each questionnaire are also encouraged. Should you wish to include feedback on the manual itself please do so. However, should your comments pertain to a particular question, please indicate the question number.

Also note any items you may wish to discuss with me when we meet after you have completed the questionnaire.

Subject Matter Review
Questionnaire

Content accuracy:

1) In terms of library research, is the content of this module accurate? Yes No
If no, how can its accuracy be improved?

2) Is the content of this module relevant to the stated objective? Yes No
If no, how can it be altered to satisfy the objective.

3) Is there any content necessary to complete the objective that is missing? Yes No
If yes, indicate what is missing.

4) Is there any content that is superfluous to the completion of the objective? Yes No
If yes, indicate what should be removed.

Up to dateness:

4) Are the library resources used in the instruction the most up to date that are available? Yes No
If no, indicate the resources overlooked.

5) Is there a research technique relevant to this module that is not used by the instruction? Yes No
If yes, indicate the technique.

Comprehensiveness:

6) Are there any methods or resources not mentioned in the module that would help students accomplish the objective. Yes No
If yes, indicate what they are.

Additional comments:

Instructional Design Review

The instruction you have agreed to evaluate has been developed as an instructional aid for a compulsory research and design course among M.A. students in Educational Technology. The course curriculum includes a research proposal assignment. The instruction you will evaluate is intended to assist students in the many steps required to fulfill the research paper assignment. The instruction has thus taken the form of a manual/workbook intended to accompany the student into the library while doing the assignment.

Three different expert reviewers has been recruited to evaluate the instruction based on their fields of expertise. You have been selected as an Instructional Design expert. The following questionnaire will provide you with a guide for evaluating the instruction's objectives, the integrity of the instructional design, and the relationship between concepts within the content.

Three questionnaires have been designed, one for each of the individual areas of expertise of each reviewer. Reviewers will use the same questionnaire for the evaluation of all phases of the instruction. The questionnaire will be found after each module of the instruction.

On the following page you will find the research proposal assignment. The instruction will begin following the assignment.
Please answer on the space provided below each question. Your additional comments at the end of each questionnaire are also encouraged. Should you wish to include feedback on the manual itself please do so. However, should your comments pertain to a particular question, please indicate the question number.

Also note any items you may wish to discuss with me when we meet after you have completed the questionnaire.

Instructional Design Review
Questionnaire

Objective:

1) Is the objective of the module clearly stated? Yes No
If no, how can it be improved.

Instruction:

2) Is the instruction written in clear and understandable language? Yes No
If no, what needs clarification.

3) Are the tasks to be accomplished presented in a logical sequence? Yes No
If no, how can the sequence be improved.

4) Is the instruction presented in an understandable fashion? Yes No
If no, how can it be improved.

5) Is the instruction presented in an appealing fashion? Yes No
If no how can it be improved?

6) Are there sufficient examples provided throughout the module? Yes No
If no, indicate where should examples be added?

7) How can the data collection from students be improved?

Additional Comments:

Curriculum Review
Questionnaire

The instruction you have agreed to evaluate has been developed as an instructional aid for a compulsory research and design course among M.A. students in Educational Technology. The course curriculum includes a research proposal assignment. The instruction you will evaluate is intended to assist students in the many steps required to fulfill the research paper assignment. The instruction has thus taken the form of a manual/workbook intended to accompany the student into the library while doing the assignment.

Three different expert reviewers has been recruited to evaluate the instruction based on their fields of expertise. You have been selected as a Curriculum expert. The following questions will provide you with a guide for evaluating the compatability of the instructional design's objectives with course objectives, course materials, other instructional materials in use and appeal of the instruction to the target population.

Three questionnaires have been designed, one for each of the individual areas of expertise of each reviewer. Reviewers will use the same questionnaire for the evaluation of all phases of the instruction. The questionnaire will be found after each module of the instruction.

On the following page you will find the research proposal assignment. The instruction will begin following the assignment.

Please answer on the space provided below each question. Your additional comments at the end of each questionnaire are also encouraged. Should you wish to include feedback on the manual itself please do so. However, should your comments pertain to a particular question, please indicate the question number.

Also note any items you may wish to discuss with me when we meet after you have completed the questionnaire.

Curriculum Review
Questionnaire

1) Is this module compatible with the objectives of ET 640. Yes No
If no, how can the objective's compatibility be improved?

2) Is the module compatible with the objectives of the research proposal assignment? Yes No
If no, how can the module be improved?

3) Is the level of the language suitable for the target population? Yes No
If no, indicate where revisions are required?

4) Is the module useful to the target population for the purpose intended? Yes No
If no, how can its usefulness be imporved?

5) Will the module appeal to the target popualtion on the basis of its format alone (ie: checklist, written directives, flow chart, etc.)? Yes No
If no, which format would be most appealing for this module.

6) Is the instructional medium (print) convenient for the setting in which it is intended? Yes No
If no, how can it better suit the setting ?

Additional Comments:

APPENDIX D

One-to-one Review

One to One Evaluation

Procedure

1) Introduce the instructional aid, its background and purpose.

2) Allow student evaluator to read through instructional aid.

3) Throughout the exchange between designer and evaluator, recommended revisions will be written down by the designer on his copy of the materials.

4) Starting with module 1, student evaluator will be asked to critique the instruction based on the following criteria.

    Extent to which instruction helps to achieve task of the phase for which it has been prepared.

    Recommend omissions and additions.

    Identify unclear terms, procedures, examples, criteria.

    Identify typographical errors.

    Thoroughness of student evaluation questionnaires.

5) Repeat the above procedure with each of the three student evaluators.

APPENDIX E

Field Trial, Module Questionnaire

Student Evaluation

Student ID. # _____ module # :

The statements below pertain only to the module you have just completed. **Please indicate your ID no. in the space provided.** Circle the number that best corresponds to your level of agreement or disagreement with the statement. Either you agree (1), agree a bit (2), disagree a bit (3), or disagree (4). There is no middle ground. Additional comments are appreciated underneath each statement or on the back. Hand in the completed questionnaire with your worksheet to the T.A.

		Agree		Disagree	
1)	The objective of the module was clear.	1	2	3	4
2)	Given the assignment, the objective of the module was relevant.	1	2	3	4
3)	The procedure was clear.	1	2	3	4
4)	The following items were relevant to completion of the assignment.				
	a) The procedure	1	2	3	4
	b) The checklist	1	2	3	4
	c) The criteria list	1	2	3	4
5)	The following items helped me complete this step of the proposal.				
	a) The procedure	1	2	3	4
	b) The checklist	1	2	3	4
	c) The criteria list	1	2	3	4
6)	The following items were insufficient thereby making use of the module necessary.				
	a) course lecture	1	2	3	4
	b) course syllabus	1	2	3	4
	c) library orientation	1	2	3	4
7)	The worksheet, (when provided), was helpful.	1	2	3	4
8)	I acquired new research skills from the module.	1	2	3	4
9)	The examples in the module were;				
	a) helpful	1	2	3	4
	b) sufficient in quantity	1	2	3	4
10)	The previous module adequately prepared me for this module.	1	2	3	4

Additional comments:

APPENDIX F

Field Trial, Summative Questionnaire

Student Evaluation

Student ID.# _____ Modules 1-6 inclusive

The statements below pertain to the entire instructional aid. **Do not complete this evaluation until you have completed the entire research proposal assignment.** Circle the number that best corresponds to your level of agreement or disagreement with the statement. Either you agree (1), agree a bit (2), disagree a bit (3), of disagree (4). There is no middle ground. Your additional comments are appreciated. Please hand in the completed questionnaire with your completed assignment to the course instructor or T.A.

	Agree		Disagree	
1) The instructional aid was helpful when presented as a;				
a) checklist	1	2	3	4
b) procedure	1	2	3	4
c) criteria list	1	2	3	4
2) The following aspects of my research proposal were improved as a result of the instructional aid.				
a) Originality of research problem	1	2	3	4
b) Variables of research problem	1	2	3	4
c) Written expression of research problem	1	2	3	4
d) Quality of primary sources in literature review	1	2	3	4
e) Organization (presentation) of literature review	1	2	3	4
3) The instructional aid helped me complete the methods section of the proposal.	1	2	3	4
4) I wrote a better proposal with the help of the instructional aid than I would have without it.	1	2	3	4
5) I would have found the research proposal assignment harder without the instructional aid.	1	2	3	4
6) Use of the instructional aid did not increase my workload necessary to complete the research proposal assignment.	1	2	3	4
7) The instructional aid, without the evaluation questionnaires, was too long.	1	2	3	4
8) I would like to pursue my proposal topic as a thesis	1	2	3	4
9) I attended the library orientation at the beginning of the semester.	Yes			No

Additional Comments:

APPENDIX G

Student Information Questionnaire

Student Information

Student ID.# _____

Please complete all of the questions below. Your answers are necessary for a thorough evaluation of the instructional aid. As the designer of these materials I would like to meet with you for twenty minutes in order to get feedback in addition to the questionnaires you completed. Please leave your name and phone number below so that I may contact you in later. If you wish not to, thank you for your cooperation in this study.

Name _____ phone # _____

1) Please list other courses you have taken in this program.

2) Please list other courses you were enrolled in while taking ETEC 640 or ESTU 615 .

3) Please list other degrees or certificates you have completed, undergraduate and graduate.

4) Have you ever written a thesis proposal (other than the proposal for this course)? Yes No
If yes, in which discipline?

5) Have you ever completed an entire thesis? Yes No
If yes, in which discipline?

6) Please list other degree programs you are currently enrolled in.

APPENDIX H

Instructor/T.A. Evaluation

Instructor/ T.A. Evaluation

March 10, 1988

Dear,

Attached please find a brief questionnaire regarding the use of the self instructional aid in your class, used and evaluated in conjunction with my thesis last semester. Kindly answer the questions and return to me (via my mail box) by Tuesday, March 15, 1988 (so I can finish by the March 18 deadline). Any comments you might have would greatly be appreciated.

Thank you,

Lewis Gitelman

Instructor/ T.A. Evaluation

Circle the number that best corresponds to your level of agreement or disagreement with the statement. Either you agree (1), agree a bit (2), disagree a bit (3), or disagree (4). There is no middle ground. Additional comments are appreciated underneath each statement or at the end.

	Agree			Disagree
1) My students' research proposals showed an improvement over past papers.	1	2	3	4
2) Holding all other variables constant, the instructional aid improved the following aspects of the proposals.				
a) Originality of the research problem	1	2	3	4
b) Variables of research problem	1	2	3	4
c) Written expression of research problem	1	2	3	4
d) Quality of primary sources in literature review	1	2	3	4
e) Organization (presentation) of literature review	1	2	3	4
3) I would like my future students to use the instructional aid.	1	2	3	4
4) The research proposals were consistent in presentation.	1	2	3	4
5) The proposals were not consistent in research quality.	1	2	3	4
6) The amount of queries from students concerning the proposalassignment were less than usual.	1	2	3	4
7) Questions asked by students about the assignment were of a higher quality than usual.	1	2	3	4
8) I assume my students know how to research a topic.	1	2	3	4
9) I teach research proposal writing skills in the course.	1	2	3	4

Please include the student number and grade for research proposals completed to date.

Student # Grade

Additional Comments:

APPENDIX I

Field Trial Results

Table 3

Frequency Distribution of Group Responses to Evaluation Questionnaire

Module 1

		Scale (f)(%)				Kolmogorov-Smirnov D
		Agree			Disagree	
Question #		1	2	3	4	
1)	Objective clear	(9)(52.9)	(2)(11.7)		(6)(35.3)	.35, $p \leq .05$
2)	Objective relevant	(15)(88.2)	(2)(11.8)			
3)	Procedure clear	(15)(88.2)	(1)(5.9)	(1)(5.9)		
4)	Procedure relevant	(15)(88.2)	(2)(11.8)			
5)	Procedure helpful	(10)(58.8)	(6)(35.3)	(1)(5.9)		
6)	Module necessary	(6)(35.5)	(7)(41.1)	(4)(23.5)		.14, $p \geq .05$
7)	Worksheet helpful	(9)(56.2)	(5)(31.2)	(1)(6.2)	(1)(6.2)	.11, $p \geq .05$
8)	I acquired new skills	(3)(18.7)	(5)(31.2)	(4)(25)	(4)(25)	.40, $p \leq .05$
9)	Enough examples	(10)(58.8)	(2)(11.8)	(5)(29.4)		.19, $p \geq .05$
10)	Examples helpful	(11)(64.7)	(5)(29.4)	(1)(5.9)		

Note: $\underline{N} = 17$

Value of D needed to reject the null hypothesis ($\alpha = .05$)

N	D
5	.565
6	.521
10	.410
11	.391
12	.375
13	.361
14	.349
15	.338
16	.328
17	.318

Table 4

Frequency Distribution of Group Responses to Evaluation Questionnaire

Module 2

		Scale (f)(%)				Kolmogorov-Smirnov D
		Agree			Disagree	
Question #		1	2	3	4	
1)	Objective clear	(11)(78.5)	(1)(7.1)	(2)(14.3)		
2)	Objective relevant	(8)(57.1)	(6)(42.8)			
3)	Procedure clear	(4)(28.5)	(9)(64.3)	(1)(7.1)		.16, p ≥ .05
4)	a Procedure relevant	(10)(71.4)	(4)(28.5)			
	b Checklist relevant	not applicable				
	c Criteria list relevant	(6)(46.1)	(3)(23)	(3)(23)	(1)(7.7)	.21, p ≥ .05
5)	a Procedure helpful	(5)(35.7)	(7)(50)	(1)(7.1)	(1)(7.1)	.09, p ≥ .05
	b Checklist helpful	not applicable				
	c Criteria list helpful	(4)(30.8)	(4)(30.8)	(3)(23)	(2)(15.4)	.28, p ≥ .05
6)	a Lecture insufficeint module necessary	(7)(50)	(5)(53.7)	(2)(14.2)		
	b Syllabus insufficient module necessary	(2)(15.3)	(7)(53.8)	(4)(30.7)		
	c Library insufficient module necessary	(1)(7.1)	(3)(21.4)	(6)(42.8)	(3)(21.4)	.59, p ≤ .05
7)	Worksheet helpful	(4)(28.5)	(5)(35.7)	(3)(21.4)	(2)(14.2)	.26, p ≥ .05
8)	I acquired new skills	(2)(14.2)	(7)(50)	(3)(21.4)	(2)(14.2)	.31, p ≥ .05
9)	a Examples helpful	(6)(42.8)	(8)(57.1)			.10, p ≥ .05
	b Examples sufficient in Qty.	(4)(28.5)	(6)(42.8)	(3)(21.4)	(1)(7.1)	.19, p ≥ .05
10)	Previous module prepared me for this module.	(8)(57.1)	(4)(28.5)	(2)(14.2)		.12, p, ≥ .05

Note: N = 14

Table 5

Frequency Distribution of Group Responses to Evaluation Questionnaire

Module 3

		Scale (f)(%)				Kolmogorov-Smirnov D
		Agree			Disagree	
Question #		1	2	3	4	
1)	Objective clear	(8)(61.5)	(2)(15.3)	(1)(7.6)	(2)(15.3)	.17, $p \geq .05$
2)	Objective relevant	(10)(76.9)	(3)(23)			
3)	Procedure clear	(9)(69.2)	(3)(23)	(1)(7.6)		
4)	a Procedure relevant	(9)(69.3)	(4)(30.7)			
	b Checklist relevant	not applicable				
	c Criteria list relevant	not applicable				
5)	a Procedure helpful	(6)(50)	(4)(33.3)	(2)(16.6)		
	b Checklist helpful	not applicable				
	c Criteria list helpful	not applicable				
6)	a Lecture insufficeint module necessary	(4)(30.7)	(7)(53.8)	(1)(7.6)	(1)(7.6)	.14, $p \geq .05$
	b Syllabus insufficient module necessary	(4)(30.7)	(7)(53.8)	(1)(7.6)	(1)(7.6)	.14, $p \geq .05$
	c Library insufficient module necessary	(3)(25)	(4)(33.3)	(4)(33.3)	(1)(8.3)	.32, $p \geq .05$
7)	Worksheet helpful	(7)(53.8)	(4)(30.7)	(2)(15.3)		
8)	I acquired new skills	(2)(15.3)	(8)(61.5)	(3)(23)		.30, $p \geq .05$
9)	a Examples helpful	(7)(53.8)	(6)(41.5)			
	b Examples sufficient in Qty.	(3)(23)	(6)(41.5)	(3)(23)	(1)(7.6)	.22, $p \geq .05$
10)	Previous module prepared me for this module.	(7)(53.8)	(4)(30.7)	(2)(15.3)		.09, $p \geq .05$

Note: N = 13

Table 6

Frequency Distribution of Group Responses to Evaluation Questionnaire

Module 4

		Scale (f)(%)				Kolmogorov-Smirnov D
		Agree			Disagree	
Question #		1	2	3	4	
1)	Objective clear	(8)(66.6)	(2)(16.6)	(1)(8.3)	(1)(8.3)	.22, p ≥ .05
2)	Objective relevant	(8)(66.6)	(3)(25)		(1)(8.3)	.22, p ≥ .05
3)	Procedure clear	(8)66.6)	(2)(16.6)	(2)(16.6)		.22, p ≥ .05
4) a	Procedure relevant	(8)(66.6)	(4)(33.3)			
b	Checklist relevant	(7(58.3)	(4)(33.3)		(1)(8.3)	.13, p ≥ .05
c	Criteria list relevant	not applicable				
5) a	Procedure helpful	(6)(50)	(4)(33.3)	(1)(8.3)	(1)(8.3)	.08, p ≥ .05
b	Checklist helpful	(5)(45.4)	(2)(18.2)	(3)(27.3)	(1)(9.1)	.26, p ≥ .05
c	Criteria list helpful	not applicable				
6) a	Lecture insufficeint module necessary	(4)(33.3)	(7)(58.3)		(1)(8.3)	.12, p ≥ .05
b	Syllabus insufficient module necessary	(4)(33.3)	(7)(58.3)	(1)(8.3)		.12, p ≥ .05
c	Library insufficient module necessary	(1)(8.3)	(7)(58.3)	(3)(25)	(1)(8.3)	.37, p ≤ .05
7)	Worksheet helpful	(4)(33.3)	(4)(33.3)	(4)(33.3)		.23, p ≥ .05
8)	I acquired new skills	(1)(8.3)	(8)(66.6)	(3)(25)		.37, p ≤ .05
9) a	Examples helpful	(5)(41.6)	(6)(50)	(1)(8.3)		.08, p ≥ .05
b	Examples sufficient in Qty.	(2)(16.6)	(7)(58.3)	(1)(8.3)	(2)(16.6)	.28, p ≥ .05
10)	Previous module prepared me for this module.	(7)(58.3)	(4)(33.3)	(1)(8.3)		.13, p ≥ .05

Note: N = 12

Table 8

Frequency Distribution of Group Responses to Evaluation Questionnaire

Module 5

	Scale (f)(%)				Kolmogorov-Smirnov D
	Agree			Disagree	
Question #	1	2	3	4	
1) Objective clear	(8)(72.7)	(2)(18.2)	(1)(9)		.28, p ≥ .05
2) Objective relevant	(8)(72.7)	(3)(27.2)			
3) Procedure clear	(8)(72.7)	(3)(27.2)			
4) a Procedure relevant	(8)(72.7)	(3)(27.2)			
b Checklist relevant	(5)(45.4)	(6)(54.5)			
c Criteria list relevant	not applicable				
5) a Procedure helpful	(6)(54.5)	(3)(27.2)	(2)(18.2)		.09, p ≥ .05
b Checklist helpful	(4)(36.3)	(5)(45.4)	(2)(18.2)		.08, p ≥ .05
c Criteria list helpful	not applicable				
Group 1					
6) a Lecture insufficient module necessary		(5)(83.3)	(1)(16.6)		.45, p ≥ .05
Group 2					
6) a Lecture insufficient module necessary		(4)(80)		(1)(20)	.45, p ≥ .05
b Syllabus insufficient module necessary	(5)(45.4)	(4)(36.3)	(2)(18.2)		
c Library insufficient module necessary	(1)(9)	(7)(63.6)	(2)(18.2)	(1)(9)	
7) Worksheet helpful	(4)(36.3)	(3)(27.2)	(3)(27.2)	(1)(9)	.26, p ≥ .05
8) I acquired new skills	(4)(36.3)	(5)(45.4)	(2)(18.2)		.09, p ≥ .05
9) a Examples helpful	(6)(54.5)	(5)(45.4)			
b Examples sufficient in Qty.	(6)(54.5)	(3)(45.4)	(2)(18.2)		.10, p ≥ .05
10) Previous module prepared me for this module.	(6)(54.5)	(4)(36.3)	(1)(9)		

Note: N = 11

Table 8

Frequency Distribution of Group Responses to Evaluation Questionnaire

Module 6

		Scale (f)(%)				Kolmogorov-Smirnov D
		Agree			Disagree	
Question #		1	2	3	4	
1)	Objective clear	(6)(54.5)	(2)(18.2)	(1)(9)	(2)(18.2)	.18, p ≥ .05
2)	Objective relevant	(8)(72.7)	(3)(27.2)			
3)	Procedure clear	(7)(63.6)	(4)(36.3)			
4) a	Procedure relevant	(10)(90.9)	(1)(9)			
b	Checklist relevant	(8)(72.7)	(3)(27.2)			
c	Criteria list relevant	not applicable				
5) a	Procedure helpful	(7)(63.6)	(3)(27.2)	(1)(9)		
b	Checklist helpful	(4)(36.3)	(5)(45.4)	(2)(18.2)		.09, p ≥ .05
c	Criteria list helpful	not applicable				
6) a	Lecture insufficeint module necessary	(5)(45.4)	(4)(36.3)	(1)(9)	(1)(9)	.09, p ≥ .05
b	Syllabus insufficient module necessary	(4)(36.3)	(4)(36.3)	(3)(27.2)		.17, p ≥ .05
c	Library insufficient module necessary	(1)(9)	(6)(54.5)	(2)(18.2)	(2)(18.2)	.36, p ≥ .05
7)	Worksheet helpful	not applicable				
8)	I acquired new skills	(4)(36.6)	(5)(45.4)	(2)(18.2)		.09, p ≥ .05
9) a	Examples helpful	(4)(40)	(5)(50)		(1)(10)	.05, p ≥ .05
b	Examples sufficient in Qty.	(3)(27.2)	(3)(27.2)	(3)(27.2)	(1)(9)	.30, p ≥ .05
10)	Previous module prepared me for this module.	(8)(72.7)	(2)(18.2)			

Note: N = 11

Table 9

Frequency Distribution of Group Responses to Evaluation Questionnaire

Modules 1 - 6, inclusive

	Scale (f)(%)				Kolmogorov-Smirnov D
	Agree			Disagree	
Question #	1	2	3	4	
1) a Checklist helpful	(7)(63.6)	(4)(36.3)			
b Procedure helpful	(9)(75)	(3)(25)			
c Criteria list helpful	(4)(33.3)	(5)(41.6)	(3)(25)		.15, p ≥ .05
2) a Originality of problem improved	(2)(15.3)	(4)(30.7)	(4)(30.7)	(3)(23)	.44, p ≤ .05
b Variables improved	(4)(30.7)	(6)(46.1)	(1)(7.6)	(2)(15.3)	.14, p ≥ .05
c Written expression improved	(4)(30.7)	(3)(25)	(4)(33.3)	(1)(7.6)	.32, p ≥ .05
d Quality of promary sources	(5)(41.6)	(5)(41.6)	(2)(15.3)	(1)(7.6)	.13, p ≥ .05
e Organization of lit. review	(6)(46.1)	(3)(25)	(2)(15.3)	(2)(15.3)	.21, p ≥ .05
3) Helped with methods section	(1)(7.6)	(3)(25)	(2)15.3()	(6)(46.1)	.57, p ≤ .05
4) I wrote a better proposal with the aid	(5)(41.6)	(6)(46.1)	(2)(15.3)		.07, p ≥ .05
5) The proposal would have been harder without the aid.	(6)(46.1)	(5)(41.6)	(1)(7.6)		.05, p ≥ .05
6) The aid increased my workload.	(7)(63.6)	(2)(15.3)	(3)(25)	(1)(7.6)	.21, p ≥ .05
7) The aid wasn't too long	(7)(63.6)	(1)(7.6)	(5)(41.6)		.28, p ≥ .05
8) I would like to pursue my topic as a thesis.	(7)(63.6)	(1)(7.6)	(2)(15.3)	(2)(15.3)	.23, p ≥ .05

Note: N = 13

APPENDIX J

Research Proposal Assignment, Group 1

Activities

1. Writing a Research Proposal. Thirty percent (30%) of your term's grade will be based on a research proposal which you will develop in five phases. Phases I - IV will be marked by the TA and vetted by the instructor.

Definition: A research proposal is a detailed description of a proposed study written for the purpose of acquiring funding for the project, convincing others (usually a committee convened for that purpose as in the case of a thesis or dissertation committee) that a study is worth conducting or receiving credit in this course. Due dates for these phases will be spread over the term, and are listed below.

Phases 1 - 4 will be marked (1) Satisfactory, (2) Satisfactory with minor revisions, (3) Satisfactory with major revisions, or (4) Unsatisfactory. Categories 1 & 2 require no additional submission (Category 2 indicates that minor problems need to be addressed before proceeding). Category 3 & 4 require a resubmission of the assignment (3 indicates that major changes must be made before resubmission, and 4 indicates that the work is unacceptable and must be resubmitted). The TA may request an appointment with you in the event of a 4. A Phase must be resubmitted before proceeding to the next phase.

Phase I: Select and submit two research topics (general areas of educational technology) that are potentially interesting to you. The instructor will provide a list. Approaches to selecting topics will be discussed in the second class meeting; Due September 24.

Phase II: Select and submit one of the above research topics expanded into a problem statement. Refer to Chapter 3 in Borg & Gall for a discussion. Examples will be provided in class. Also, identify specific descriptors for your study (eg. computer-aided instruction, televised instruction, locus of control, etc.) and the population of interest (handicapped adolescents, kindergarten students, etc.) to be used in a search of the literature. Due October 8.

Phase III: Search the literature for research studies (usually articles in journals) and other articles or books that are relevant to your problem statement. Previous reviews of research in your topic area are especially desirable since they will help you identify other topical literature and may provide additional insights into your problem. It is not uncommon to refine your problem statement as you read more widely about the topic, so be prepared by maintaining an open mind as

you read and search for literature. From your reading, chose at least 10 key references (research studies, literature reviews, or other relevant works) that you think will be cited in the final proposal; read them thouroughly and prepare an abstract of each. Use 5 X 8 index cards for this. Include: (1) a complete citation in APA style at the top of the card; (2) the hypotheses or purpose of the study or paper; (3) a summary of the methods, including the sample, instrumentation, materials, and procedure; and (4) a summary of the findings. If you find methodological or theoretical flaws in the study that might be important in developing your proposal, note these in a final section called Criticisms. (Note: Since this card file is intended to eliminate the need to re-read the articles, you should include substantially more information than is included in the typical abstract of 75 to 150 words; Due November 5.

Phase IV: Submit the introductory section of your proposal which includes (1) an introduction to the problem (What is the context of the problem?); (2) significance of the problem (Why is this research important?); (3) review of related literature (What have others said about this problem?); (4) specific problem statement (What particular variables will be addressed in this study?); (5) research hypothesis(es) (Based on previous research, what is the predicted outcome of the study?); and (6) tentative operational definitions (These define the variables listed in the problem statement in terms of specific activities or operations necessary to measure, categorize, or manipulate them, and as such, form the basis for describing the materials and procedures of the study. Eg. learning from text might be operationally defined as the number of concepts recalled after reading a chapter of text. This operational definition becomes the basis for describing the dependent variable stated in the problem statement, learning from text, in explicit and quantifiable terms inmthe Method section of the proposal. Other terms in this example, such as concepts and chapter of text might also require operationalizing.); Due November 19.

Phase V: Submit a final proposal (average 15-20 typewritten pages, double-spaced) including the following:

-Title Page;

-Abstract (75 - 125 words);

-Introduction to the study;

---Introduction to the problem;

---Significance of the problem;

---Review of the literaturerelated to the problem;

---Problem statement;

---Operational definitions (may appear in the Methods instead);

---Hypothesis(es);

-Method;

---Sample;

---Research design;

---Materials (usually includes description of instruments);

---Procedures;

---Statistical analysis;

-References

The proposal must be in correct APA style.
Due on or before January 15, 1988, 1600 EST.

APPENDIX K

Research Proposal Assignment, Group 2

Course Overview and Objectives

This course provides students with a general overview of empirical research in education, develops their skills to critically evaluate published research and also introduces students to the fundamental techniques needed to conduct educational research. This is not exclusively a course in statistics nor does it place undue emphasis on derivations and computational procedures. While the mathematical procedures needed to employ certain statistical tests will be presented, attention will be given to the logic of statistcal procedures, their correct application and interpretation with examples of their use in the educational research literature. In addition, some portion of this course will be devoted to understanding the basics of research design including factorial designs, experimental and quasi-experimental designs, internal and external validity, etc.

This course, then, is designed as an introductory course for advanced students; it is a first step in developing empirical research skills. Graduate students in Educational Studies wishing to conduct an empirical thesis are strongly urged to complete at least one other quantitative course such as, ETEC 642.

In evaluating empirical research, the questions to be asked include: What are the researcher's hypothesis? What are the independent, dependent, and concomitant variables? Are the operational definitions of these variables appropriate? Are the outcome measures psychometrically sound? What is the basic design of the study? Is the design adequate to address the questions under investigation? Is the sample of subjects representative and randomly assigned to treatment conditions? Have the appropriate statistical tests been applied to the data? Are the results of the study clearcut or are there omissions or complications? Do the researcher's conclusions appear justified or are there alternative explanations of the findings? Are the limitations of the results carefully and completely outlined? What changes to the original study would substantially improve it? What follow-up research is called for?

Workload and Student Evaluation

An average student with some academic background in the social sciences (e.g., psychology, sociology, etc.) can expect to earn a grade of B in this course with a work expenditure of six hours per week.

1. Literature review and research proposal (30% of total grade)

The term paper required for this course will be a brief literature review and research proposal, typically about ten typed pages of text in length and written in APA style. The introduction should include a brief, critical reveiw of no less than five recent and related empirical studies on a topic of interest to the student. The topic should initially be derived from an article published in a recent issue of a major, research-oriented journal in education (e.g., American Educational Research Journal, Journal of Educational Psychology); and a technical journal with a narrow focus (e.g., Canadian Nurse). Based on this review,

the student should then propose an additional investigation to explore empirically the questions raised.

The methods section should clearly outline the subjects to be used, the materials to be employed, and the procedure to be followed. The basic design of the study should be outlined and the data analysis techniques should be described and defended. The design must be a factorial design incorporating at least two independent variables. A good rule of thumb for the methods section: It should be sufficiently detailed that soemone other than the author could conduct the study without being provided any further information.

Optionally, students may wish to include bogus Results and Discussion sections. This is a valuable exercise if you are uncertain of your understanding of what you have proposed, how to test it, and what the results of those tests suggest about your hypothesis.

The term paper should also include an Abstract, a Reference section written in APA style, and an Appendix. The Appendix should describe the steps followed in the library to conduct the literature review including a manual search of Psychological Abstracts, ERIC (EJ's only), unbound periodicals, Social Sciences Citation Index, and a computer search (include a copy of the search). It is important that you introduce yourself to the different techniques available for a competent and scholarly library search.

The following textbook (Borg & Gall) chapters will be useful in preparing a term paper:

Chapter 3.	The research problem, research plans and pilot study.
Chapter 4.	Ethics, legal constraints, and human relations in education research.
Chapter 5.	Reviewing the literature.
Chapter 6.	Critical evaluation of research.
Chapter 21.	Preparing the research report.

Special Notes on Term Papers:

The final due date for term papers is the first day of winter term classes, Wedensday, January 6. However students are encouraged to turn in papers prior to this date.

A deduction of 10% will be made for each week a paper is submitted past the January 6 due date.

Students wishing to complete their term paper in French should make arrangements with the instructor during the first weeks of the course.

2. Examinations (15% Midterm, 30% of Final)

There will be a midterm examination on Monday, November 6 and a final examination on Monday, December 21. The exams will be comprehensive and reflect the topics covered throughout the course including readings, lectures, discussions, handouts, etc.

Make-up examinations will be scheduled only when a students provides a written medical certificate explaining his/her absence.

3. Weekly assignments (25%)

a. Critiques of research articles. Over the course of the semester there will be a number of research articles to critique. These articles have not been for their outstanding quality as empirical investigations. On the contrary, each article has at least one serious flaw. You are to briefly review each study, describe the flaws and suggest a more appropriate experimental or analytical procedure. In fairness to all students, late assignments will not be accepted after the materials are discussed in class.

At a minimum, your critique should describe the following:

i. the experimental hypothesis.
ii. the independent and dependent variables.
iii. the experimental design.
iv. a brief overview of the method.
v. a summary of the important results and author's conclusions.
vi. the major flaws of the study (with explanation).
vii. suggestions for improvement.