R P H - Research Proposal Helper:
A CD-ROM Based Interactive Research Proposal Preparation Program
For Student Research Projects

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Abstract

Students frequently struggle to complete research proposals due to new terminology, lack of critical thinking skills, and exacting procedures demanded by IRB (Institutional Review Board) policies. The RPH (Research Proposal Helper) project is an attempt to alleviate the student’s daunting tasks involved with writing research proposals by the use of a CD-ROM based interactive guide program developed by the author. A quasi-experimental pre-test and post-test showed no statistically significant difference between a group of students who used the RPH CD-ROM and a group who used a traditional printed manual. A different post-test only design using a second instrument also showed no significant difference between the groups. Focus group sessions showed that both groups valued the CD-ROM approach. Several suggestions are made for improving the RPH program.

Keywords: IRB, RPH, CD-ROM, pre-test, post test, focus group
Identifying Problems and Creating Solutions

Graduate students in Master of Social Work programs often struggle to complete research project proposals. Several problematic student attributes and particular demands of research course requirements and assignments contribute to this situation. They must, for example, differentiate among main hypothesis, secondary hypothesis, and null hypothesis. Students need to understand when to use an independent samples t-test instead of its close cousin, the paired samples t-test. They are not comfortable with thinking of themselves as a “researcher”. Many of them have few critical thinking skills (King, Wood, & Mines, 1990). Many are working at the relatively lower skill levels in the cognitive domain of Bloom's Taxonomy labeled “knowledge” and “comprehension” (“Taxonomy of Educational Objectives - Wikipedia, the free encyclopedia”). Many feel “overwhelmed” by the long process involved in a substantive research project. Sometimes the university IRB (Institutional Review Board) is difficult to deal with and exacting in its complex requirements.

Many solutions to this ubiquitous problem have been suggested. Most involve some kind of specific resources or guides to the various steps or parts of a research proposal. There are several Internet-based aids such as sites devoted to commentary on the content of the various sections of a well-written research proposal. One example is the University of Michigan Research Page (“Proposal Writer's Guide: Contents”) and another is Yenza. Yenza is an inclusive site developed by the South African National Research Foundation and is hosted at a South African university (“Yenza! - Start your research - The research proposal”). A few paper-based guides are available on the Internet from a handful of social work research faculty and from several universities. These are often attached to syllabi or individual course sites.

There is at least one published workbook available that deals specifically with social work research proposals and research reports (Friedman, 2005). Each part of a proposal is presented
with a brief introduction and questions for the student with fill-in-the-blank sections for that part of a proposal. For example, for the data analysis section of a proposal, a chart is provided that suggests a particular statistical test for a particular hypothesis based on the level of measurement for the involved variables. The student then fills in a form with columns for variables, the type of variable and the appropriate statistical test. The pages have perforations along the inside margins so that the student can tear them out and hand them in for assessment and/or feedback purposes. Recent editions of several popular social work research textbooks contain chapters illuminating research proposal details (Rubin & Babbie, 2007). One recent textbook, The Practice of Research in Social Work (Engle & Schutt, 2005), has hints at the end of each chapter under the heading “Developing a Research Proposal.” Some graduate programs offer workshops on the various skills that may be needed in a research process including proposal tasks such as literature review strategies.

Finally, a few organizations have developed expensive comprehensive technology based solutions. One group of Pittsburgh area health providers chose a product called Click Commerce’s eResearch Portal. A press release described this internet-based program as: "…. a system similar to the leading tax preparation software programs," stated Swanson. "Webridge SmartForms provides us the ability to lead a researcher through a complex set of questions resulting in a protocol that has all the appropriate information filled in. Combined with Webridge’s routing and workflow approval, we have a system that addresses the complete needs of the human subjects research oversight process." (“University of Pittsburgh Consortium Selects Webridge Extranet for Institutional Review Board — IRB — Initiative,” 2003). However, many graduate students still struggle with the process.
Several studies have been conducted concerning the use of CD-ROM's for various educational tasks. One project (Gold et al., 2004) designed to help teach thoracic surgery concepts used a CD-ROM Internet hybrid design. This scheme combines CD-based video and audio while test material, references, Internet linkages, frequently asked questions, and so forth are stored on web servers. This approach solves the problem of downloading the large video and audio files over slow Internet connections.

Today, fewer graduate students have slow Internet connections. Broadband connections increased more than 300 percent since 2002; according to an analysis from consumer and media research firm Scarborough Research. In 2002, 12 percent of U.S. adults had a broadband connection in their household. Almost half (49 percent) now have broadband – an increase of more than 300 percent (“Broadband in the United States - Newsletter June, 2005”).

Some research has compared the efficacy of CD-ROM's to more traditional methods such as lecture, textbooks, and other types of self-study activities. A group of medical educators (Erkonen, D’Alessandro, Galvin, Albanese, & Michaelsen, 1994) compared the long-term instructional effectiveness of a computer-based radiology multimedia textbook (MMTB) with that of a traditional lecture. This time pre-tests, post-tests, and 1-year long-term retention tests were given to both groups. Long-term results showed that the MMTB was comparable to the lecture method. Short-term results favored the lecture method.

Another study (P. R. Jeffries, 2005) compared the effectiveness of an interactive, multimedia CD-ROM and a traditional lecture for teaching oral medication administration information to nursing students. A randomized pre-test and post-test experimental design was used. One group was given a scripted lecture with black and white overhead transparencies, in addition to an 18-minute videotape on medication administration. The other group used an interactive, multimedia CD-
ROM program, covering the same content. Students in the computer group demonstrated higher student satisfaction and more cognitive gains than the lecture group. Both groups were equal in mastery of the skills. The computer group used 2 hours to learn the material, while students in the lecture group needed 3 hours.

Jeffries also compared the effectiveness of an interactive, multimedia CD-ROM with traditional methods of teaching the skills needed in performing a 12-lead ECG. A pre-test and post-test experimental design was used. One group used a self-study module, a brief lecture and demonstration by an instructor, and hands-on experience using a plastic manikin and a real 12-lead ECG machine in the learning laboratory. The other group used an interactive, multimedia CD-ROM and a self-study module. The results showed that both groups demonstrated the skill correctly on a live, simulated patient. The intent was to show that more cost-effective methods are as effective as traditional methods (PR Jeffries, Woolf, & Linde).

A study using first-year University of North Carolina dental students learning how to perform intra-oral radiography compared computer-assisted instruction (CAI) with lectures (Howerton, Platin, Ludlow, & Tyndall, 2002). This study contained 3 groups: interactive CD only, interactive CD and lecture, and lecture only. A pre-test and post-test design found that there was no significant difference in outcomes. Students did prefer the CAI to lecture format. In another medical education study, third- and fourth-year medical students taking a course on diagnostic radiology were assigned 2 modules. One module used a CAI-video-disc version and the other module used a textbook version. The students using CAI-video-disc scored higher than the students using the textbook. However, even though the CAI medical students scored higher, they spent more time using the video-disc (Chew & Stiles, 199).

Medical researchers working directly with patients have also found favorable results. In one study, children who received CD-ROM based education about their Leukemia had increased
feelings of control over their health than a group of children who read a book about their disease (Dragone, Bush, Jones, Bearison, & Kamani, 2002).

The RPH Project

The RPH project attempts to alleviate the student’s daunting tasks involved with writing research proposals. The author wrote a computer program that could be distributed on a CD-ROM. The program was developed using the easy to use rapid development software program, Runtime Revolution. This is inexpensive cross-platform software that will produce applications that can be used on Microsoft Windows, Macintosh OSX, and various Unix variants.

The CD-ROM consists of 10 screens (or pages) of information helpful in writing a research proposal. The screens are based on the major sections of a research proposal. Each section has its own distinct screen. The sections include:

1. Problems and Objectives
2. Literature Review
3. Conceptual Framework
4. Measurement
5. Study Participants
6. Design and Data Collection
7. Data Analysis
8. Schedule
9. Budget

Each screen has 2 distinct areas. The left third of the screen and a small bar at the bottom contain navigational aids. On the left is a map with an icon for each of the screens in the order they appear to the student. The current screen is highlighted on the map so that the student
knows where he/she is and what progress has been accomplished. The icons on the map are also in the order of the sections of a research proposal. At the bottom are buttons for moving through the screens. The left also has a drop-down menu labeled “Quick Jump,” which lets the student move to another section with a single click of the mouse. The right side of each screen has 3 scrollable windows. The top window contains a description of that section of a proposal. For example, one of the screens is labeled “Participants.” The middle scrollable window lists examples for that particular section taken from actual proposals. There are both qualitative and quantitative examples listed where appropriate. The bottom window is the area where the student types in his or her own proposal information.

After the student has entered all of the required information, he/she can click on the button labeled “finish proposal,” which leads to a pop-up window that shows a draft of the proposal with the correct headings and all sections in the correct order. The students are then instructed to click on a button labeled “copy” and then paste the draft into a word processing program of their choice which they use to proof, revise, and prepare the final proposal in the format required by the particular institution. There are several salient differences between the CD-ROM version and the print version of RPH. Colorful graphics can easily be included on the CD-ROM. The color can be added without concern for printing cost. A color-based CD-ROM cost no more than a black-and-white CD-ROM. Blank media, both CD-R and CD+R, now cost less than 4 or 5 full-color pages produced on a laser printer. Some students who are visual learners may benefit from the increased number of graphics and the visual interactivity of the CD-ROM version. Even though CD-ROM’s are becoming “obsolete” in this era of flash-drives and inexpensive external and portable hard-drives, information and programs like RPH can easily be saved and distributed in other electronic formats that arise. The print version can only be mailed or made available as a downloadable file. Since easy-to-use programming language is used, future versions can have additional functions, whereas, the print versions can only be improved in minor ways, such as using color ink or different layouts. The CD-ROM version may increase student engagement since the modular approach requires the student to become active because he/she must enter
information to progress to the next section. The student is kept passive when using the print version, whereas he/she merely turns the page to advance to the next section.

There are a few potential issues for those who might use the CD-ROM outside of the United States. Although many European and Asian countries have higher broadband access than the United States, which is ranked fifteenth (“Broadband Internet Subscribers - World Countries,” n.d.), many other countries have more limited access to high-speed internet. The CD-ROM can be beneficial to faculty and students in those countries. For example, a CD-ROM distributed to hundreds of African physicians and health ministers has helped them overcome some Internet connection problems and furthered the fight against HIV/AIDS (“CD-ROM brings HIV/AIDS information to countries with poor internet service - UCSF News Office,” n.d.).

**Methodology**

This project used 3 different methodologies. The main part of the project is best described as a quasi-experimental pre-test and post-test comparing 2 experimental (comparison) groups without a control group. Another part of the project used a post-test only design that compared the groups with a second instrument. Finally, focus group sessions were conducted with each experimental group.

Pursuant to Federal Regulation 45CFR46.101(b), the Institutional Review Board of the University granted an exemption from further review since the study entailed no more than “minimal risk” and was research involving a comparison among instructional techniques.

A consent form was distributed to and read to the participants before they took the pre-test. The participants were informed at that time that their participation was voluntary and that they could decline to participate in the experiment at any time and that their decision to decline to participate would not affect their grade for the course. The students were asked to sign 2 copies of the
consent form. They kept 1 copy and the investigator kept the other. The scores participants made on the quiz were not used in any way to determine their grade for the course.

**Study Participants**

The study participants were all first semester MSW (Master of Social Work) students at an HBCU (Historically Black College or University) in the southeastern United States during the 2005-2006 school year. Each was enrolled in the first of 3 classes in the program’s research sequence. There were a total of 30 students in the class. Twenty-five (25) of the students were female and 5 (5) of the students were male.

**Data Collection**

All of the students in the class were randomly assigned to either Group A or to Group B. The students in Group A received a CD-ROM that contained a computer program designed to aid in constructing a research proposal. The students in Group B received a paper-based guide to aid in constructing a research proposal. The information was presented as an 11 page pamphlet with a different research proposal section on each of the 10 pages following the cover page. Both Group A and Group B were given a pre-test and post-test quiz. The quiz consisted of 27 multiple-choice questions. There were 3 questions about each of the sections of a research proposal. There were, for example, 3 questions concerning a literature review, 3 questions concerning study participants, and 3 questions concerning sampling. The completed proposals were also graded according to a rubric containing 10 dimensions – 1 for each of the proposal sections.
Results

Although students who used the CD-ROM performed higher than those who used the printed version on each of the tests (Post-test Group A Mean = 21.14, Group B Mean = 18.50), none of the statistical test performed using the SPSS 16 program showed a statistically significant difference between the 2 groups. Two different types of t-Test were performed. First, an independent t-Test compared the 2 groups on the grade they received for their final proposal. This t-Test showed that there was no significant difference between the 2 groups in the grade they received (t= .481, df=19, p=.636, two-tailed). Next, subtracting the pre-test score from the post-test score on the proposal quiz created a new change variable. Then, an independent samples t-Test showed that there was no significant difference between the 2 groups in the increase in scores after the students used the 2 aids (t= .774, df=18, p=.449, two-tailed).

Focus group meetings with both comparison groups were conducted during final exam week at the end of the semester. Members of Group A reported that being guided by the computer program was reassuring to them about their ability to complete a successful research proposal project. They agreed by consensus that the RPH program helped them concentrate on one step at a time during their task. The Group A focus group also agreed that the computer program was more helpful than the textbook chapter which outlined the proposal sections.

Members of Group B also considered the written guide to be very helpful. One stated that she could not have completed her proposal without it. They said the printed guide was “straightforward, easy to use, and accessible.” One member of Group B stated that the printed guide “complimented the text book”. A few hinted that they were envious of the group who had been assigned to use the CD-ROM.
Weaknesses of the Current Design

There were several limitations in this first iteration of the program and its evaluative design. There was a marked lack of precision in the instrument used to measure the student’s mastery of the proposal process. There were only 3 questions about each of the sections of a proposal. The 2 most important “bugs” in the software involved poor “save” functionality and poor “print” functionality. The students were required to leave the program in a particular location on the computer’s hard drive or the changes made to their proposal would be lost when they quit the program. Unfortunately, the completed proposal needed to be imported into a word processing program to add the correct formatting to the document. The current program does not support headings, titles, tables, and other necessary formatting. The student must copy and paste the draft of the proposal into a word processing program for final formatting. In addition, more interactivity between the program and the student user is badly needed. There should be more prompts to aid and direct the student. Some of the sections should have more detailed examples for writing proposals for doing qualitative research.

Future Plans

The most common student requested feature was to add an interactive component that would lead the students through steps that would guide them in selecting the correct statistical procedure to test their particular hypotheses. Several interactive web sites already exist that help in this task. The author will provide links to these sites in a future computer version of RPH and a list of the sites in the printed version. The current version of the computer program runs on Macintosh and Windows computers. The next version will also work on computers that use the Linux operating system.

The next version of the program will be distributed only through downloading from an Internet site. The original decision to distribute the program on CD-ROM was based on 2 factors. First, the author planned to add helpful videos to show both how to use the program and to give some
insight into issues the students face when completing some of the proposal sections. For example, a video was planned that was really a tutorial concerning sampling designs. Downloading videos can take a long time over slow Internet connections. A CD-ROM has ample storage area for several such videos. Secondly, based on international studies such as this one (Dijk, 2005), the author assumed that many students would not have access to the Internet. The recent popularity of web sites like YouTube has shown that video downloading is much more feasible now. Other studies (and the author’s direct experience with students) indicate that virtually no graduate students in the U.S. lack access to the Internet (Hoffman, Novak, & Schlosser, 2006).

**Interface Improvements**

The current version of RPH requires the user to click on buttons at the bottom of each of the 10 screens (pages) or to “click” and hold on a drop-down menu to navigate through the steps required to construct a proposal. Navigation in the next version of RPH will use a tabbed interface. The student user will simply click on folder-tab like buttons arranged across the upper part of the screen.

Most research methods textbooks have a glossary as an appendix. These glossaries may be very useful to the students but they have 2 weaknesses. The student may lose her train of thought while she finds the textbook, then finds the correct appendix, and then thumbs through the pages to find the alphabetically arranged word or concept. Also, many of the entries are not often required for writing a proposal. A searchable glossary in a pop-up window containing only the most often used terms in a proposal can overcome both of these weaknesses could easily be added to the next version of RPH (Molenaar et al., 2001).
Conclusion

Although, no clear statistically significant differences were found between the 2 experimental groups, the students using the CD-ROM did score higher on both instruments. They also seemed to be very motivated and excited by the use of the computer technology. Both focus groups unanimously encouraged the instructor to continue development of the project and to attempt other similar projects. A larger sample size may well have shown a statistically significant difference.
References


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