

AC 2008-1905: TEACHING RESEARCH SKILLS IN SUMMER UNDERGRADUATE RESEARCH PROGRAMS

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Teaching Research Skills in Summer Undergraduate Research Programs

Abstract

High-quality research skills are an essential component in successfully navigating the graduate school process. The focus of this work is to describe a successful approach to teaching research skills to undergraduate students by combining laboratory experience with weekly instructional seminars in an attempt to foster future success in graduate school. This approach was designed and implemented for a ten-week summer research experience program for undergraduate students. The weekly instructional seminar series addressed research skills in three key areas: communication, investigation, and documentation.

The seminar series began with the “Communications Seminars,” where student participants learned how to concisely explain their research topics through an ‘elevator talk’ activity, a common exercise utilized in business fields. Followed by “Investigation Seminars,” that addressed conducting literature reviews and creating annotated bibliographies. Instructions on formulating and maintaining a research notebook were given in the “Documentation Seminar” to close out the seminar series. Each seminar consisted of hands-on activities that demonstrated the application of the material covered during the workshop. Students were then encouraged to use the applications while conducting their own research throughout the summer.

Details on the procedures used to implement each seminar are included in this work. A survey assessment of the research skills seminars was also conducted. The survey findings show the effectiveness of the research seminars in enhancing student participant’s understanding and application of research skills. The 2007 program year survey results provide insight on the overall effectiveness of incorporating weekly research skills workshops into a summer undergraduate research experience and are presented in this study.

Introduction

The organizational structure of the summer undergraduate research program is outlined by Fairley^[1] and will be presented in this section. The SURE (Summer Undergraduate Research in Engineering/Science) program was established in 1992 at the Georgia Institute of Technology to expose minority students to research in engineering, applied science, and electronics packaging, and to increase their interest in graduate study. The program is conducted in cooperation with the Colleges of Engineering, Sciences, and Computing at the university and is funded by the National Science Foundation. Key elements of the SURE program are presented to provide the reader with a knowledge-base regarding the organization of the SURE program^[2].

- Ten weeks of research in engineering (electrical, aerospace, chemical, civil, computer, environmental, industrial, mechanical, or materials), applied science (physics, chemistry, biology, or mathematics), and electronics packaging
- Student participant pairing with both a faculty advisor and a graduate student mentor
- Weekly seminars on emerging research in engineering/science fields from the faculty
- A competitive monthly stipend as compared to that of a summer internship in industry
- Lodging, meals and a travel allowance for student participants
- Local industrial research site visits
- Oral and written research project summaries prepared by the student participants
- Social interaction between the student participants and their graduate mentors
- Program evaluation by the student participants

This knowledge-base provides information regarding the program time constraints (ten weeks), research support network (faculty advisor and graduate student mentor), academic enrichment (weekly emerging research seminars), student participant accommodations (stipend, meals, lodging, and travel allowance), professional enrichment (industry visits), requirements (oral and written research project summary), and assessment (student participant response based program evaluation). This paper will examine SURE program components that are directly related to the teaching and assessment of research skills for undergraduate students. These areas of interest include:

1. Ten weeks of research in engineering (electrical, aerospace, chemical, civil, computer, environmental, industrial, mechanical, or materials), applied science (physics, chemistry, biology, or mathematics), and electronics packaging
2. SURE student participant pairing with both a faculty advisor and a graduate student mentor
3. Oral and written research project summaries prepared by the student participants
4. Program evaluation by the SURE student participants

Area one (1) is significant in that research skills were taught to undergraduate student participants within the areas of study mentioned during the ten-week summer program. Areas two (2) and three (3) provided student participants the opportunity to apply those research skills. SURE 2007 program survey results were conducted in area four (4). The assessment results obtain in (4) provided insight on the effectiveness of incorporating weekly research skills seminars in the SURE program.

The remainder of the study is divided into four sections: Background, Seminar Series, Assessment and Evaluation, and Conclusions and Recommendations. The Motivation section presents information that supports the need for teaching research skills to students in undergraduate research programs. Detailed information on the modules utilized in the SURE program to teach research skills to SURE student participants are presented in the section entitled Seminar Series. The effectiveness of teaching student participants research skills in the SURE program is presented in the section entitled Assessment and Evaluation. Final thoughts and suggested improvements on the work presented in this study are included in the section entitled Conclusions and Recommendations.

Motivation

High-quality research skills are an essential component in successfully navigating the graduate school process. The need for high-quality research skills were expressed by Lilja^[3] as fundamental components in becoming a successful engineering researcher. Lilja describes the needs of engineering researchers to critically evaluate the work of their peers, understand and utilize standard tools and techniques in their field of study, and present innovative ideas and results clearly in written and oral communication. All SURE student participants are not engineers, however the skills cited by Lilja are considered applicable for success in all disciplines represented within the SURE program. The fundamental components stated by Lilja for successful research were incorporated in the SURE 2007 program year through a three part seminar series focused on communication, investigation and documentation. All seminars were formulated and facilitated by the SURE Program Coordinator.

Seminar Series

Communications Seminars

The Communications seminar was split into three one hour workshops. Workshops one and two were conducted during the second and third week of the program. It is important to note that no research is conducted during the first week of the program due to lab orientations and safety training. The aim of each communication workshop included teaching student participants how to concisely explain their research topics through activity based learning. Activity based learning for the communication of student research projects were initiated through an ‘elevator talk’ activity, a common

exercise utilized in the business industry. The elevator talk is a 30 second jargon free summary of one's field of study used to engage and prompt interest of one's audience.

Duncan's^[4] Denver Business Journal article on the elevator talk was adapted for the Communications seminar. In workshops one and two students were required to compose elevator talks about their research projects for a fifth grade audience. During this activity each student participant individually presented their elevator talk to the other students and the SURE Program Coordinator, whom acted as the fifth grade audience. This activity provided the students with a general understanding of their research project and built confidence in their research communication skills prior to conducting their research experiments. Students were also required to present their elevator talks to their graduate student mentors and faculty advisors to obtain feedback. The feedback obtained ensured that student participants understood, at the onset, the main goals and student participant's role in the research project.

Workshop three was conducted three weeks prior to the conclusion of the SURE program (week 7). The elevator talk activity was re-visited and student participants prepared elevator talks for an audience representative of their field of study. During this activity each student participant individually presented their elevator talk to the other student participants and the SURE Program Coordinator, whom acted as the audience. This activity provided the students with an opportunity to practice the oral communication skills learned in workshops one and two for an audience representative of their field of study.

The Communications seminars provided in the 2007 SURE program exposed student participants to the fundamental component "presenting innovative ideas and results clearly in oral communication" for successful research, expressed by Lilja^[3]. The documents supplied to the students to complete the Communications seminars are located in Appendix A of this study.

Investigation Seminars

The Investigation seminar was split into two one hour workshops. Workshops one and two were conducted during the fourth and fifth week of the program, respectively. The aim of workshop one included teaching student participants how to conduct efficient literature reviews. The aim of workshop two focused on teaching student participants how to create an annotated bibliography based upon the literature review conducted in the previous workshop. Student participants were given materials with literature from Writing at the University of Toronto^[5] and the Purdue OnLine Writing Lab (OWL)^[6] on conducting a literature review and creating an annotated bibliography, respectively.

During the workshops students participated in group discussions facilitated by the SURE Program Coordinator. Group discussions focused on troubleshooting methods to aid students during the literature review and formulation of the annotated bibliography. This activity provided the students with an opportunity to obtain feedback specific to

their research project regarding the literature review and formulation of the annotated bibliography.

The Investigation seminars provided in the 2007 SURE program exposed student participants to the fundamental component “critically evaluate the work of their peers” for successful research, expressed by Lilja^[3]. The documents supplied to the students to complete the Investigation seminars are located in Appendix B of this study.

Documentation Seminar

The Documentation Seminar was conducted in a single one hour workshop during the sixth week of the program. The aim of the workshop was to teach students how to create and maintain a research notebook. Literature on formulating and maintaining a research notebook were given in the workshop. During the workshops students participated in group discussions facilitated by the SURE Program Coordinator. Group discussions focused on methods for documenting student research findings for easy retrieval for use in written communication. This activity provided the students with a chance to obtain feedback on efficiently documenting and evaluating research findings through maintaining a research notebook.

The Documentation seminar provided in the 2007 SURE program exposed student participants to the fundamental component “presenting innovative ideas and results clearly in written communication” for successful research, expressed by Lilja^[3]. The documents supplied to the students to complete the Documentation seminar are located in Appendix C of this study.

Table 1 displays a summary of the 2007 SURE Program Assessment, Logistics, and Research Skills Seminars. At the culmination of the SURE program, student participants show-cased the skills obtained during the Research Skills seminars in a final oral research presentation and written report.

Week	Seminar	Activity
1	Program Assessment and Logistics	SURE Program Orientation/ Lab Safety Training/ Pre-Program Survey
2	Communications Workshop 1	Elevator Talk Workshop 1
3	Communications Workshop 2	Elevator Talk Workshop 2
4	Investigation Workshop 1	Conducting Efficient Literature Reviews
5	Investigation Workshop 2	Creating an Annotated Bibliography
6	Documentation	Creating and Maintaining a Research Notebook
7	Communications Workshop 3	Elevator Talk Workshop 3
10	Program Assessment	Oral Research Presentations/Written Report Submissions/Post-Program Survey

Table 1: 2007 SURE Program Assessment, Logistics, and Research Skills Seminars.

Assessment and Evaluation

Evaluation of the 2007 SURE program was conducted on-site using pre-and post-surveys. The surveys consisted of a 13 question pre-program survey (in Appendix E), and a 35 question post-program survey (in Appendix F).

The pre-program survey was administered to the student participants during the first week of the program (week 1) at the orientation session by the SURE Assessment Director. Results from the pre-program survey described the student participant's initial thoughts about attending graduate school. This information is beyond the focus of this paper and will not be addressed in this study.

Post-program survey results examined attitudes about the quality of the SURE program components and are discussed below. The post-program survey was administered to the student participants by the SURE Assessment Director during the last week of the program (week 10). SURE 2007 program assessment results included 27 students.

In the 2007 post-program assessment survey SURE student participants were asked to rate the program using a quality rating scale of Excellent, Good, Fair, Poor, and Not

Applicable (NA). Table 2 displays the quality rating results of the research skills seminars obtained from the post-program survey for the 2007 SURE program year. Quality rating results were obtained from questions highlighted in grey on the post-program survey (Questions 15, 17, and 18 in Appendix F). Quality rating results are presented as percentages in Table 3 and are based upon results obtained in Table 2. Excellent and Good quality rating results were combined and represent a “Positive Rating” for the seminar. Fair and Poor quality rating results were combined and represent a “Needs Improvement Rating” for the seminar. Non-Applicable (NA) quality rating results represent a “No Response Rating” for the seminar. All research skills seminars obtained a “Positive Rating” of 70% or higher. The highest “Positive Rating” was received from the Communication Seminar (shown in bold in Table 3) (89%).

Research Skills Seminar	Excellent (1)	Good (2)	Fair (3)	Poor (4)	NA
Elevator talk (enrichment activity) (Communications Seminars)	14	10	3	0	0
Lit review & annotated bibliography (enrichment activity) (Investigation Seminars)	13	6	7	1	0
Research notebook (enrichment activity) (Documentation Seminars)	12	9	4	1	1

Table 2: Quality rating results of the Research Skills Seminars obtained from the post-program survey for the 2007 SURE program year.

Research Skills Seminar	Positive Rating	Needs Improvement Rating	No Response Rating
Elevator talk (enrichment activity) (Communications Seminars)	89%	11%	0%
Lit review & annotated bibliography (enrichment activity) (Investigation Seminars)	70%	30%	0%
Research notebook (enrichment activity) (Documentation Seminars)	78%	19%	1%

Table 3: Quality rating results of the Research Skills Seminars obtained from the post-program survey for the 2007 SURE program year.

Conclusions and Recommendations

New approaches, motivated by the work of Lilja^[3], were carried out in teaching research skills to undergraduate students in the 2007 SURE program year. SURE student participant's post-program survey responses during the 2007 SURE program year showed favorable quality ratings for all Research Skills Seminars.

Further analysis should be carried out to determine how to meet and reduce "Needs Improvement Rating" and interpret the "No Response Rating." To meet and reduce "Needs Improvement Rating" results, quality assessment techniques focused on improvement measures for the seminars, such as comment-based surveys and exit interviews of SURE student participants should be implemented. The application of comment-based surveys will also aid in the interpretation of the "No Response Rating." The suggested quality assessment techniques will be merged with that of the current pre and post-program surveys to meet and reduce "Needs Improvement Rating" and interpret the "No Response Rating" for each Research Skills Seminar.

Hopefully work presented in this study will be incorporated in other undergraduate research programs to aid in teaching research skills to undergraduate students.

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Appendix A: Elevator Talk Resources

SURE Research Experience Activity

How to make your 'elevator talk' a floor above the rest

The Denver Business Journal - February 11, 2005

by [Garry Duncan](#)

First impressions in the high-pressure world of selling are becoming more important. Having an effective "elevator talk" is essential in networking, engaging prospects and opening new doors. First impressions are easily sabotaged with an elevator talk that's unimpressive because it's too long or too short.

Elevator talks should only be for a one- or two-story building -- the time it takes an elevator to traverse one or two floors, and no more than 30 seconds. Advertisers and video production companies change images every two seconds to keep their prospect's interest. People tire quickly of tedious talk about services and credentials.

Avoid common labels and descriptions, because they play into stereotyping. Industry job titles such as consultant, systems analyst, trainer, contractor, therapist, Web designer, engineer, etc. lead to preconceived perceptions that can immediately dampen interest.

Your real aim is to distinguish yourself and your unique capabilities, and create interest. You want your talk to be like a good résumé, creating enough interest on the part of the receiver to want to find out more.

Use the most appealing aspects of your offering from your audience's perspective. Make clear how you do it differently from everyone else.

The payoff is the "what's in it for me?" and doesn't always have to be explicitly stated. Potential clients don't really care about you and your business. They only care about your ability to solve their problems. You have a maximum of **30 seconds** to get them to care. The easiest way to connect quickly is to articulate problems they can identify with. The stated or implied payoff is the solution to those problems.

Use your prospect's language and not your own industry or technical jargon. Unfamiliar acronyms cause the listener to tune out.

Trust and rapport develop if you convey that you understand your listener's world. The best way to convey understanding is to use the language of your audience, and know their challenges and problems.

A business owner hearing an introduction at a luncheon asked what a PEO (Professional Employer Organization) was. A simple, "We solve payroll, personnel and insurance problems" is stronger and clearer.

How to make your 'elevator talk' a floor above the rest (cont.)

Try this exercise: Pretend you have to explain what you do to a fifth-grade elementary class. Use no jargon or fuzzy words -- just simple talk. Then increase the grade level while keeping the simplicity.

Write out in 20 words or less how you do what you do. Describe your process and edit it until you have a creative way of conveying your message that stimulates the listener to want to know how you do what you do.

For example, if you're in a staff-leasing business, you could say, "I am in the staff-leasing business," which isn't unique. More intriguing is, "I provide quality emergency employees for businesses like yours, so that when one of your own employees is gone for any reason, there is no loss of productivity or reduction of services to your customers."

A specialty advertising products company says, "We impact your image, create sales and ensure repeat business by keeping your name in front of customers and prospects."

After you develop the best elevator speech possible, **you should test and re-test it with prospects.** Tighten it up so you'll know what works and what doesn't. When people start responding favorably, continue with the same message.

You may become tired of it, but remember that others are hearing it for the first time. Even if they've heard it before, the repetition reinforces it for a longer-lasting effect.

So tell me, what is it you do again?

Garry Duncan is principal of Denver-based Leadership Connections, a sales training company. Reach him at 303-462-1277 or garry@leadershipconnections.com.

SURE Research Experience Activity Exercises

1) Create an elevator talk for your SURE research with a fifth grade elementary class as your intended audience. Try doing this in 20 words or less.

Note your talk should answer the following questions.

What do you do?

Why is it interesting?

2) Create an elevator talk for your SURE research with someone in your research area as your intended audience. Try doing this in 20 words or less.

3) Test out your elevator talk with your SURE social graduate mentor use their feedback to improve your talk.

Appendix B: Literature Review Resources

What is a review of the literature?

A literature review is an account of what has been published on a topic by accredited scholars and researchers. Occasionally you will be asked to write one as a separate assignment (sometimes in the form of an **annotated bibliography**--see the bottom of the next page), but more often it is part of the introduction to an essay, research report, or thesis. In writing the literature review, your purpose is to convey to your reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. As a piece of writing, the literature review must be defined by a guiding concept (e.g., your research objective, the problem or issue you are discussing, or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries.

Besides enlarging your knowledge about the topic, writing a literature review lets you gain and demonstrate skills in two areas:

1. **information seeking:** the ability to scan the literature efficiently, using manual or computerized methods, to identify a set of useful articles and books
2. **critical appraisal:** the ability to apply principles of analysis to identify unbiased and valid studies.

A literature review must do these things:

- a. be organized around and related directly to the thesis or research question you are developing
- b. synthesize results into a summary of what is and is not known
- c. identify areas of controversy in the literature
- d. formulate questions that need further research

Ask yourself questions like these:

1. What is the **specific thesis, problem, or research question** that my literature review helps to define?
2. What **type** of literature review am I conducting? Am I looking at issues of theory? methodology? policy? quantitative research (e.g. on the effectiveness of a new procedure)? qualitative research (e.g., studies)?
3. What is the **scope** of my literature review? What types of publications am I using (e.g., journals, books, government documents, popular media)? What discipline am I working in (e.g., nursing psychology, sociology, medicine)?
4. How good was my **information seeking**? Has my search been wide enough to ensure I've found all the relevant material? Has it been narrow

- enough to exclude irrelevant material? Is the number of sources I've used appropriate for the length of my paper?
5. Have I **critically analysed** the literature I use? Do I follow through a set of concepts and questions, comparing items to each other in the ways they deal with them? Instead of just listing and summarizing items, do I assess them, discussing strengths and weaknesses?
 6. Have I cited and discussed studies **contrary** to my perspective?
 7. Will the reader find my literature review **relevant, appropriate, and useful**?

Ask yourself questions like these about each book or article you include:

1. Has the author formulated a problem/issue?
2. Is it clearly defined? Is its significance (scope, severity, relevance) clearly established?
3. Could the problem have been approached more effectively from another perspective?
4. What is the author's research orientation (e.g., interpretive, critical science, combination)?
5. What is the author's theoretical framework (e.g., psychological, developmental, feminist)?
6. What is the relationship between the theoretical and research perspectives?
7. Has the author evaluated the literature relevant to the problem/issue? Does the author include literature taking positions she or he does not agree with?
8. In a research study, how good are the basic components of the study design (e.g., population, intervention, outcome)? How accurate and valid are the measurements? Is the analysis of the data accurate and relevant to the research question? Are the conclusions validly based upon the data and analysis?
9. In material written for a popular readership, does the author use appeals to emotion, one-sided examples, or rhetorically-charged language and tone? Is there an objective basis to the reasoning, or is the author merely "proving" what he or she already believes?
10. How does the author structure the argument? Can you "deconstruct" the flow of the argument to see whether or where it breaks down logically (e.g., in establishing cause-effect relationships)?
11. In what ways does this book or article contribute to our understanding of the problem under study, and in what ways is it useful for practice? What are the strengths and limitations?
12. How does this book or article relate to the specific thesis or question I am developing?

Final Notes:

A literature review is a piece of **discursive prose**, not a list describing or summarizing one piece of literature after another. It's usually a bad sign to see every paragraph beginning with the name of a researcher. Instead, organize the literature review into sections that present themes or identify trends, including relevant theory. You are not trying to list all the material published, but to synthesize and evaluate it according to the guiding concept of your thesis or research question.

If you are writing an **annotated bibliography**, you may need to summarize each item briefly, but should still follow through themes and concepts and do some critical assessment of material. Use an overall introduction and conclusion to state the scope of your coverage and to formulate the question, problem, or concept your chosen material illuminates. Usually you will have the option of grouping items into sections--this helps you indicate comparisons and relationships. You may be able to write a paragraph or so to introduce the focus of each section.

*Written by Dena Taylor, Director, Health Sciences Writing Centre,
and Margaret Procter, Coordinator, Writing Support, University of Toronto.
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Appendix C: Literature Review Resources



Annotated Bibliographies

Brought to you by the Purdue University Online Writing Lab at <http://owl.english.purdue.edu>.

Definition

A bibliography is a list of sources (books, journals, websites, periodicals, etc.) one has used for researching a topic. A bibliography usually just includes the bibliographic information (i.e., the author, title, publisher, etc.).

An annotation is a summary and/or evaluation. Therefore, an annotated bibliography includes a summary and/or evaluation of each of the sources. Depending on your project or the assignment, your annotations may do one or more of the following:

Summarize: Some annotations merely summarize the source. What are the main arguments? What is the point of this book or article? What topics are covered? If someone asked what this article/book is about, what would you say? The length of your annotations will determine how detailed your summary is.

For more help, see our handout on paraphrasing sources at http://owl.english.purdue.edu/handouts/research/r_paraphr.html.

Assess: After summarizing a source, it may be helpful to evaluate it. Is it a useful source? How does it compare with other sources in your bibliography? Is the information reliable? Is it this source biased or objective? What is the goal of the this source?

For more help, see our handouts on evaluating resources at http://owl.english.purdue.edu/handouts/research/r_evalsource3.html.

Reflect: Once you've summarized and assessed a source, you need to ask how it fits into your research. Was this source helpful to you? How does it help you shape your argument? How can you use this source in your research project? Has it changed how you think about your topic? Your annotated bibliography may include some of these, all of these, or even others. So it's important, if you're doing this for a



class, to get specific guidelines from your instructor.

Purpose

To learn about your topic: Writing an annotated bibliography is excellent preparation for a research project. Just collecting sources for a bibliography is useful, but when you have to write annotations for each source, you're forced to read each source more carefully. You begin to read more critically instead of just collecting information.

To help you formulate a thesis: Every good research paper is an argument. The purpose of research is to state and support a thesis. So a very important part of research is developing a thesis that is debatable, interesting, and current. Writing an annotated bibliography can help you gain a good perspective on what is being said about your topic. By reading and responding to a variety of sources on a topic, you'll start to see what the issues are, what people are arguing about, and you'll then be able to develop your own point of view.

To help other researchers: Extensive and scholarly annotated bibliographies are sometimes published. They provide a comprehensive overview of everything that has been and is being said about that topic. You may not ever get your annotated bibliography published, but as a researcher, you might want to look for one that has been published about your topic.

Format

The format of an annotated bibliography can vary, so if you're doing one for a class, it's important to ask for specific guidelines.

The bibliographic information: Generally, though, the bibliographic information of the source (the title, author, publisher, date, etc.) is written in either MLA or APA format. For more help with formatting, see our MLA handout, available at http://owl.english.purdue.edu/handouts/research/r_mla.html, our APA handout, available at http://owl.english.purdue.edu/handouts/research/r_apa.html, or our handout on other types of formats, available



at http://owl.english.purdue.edu/handouts/research/r_docsources.html.

The annotations: The annotations for each source are written in paragraph form. The lengths of the annotations can vary significantly from a couple of sentences to a couple of pages. The length will depend on the purpose. If you're just writing summaries of your sources, the annotations may not be very long. However, if you are writing an extensive analysis of each source, you'll need more space.

Examples

See our handout for sample entries for an annotated bibliography at http://owl.english.purdue.edu/handouts/general/gl_annotatedbibEX.html.

Written by Geoff Stacks and Erin Karper, July 2001.

The following information must remain intact on every handout printed for distribution.

This page is located at

http://owl.english.purdue.edu/handouts/print/general/gl_annotatedbib.html

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Appendix D: Research Notebook Resources

SURE Research Activity

Keeping a Research Notebook

A research notebook is a document that helps organize, track, and perhaps most important, enriches, one's day to day problem solving and thought.

--http://www.vendian.org/mncharity/dir3/research_notebook/

You may think of a research notebook as a cook book. Recall that cook books include ingredients and directions. Here are some analogies.

INGREDIENTS

Materials – Software, Equipment

Resources – Papers, Books, Annotated Bibliographies, Personal Contacts

DIRECTIONS

Procedures – Experimental Steps, Simulation Steps, File Locations

QUESTIONS

- When should I start my research notebook?
- Should I keep an electronic or paper research notebook?
- How often should I update my research notebook?
- Do I need to review my research notebook?

More Resources

A Letter to Research Students, Duane A. Bailey

How to Succeed in Graduate School: A Guide for Students and Advisors. Marie desJardins.

EXERCISE

The back of this page contains an excerpt from a sample research notebook. Comment on parts of the notebook you believe are helpful and areas that you think need improvement.

Example Research Notebook: JUNE 2007

06/02/2007 (SATURDAY)

Log Hours (0.0HR)

Day of Rest

06/03/2007 (SUNDAY)

Log Hours (3.0HR)

4:00-7:00pm

Read Book #1 on Particle Swarm Optimization (pgs. 63-86)

Read Book #2 on Genetic Programming (pgs. 72-82)

06/04/2007 (MONDAY)

Log Hours (3.0HR)

12:30-1:30pm

Compiled possible conference list

Emailed Frank (co-Author) conference list

1:30-3:30pm

Reviewed Overall Modeling Approach for Software Toolbox

Appendix E: 2007 Pre-Program Survey

**Summer Undergraduate Research in Engineering/Science (SURE)
Selected Findings Pre – Program Survey**

At this point in your academic career, which <u>one</u> statement best describes your thoughts about attending graduate school?	
I plan to attend graduate school in the next year or two	
I probably will attend graduate school, but not 100% sure	
I have not made any decisions about graduate school	
I probably will not attend graduate school	
I do not plan to attend graduate school	

	Primary reason	Secondary reason	Not a reason
To pursue a particular research interest			
To learn more about graduate school in general			
To gain more exposure to this university			
To decide if I want to attend grad school at this university			
To decide if I want attend grad school at all			
To have something to do in the summer			
To learn new skills			
To enhance my resume for job possibilities			

Appendix F: 2007 Post-Program Survey

**Summer Undergraduate Research in Engineering/Science (SURE)
Post-Program Survey**

	Excellent	Good	Fair	Poor	NA
1. SURE housing arrangements					
2. Assistance with travel arrangements to Atlanta					
3. Assistance with travel arrangements from Atlanta					
4. Clarity of SURE program objectives					
5. Overall SURE program organization					
6. Helpfulness of social mentor					
7. Assistance with research from faculty advisor					
8. Guidance with research from lab graduate student(s)					
9. Availability of graduate student(s) from your lab					
10. Helpfulness of the program coordinator					
11. Helpfulness of the program director					
12. Clarity of research project objectives					
13. Experience gained from research project					
14. Quality of research facilities used for my project					
15. Elevator talk (enrichment activity)					
16. Graduate panel (enrichment activity)					
17. Lit review & annotated bibliography (enrichment activity)					
18. Research notebook (enrichment activity)					
19. Home buying (enrichment activity)					
20. State Power Plant (industry visit)					

For each question, please check one response to indicate your answer.

In terms of the SURE activities, please indicate if the frequency of each of the activities listed below was about right, too many, too few, or the activity should be eliminated from the program.

	About right	Too many	Too few	Eliminate this activity
21. Seminars on state-of-the art topics				
22. Visits to local industrial centers				
23. Group social outings				

24. In order to complete the objectives of the SURE program, do you think the length of the program was about right, too long or too short?

	About right
	Too long
	Too short

25. To what extent did your research project strengthen your overall learning experience while in the SURE program?

	Significantly strengthened learning experience
	Moderately strengthened learning experience
	Minimally strengthened learning experience
	Did not strengthen learning experience

26. To what extent, if any, did your experience in the SURE program enhance your understanding of the college life of a graduate student?

	Significantly enhanced my understanding
	Moderately enhanced my understanding
	Minimally enhanced my understanding
	Did not enhance my understanding either way

27. In which one of the following ways did your SURE program experience impact your thoughts about attending graduate school?

	SURE experience had no impact either way
	SURE experience increased my desire to attend graduate school
	SURE experience lessened my desire to attend graduate school

28. In your opinion, was the amount of the stipend appropriate given the program?

	Amount was appropriate
	Amount was too high
	Amount was too low

29. How likely would you be to consider attending this university for graduate education in the near future?

	Very likely (strong consideration)
	Somewhat likely (considering the possibility)
	Not likely (still possible)
	Not at all likely (no way)

30. In which one of the following ways did your SURE program experience impact your thoughts about attending graduate school at this university?

	SURE experience had no impact either way
	SURE experience increased my desire to attend graduate school at this university
	SURE experience lessened my desire to attend graduate school at this university

31. Would you recommend the SURE program to someone you know with similar interests?

	Would strongly recommend SURE
	Would probably recommend SURE
	Would not recommend SURE

32. What one suggestion would you make to improve the SURE experience?

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33. What would you say is the major strength of the SURE program?

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34. Below is a list of SURE program activities. How effective was each of these activities to develop a connection between you and your social mentor?

	Very effective	Moderately effective	Not effective	Did not attend
SURE mixer/pizza party (orientation day)				
Cookout at President's Glade for all Research Experience for Undergraduate students at this university				
State Aquarium outing				
Social Fest at university student center				
Six Flags Day				

35. Looking at this same list of SURE program activities, how effective was each of these activities to develop a sense of community among SURE student participants?

	Very effective	Moderately effective	Not effective	Did not attend
SURE mixer/pizza party (orientation day)				
Cookout at President's Glade for REU students				
State Aquarium outing				
Social Fest at university student center				
Six Flags Day				

Thank you again for completing this assessment component of the 2007 SURE Program.