

Course: Research Method in Software Engineering

WEEK 3 – Review of Literature

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Contents

1. Introduction to Literature Review
2. Strategies for locating related literature
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Learning Outcome

- Understand the purpose of literature review
- Learn methods for organizing literature
- Identify potential goals for conducting a review
- Understand the steps in doing a literature review
- Understand how to review the work of others and evaluate the quality of their methods, results, and conclusions

1. Introduction to Literature Review

What is Literature Review ?

- Means “look again” at (*re + view*)—what others have done in areas that are similar, though not necessarily identical to, one’s own topic of investigation.
- As a researcher, we should ultimately know the literature related to our topic **very, very well.**
- Do not include everything i.e., Only review work that is related to our topic and research questions

[1]. Leedy, P. D., & Ormrod, J. E. (2015). *Practical research: Planning and design*, 11th edn., global edition. Page-70

Benefits of Literature review

1. Help to ascertain whether other researchers have already addressed and answered our research problem or at least some of its subproblems.
2. It can offer new ideas, perspectives, and approaches that may not have occurred to us.
3. It can inform about other individuals who conduct work in this area—we may wish to contact for advice or feedback.
4. It can alert to controversial issues and gaps in understanding that have not yet been resolved
5. Show how others have handled methodological and design issues in studies similar issues

Benefits of Literature review ...cont'd

6. It can reveal sources of data we may not have known existed.
 7. It can introduce measurement tools that other researchers have developed and effectively used.
 8. Help interpret and make sense of our findings and, ultimately, help tie our results to the work of those who have preceded.
 9. It can boost confidence that our topic is one worth studying, because we will find that others have invested considerable time, effort, and resources in studying it.
- ❖ The more we know about investigations and perspectives related to our topic, the more effectively we can address our own research problem.

2. Strategies for locating related literature

- A good way to start is to identify one or more **keywords**—words or short phrases summarizing our research topic—that can point us toward potentially useful resources.
- A prime source of such keywords is **statement of research problem**.
- **Strategies for locating related literature:-** library catalog, online databases, reference librarians, the Internet, and other researchers' citations and reference lists.



<https://images.app.goo.gl/ULHuFSWxe3WRkwVw7>

[1] Leedy, P. D., & Ormrod, J. E. (2015). Practical research:

Planning and design, 11th edn., global edition. Page 70

2. Strategies for locating related literature ..Cont'd

1. **Library Catalog** : search through the cards in search of books relevant to our topic and then write down the call numbers of books we wanted to track down in the library's numerous shelves of books.

2. Online Databases

- Enable searches of thousands of journals and such other sources as books, chapters in edited books, dissertations, government documents, technical reports, and newspapers.
- A typical database allows to limit our search in a variety of ways—perhaps by keywords, title, author, year, source (e.g., journal title), language, or any combination of these.
- Many databases focus on particular disciplines and subject areas

3. Consulting with Reference Librarians

- Librarians sitting to help find needed information.
- They can also demonstrate how to use the computer catalog, hard-bound reference resources, online databases, or any of the library's other resources.



<https://images.app.goo.gl/MiAQ9ywXauTrvLp16>

[1] Leedy, P. D., & Ormrod, J. E. (2015). Practical research: Planning and design, 11th edn., global edition. Page-70

4. Surfing the Internet

- Internet as a source of such free-access online databases as Google Scholar, PubMed, and Google Books.
- Internet search begins with a **search engine** at a website such as Google, Bing, or Yahoo!

The screenshot shows a Google Scholar search for "software quality". The search bar at the top contains the text "software quality" and a magnifying glass icon. Below the search bar, it indicates "Articles" and "About 6,670,000 results (0.14 sec)".

On the left side, there are filters for "Any time" (with sub-options: Since 2024, Since 2023, Since 2020, Custom range...), "Sort by relevance" (with sub-option: Sort by date), and "Any type" (with sub-option: Review articles). At the bottom left, there are checkboxes for "include patents" (unchecked) and "include citations" (checked).

The search results are listed on the right. The first result is a book titled "Software quality: theory and management" by A Gillies, published in 2011 on books.google.com. The snippet mentions definitions of software quality and cites Kitchenham (1989b). It has 387 citations and 5 versions.

The second result is a PDF article titled "Strategic directions in software quality" by L Osterweil, published in ACM Computing Surveys (CSUR) in 1996 on dl.acm.org. The snippet discusses the current state of software quality and its poor quality. It has 174 citations and 6 versions.

The third result is a PDF article titled "A review of software quality models for the evaluation of software products" by JP Miguel, D Mauricio, and G Rodríguez, published as an arXiv preprint in 2014 on arxiv.org. The snippet discusses software quality in commercial, open source, and services contexts. It has 174 citations and 6 versions.

[1]. Leedy, P. D., & Ormrod, J. E. (2015). Practical research: Planning and design, 11th edn. Page-70

2. Strategies for locating related literatureCont'd

- **Some general strategies to keep in mind when using search engines:**
 - Use at least two keywords to limit our search. (For example, to locate research software quality, type the words *software* and *quality*.)
 - Type a plus sign (+) before any keyword definitely wanted in our search. (For example, to limit your search only to children who have autism, type “**+children**” and “**+autism.**”
 - To look for a phrase rather than a single word, put quotation marks around the phrase. (For example, if you are looking for the home page of the *software quality*, should type “**Software quality**” within quotation marks)

2. Strategies for locating related literatureCont'd

5. Using Citations and Reference Lists of those Who Have Gone Before us

- As a rule of thumb, we should track down any references we see cited by three or more other researchers.
- Such references are clearly influencing current work in our field and should not be overlooked

Search Strategy



Figure 1 . Reference searching strategies
<https://images.app.goo.gl/9vuqdo1xARerycjt5>

2. Strategies for locating related literatureCont'd

Example: - Software Engineering research problem

❖ How can security considerations be effectively integrated into the software quality assurance process to enhance both functional and non-functional quality attributes?

Keywords for literature search

- Software Quality
- Software Quality Assurance
- Functional Quality Attributes
- Non-Functional Quality Attributes
- Integration of security in software testing
- Impact of security on software quality

The screenshot shows a Google Scholar search for "Software Quality". The search bar at the top contains the text "Software Quality" and a search icon. Below the search bar, it indicates "Articles" and "About 6,600,000 results (0.11 sec)".

On the left side, there are filters for "Any time" (with sub-options: "Since 2024", "Since 2023", "Since 2020", "Custom range..."), "Sort by relevance" (with sub-option: "Sort by date"), and "Any type" (with sub-option: "Review articles").

Two search results are visible:

- [BOOK] Software quality: theory and management**
A Gillies - 2011 - books.google.com
... The definitions provided thus far may all be applied to **software**. However, some ... **software quality**. Kitchenham (1989b) refers to **software quality** as 'fitness for needs' and claims **quality** ...
☆ Save 📄 Cite Cited by 387 Related articles All 5 versions
- [PDF] Strategic directions in software quality**
L Osterweil - ACM Computing Surveys (CSUR), 1996 - dl.acm.org
... In summary, the panel is concerned about the current state of affairs in the area of **software quality**. The **quality** of **software** products is clearly unacceptably poor. A large and challenging ...
☆ Save 📄 Cite Cited by 174 Related articles All 6 versions

3. Evaluating the research of others

Planning a Literature Search

The main problem and subproblems provide a way to focus our attention as we read the literature.

- Literature Search approach involves the following steps:
 1. Write the problem in its entirety on the page or computer screen.
 2. Write each subproblem in its entirety as well.
 3. Identify the important words and phrases in each subproblem.
 4. Translate these words and phrases into specific topics we must learn more about.
 5. Go to the library catalog, its online databases, and the Internet to seek out resources related to our agenda (Topic).

[1]. Leedy, P. D., & Ormrod, J. E. (2015). Practical research: Planning and design, 11th edn. Page-78

- An important skill for any researcher is the ability to review the work of others and evaluate the quality of their methods, results, and conclusions.
- **Benefits of critically examining others research :**
 - Help to determine which ideas, research findings, and conclusions we should take seriously and which we can reasonably ignore.
 - Help to reconcile inconsistent findings obtained in previous research studies.
 - It can give some ideas about how we might improve our own research efforts
 - Helps to be knowledgeable about the kinds of conclusions that are and are not justified from various methodologies and types of data.

Organizing And Synthesizing the Literature into a Cohesive Review [1]

- In a good literature review, the researcher doesn't merely report the related literature but also evaluates, organizes, and synthesizes what others have done.
- But in addition to evaluating what we read, we must also **organize** the ideas we encounter during review.
- In many cases, the subproblems within main problem can provide a general organizational scheme we can use.
- Looking at how other authors have organized literature reviews related to our topic can be helpful as well.

- Most importantly, we must **synthesize** what we have learned from our review i.e., we must pull together the diverse perspectives and research results we have read.
- Some examples of what might do:
 - Identify common themes that run throughout the literature.
 - Show how approaches to the topic have changed over time.
 - Compare and contrast varying theoretical perspectives on the topic.
 - Describe general trends in research findings.
 - Identify contradictory findings, and suggest possible explanations for such contradictory.
- ❖ Thus if we write a literature review that does such things, we can contribute something new to the knowledge in the field even *before* we have conducted our own study.

- Finally , we can produce a table with the summaries of critical evaluation of each of the studies to scan across the set of papers.
 - Provide a clear and simple framework for making a comparative assessment of the papers.

- Study design and assumptions
- Methods of data collection
- Analytical methods
- Main findings
- Conclusions
- The study's strengths and limitations: (Clarity, Logic, Scope)

4. Guidelines for Writing a Literature Survey

We can create a comprehensive and well-structured literature survey that effectively communicates the current state of research in our field [1].

1. Search for articles, books and papers related to our subject.

- Be creative and persistent in our keyword search until you hunt down good references or examples.
- Try and decide on the parameters of our research--What exactly are our objectives and what do we need to find out?
- In our review, what are we looking at-- issues of theory, methodology, policy, quantitative research?

[1]. Leedy, P. D., & Ormrod, J. E. (2015). *Practical research: Planning and design*, 11th edn., global edition.

4. Guidelines for Writing a Literature Survey ...Cont'd

2. Exclude literature that is not very useful form our list of references.

- More references do not mean a better list of references.

3. In each document, identify the approach(es)/method(s) for solving problem(s), and compare this/these with what you already know.

4. Identify which approaches and/or methods we will use and omit in our research.

[1]. Leedy, P. D., & Ormrod, J. E. (2015). Pracfical research: Planning and design, 11th edn., global edition.

4. Guidelines for Writing a Literature SurveyCont'd

5. A good literature review needs a clear line of argument, therefore need to use the critical notes and comments made while doing our reading to express **anacademic opinion**.

- After we feel satisfied that know most of the existing approaches/methods, we do the following for each approach/method:
 - Describe how it works and what its components are
 - Tell what kinds of problems it is good at solving
 - Tell what kinds of problems it is poor or limited at solving
 - Mention other strengths and/or weakness of each approach
 - Tell if we will use or omit the approach for our research and why or why not

4. Guidelines for Writing a Literature SurveyCont'd

- Your review must be written in a formal, academic style.
- Keep your writing clear and concise, avoiding colloquialisms and personal language.
- always aim to be objective and respectful of others' opinions.
- Remember at all times to avoid **plagiarising** our sources.
- Always separate our source opinions from our own hypothesis.
- Making sure consistently reference the literature referring

Summary

- A literature review is an essential component in a research process that helps to not only inform and refine our study but also contributes to the advancement of knowledge in the field.
- Library catalog, online databases, reference librarians, the Internet, and other researchers' citations and reference are the strategies to locate related literature.
- An important skill for any researcher is the ability to review the work of others and evaluate the quality of their methods, results, and conclusions.
- By following guidelines literature review, one can create a comprehensive and well-structured literature survey that effectively communicates the current state of research in the field.

References

1. Leedy, P. D., & Ormrod, J. E. (2015). *Practical research: Planning and design*, 11th edn., global edition.
3. Walliman, N. (2021). *Research methods: The basics*. Routledge.

Thank You !