Systematic Review

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Outline

The goal

The Goal of a Systematic Literature Review

Rigorous Evaluation

"Present a just evaluation of a research topic using logical, reliable methods."

Ierardi et al. [1]

What is a Systematic Literature Review?

A **Systematic Literature Review (SLR)**

- Evaluates and interprets relevant research
- Focuses on a **specific research question**
- Applies a **structured and replicable method**

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The main objectives are:

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Key Parts of a SLR

A Systematic Literature Review typically involves:

- Planning the review
- Conducting the review
- Reporting the findings

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Planning

Planning a SLR: Key Steps

Upon selecting a research topic, one must:

- Formulate **clear and precise research questions**
- Choose **appropriate databases**
- Establish **criteria for inclusion and exclusion**
- Define a **Boolean search strategy**

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Research Questions: Key Criteria

In physics, clear and precise research questions should meet the following criteria: [2]

- **Specificity:** Focus on a well-defined aspect of the topic
- **Quantifiability:** Allow measurable or testable outcomes
- **Feasibility:** Be realistic given available resources and methods
- **Novelty and Connection:** Explore new ideas or link existing concepts meaningfully

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Databases and Reference Managers

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- ScienceDirect
- Scopus
- SpringerLink
- Wiley Online Library

Reference Management Tools

- Zotero
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- JabRef

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Inclusion and Exclusion Criteria

Purpose

Define clear rules to **filter relevant studies** and maintain the **quality and focus** of the review.

Inclusion Criteria

- Published in peer-reviewed journals
- Focused on the research topic
- Within a defined time range
- Available in full text
- Written in selected languages (e.g., English)

Exclusion Criteria

- Non-peer-reviewed (e.g., blogs, opinion pieces)
- Irrelevant or off-topic studies
- Duplicate publications
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Boolean Search Strategy

Purpose

Build a **structured and efficient search query** to find relevant studies while minimizing noise.

- **AND**: Narrows the search by combining terms.
  - e.g., `quantum AND entanglement`
- **OR**: Broadens the search to include either term.
  - e.g., `nanomaterials OR nanoparticles`
- **NOT**: Excludes terms from the search.
  - e.g., `superconductivity NOT high-temperature`
- **Parentheses and Quotes**: Group terms and fix expressions.
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Conducting

Primary Sources

What to Select

- Focus on **primary research articles**.
- Prefer materials published in **peer-reviewed journals**.

What to Avoid

- Review papers and meta-analyses
- Books, book chapters, PhD theses
- Surveys and secondary summaries

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Study Characteristics

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Reporting

The Report

Beyond Listing

A Systematic Literature Review (SLR) is **not** just a list of authors and publications.

Critical Discussion

It must present a **critical analysis** of the literature, demonstrating **understanding** of arguments, results, and differing points of view.

Answer the Research Questions

The final report should **explicitly answer** the research questions defined during the planning phase.

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Bibliography

References

[1] Carmelina Ierardi et al. ***Revisión sistemática de la literatura en ingeniería de sistemas. Caso práctico: técnicas de estimación distribuida de sistemas ciberfísicos. Jornadas de Automática.*** 37th ed. Literaturangaben. Coruña: Universidade da Coruña, 2017. 11038 pp. ISBN: 9788497497749.

[2] Michael P. Marder. ***Research Methods for Science.*** Description based on publisher supplied metadata and other sources. Cambridge: Cambridge University Press, 2011. 1237 pp. ISBN: 9780511927782.

Thank You!

Thank you for your attention!

Questions?