Systematic quantitative literature reviews
What are they and why use them?

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Resources


http://dx.doi.org/10.1080/07294360.2013.841651.

Lots resources on our method at - http://www.griffith.edu.au/environment-planning-architecture/griffith-school-environment/research/systematic-quantitative-literature-review
Literature review

- **Process** – gain understanding of the existing literature and how your research will contribute to it.
- **Product** – demonstrate this in the document

Different audiences for literature reviews include – industry/company, academic, consultancy, government....

Relationship between thinking, knowledge production and writing...

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Literature reviews.....

We all produce them...

1. But what is my topic?
2. How do I do them?
3. What method are available?
4. How do the methods differ?
5. Why should I consider doing a......

   Systematic Quantitative Literature Review?
Common things in reviews

- Define terms
- Justify selection of literature – it cannot be everything...
- So also...justify omissions
- Have a clear structure and let the reader know about it early in the text (could be historical, conceptual or methodological)
- Link your work with the literature
- Critique the literature
- Define the gap

Criteria for evaluating literature reviews

(Boote and Beile 2005)

Coverage
- Is there well justified criteria for inclusion and exclusion of literature?

Synthesis
- Does it distinguish what done from what needs to be done?
- Does it place topic in broader scholarly literature?
- Does it place topic in historical context of field?
- Has the writer acquired and enhanced subject vocabulary?
- Articulated the important variables and phenomena?
- Synthesized and gained a new perspective on literature?
Criteria for evaluating literature reviews

(Boote and Beile 2005)
Methodology
• Identified main methods and techniques (advantages/disadvantages)
• Related ideas and theories to these

Significance
- Practical significance of the topic
- Scholarly significance of the research

Rhetoric
• Writing coherent, with a clear structure and style?

Let's start by working out what you are going to review

• Focus on your topic
• What broad discipline areas?
• How do they fit together?
• What literature do I need to read?
• What is it an important topic?
• How do I structure/justify the topic?
Evaluate/synthesis/analysis topics related to your research question

1. What's my question and what disciplines are involved?
2. What's the literature I need to review?

3. How do I structuring my literature review?  
   Turning circles into a triangle

The literature to review

Your research

The text of the literature review

Aims
3. How do I structuring my literature review?
Turning circles into a triangle

The literature to review

1. Your research
2. The text of the literature review
3. Stepped out argument

Leading to the aims

Aims

What methods are available?

1. Traditional narrative
2. Meta-analysis
3. Systematic quantitative literature review
What about the traditional non systematic narrative review?

It involves...

• Reading as much literature as possible
• Assessing its importance
• Constructing carefully argued narrative of your analysis of the current status of research

A method for qualitative/narrative reviews

• Create an audit trail
• Define the focus of review
• Search for relevant literature
• Classify documents
• Create summary database
• Identify constructs and linkages
• Search for differing opinions
• Corroborate by checking with others...
Evaluating papers

Think about and make notes/database on...
• What were the aims/objectives of the research?
• What were the outcomes?
• What approaches/methods/strategies were used?
• What was the context of the research
• How does it contribute to the field
• Is it connected to my research question, and how?

What about systematic approaches?

• Reproducible
• Rigorous
• Comprehensive
• Clear rules for inclusion/exclusion of literature
What about systematic approaches?


Maybe try a Meta-analysis?

- Statistical method for combining results from separate studies to assess effect size often using weighted average.
- Often need studies with similar methodology, similar subjects and similar response variables
- Common in health sciences and many other areas when enough suitable datasets.
- Can need team of experts and lots of time!
Examples of systematic reviews using meta-analysis

Cochrane Databases of systematic reviews (mostly health care but also social)

Campbell Collaboration – public policy interventions (crime, education, social welfare etc)


Cochrane and Campbell reviews

• Clear rules regarding methods
• Need to have proposed methods registered and evaluated before commencing
• Often costly/time consuming (>50,000)
• Require team of specialists, including discipline area, but also information specialists, statisticians, and researchers with expertise in these reviews
So what about using a systematic quantitative literature review?

Mapping the discipline...

1. **Systematic** = methods to survey literature and select papers to include are explicit and reproducible
2. **Quantitative** = measure of the amount (number of papers) of research within different sections of topic
3. **Comprehensive** = assesses different combinations of locations, subjects, variables and responses
4. **Structured** = working out what is important about the literature (categories/subcategories) - collecting, analysing literature, and writing follows clear steps

Easier step by step process for collecting, analysing the data and the writing the review

- **Step 1** Define topic
- **Step 2** Formulate research questions
- **Step 3** Identify keywords
- **Step 4** Identify & search databases
- **Step 5** Read & assess publications
- **Step 6** Structure database
- **Step 7** Enter first 10% papers
- **Step 8** Test & revise categories
- **Step 9** Enter bulk of papers
- **Step 10** Produce & review summary tables
- **Step 11** Evaluate key results & draft results section
- **Step 12** Draft methods
- **Step 13** Draft introduction
- **Step 14** Draft discussion & abstract
- **Step 15** Revise document till ready for submission
Summary of the different methods

<table>
<thead>
<tr>
<th></th>
<th>Traditional narrative</th>
<th>Systematic quantitative</th>
<th>Meta-Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who commonly does the reviews?</td>
<td>Experts &amp; new PhD students</td>
<td>PhD students &amp; others</td>
<td>Teams of experts</td>
</tr>
<tr>
<td>How can usually publish them</td>
<td>Experts</td>
<td>PhD students &amp; others</td>
<td>Teams of experts</td>
</tr>
<tr>
<td>How papers selected</td>
<td>Rarely systematic</td>
<td>Systematic</td>
<td>Systematic</td>
</tr>
<tr>
<td>Compiling data on papers</td>
<td>Rarely systematic</td>
<td>Systematic</td>
<td>Systematic</td>
</tr>
<tr>
<td>Comparing papers</td>
<td>Expert evaluation</td>
<td>Quantitative or expert evaluation</td>
<td>Expert evaluation</td>
</tr>
<tr>
<td>Statistical analysis</td>
<td>No</td>
<td>If want to</td>
<td>Yes</td>
</tr>
<tr>
<td>Gap analysis</td>
<td>Descriptive</td>
<td>Quantitative</td>
<td>Descriptive</td>
</tr>
<tr>
<td>Structure of the document</td>
<td>Narrative</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Easy for updating</td>
<td>Limited</td>
<td>Easy</td>
<td>Re do statistics</td>
</tr>
</tbody>
</table>

Method with benefits...

1. Straight forward structure/process for undertaking and writing review
2. Maps the literature by – finding geographic, scalar, theoretical and methodological gaps
3. Identifies unknown unknowns
4. Can be rapidly turned into academic paper
5. Database can be easily updated
6. Database useful for intro/discussion of other papers/later research
7. Easier latter as do not have to re-read the whole literature again!
Systematic quantitative literature views works for students

Averaging 33 citations per year for each paper

So how do you do it...


Includes –
1. Youtube videos on each stage,
2. Papers outlining the approach,
3. Papers published using the method,
4. Youtube videos of students talking about the method
5. Example excel databases
6. Youtube video on why publish during your PhD

Also article in The Conversation - But I will summarise it for you now!
Being systematic when fishing

Aim: need to catch all the specified fish, but not spend forever, and minimise bycatch.

Questions

- Why fish? Aims and research questions
- What fish? Papers vs books, thesis, reports and other grey literature, other languages etc
- What nets to use? Are there keywords that work? Title+Keywords+Abstract vs whole paper?
- Where to fish? Which Databases and how do they differ?
- How long to fish? When have you found all the specified fish?
Step 1. Define topic

Works well for
- Emerging areas,
- Topics where methods so diverse cannot do meta-analysis
- Trans-disciplinary fields

Examples on website and published in journals such as:

Step 2. Formulate research questions

...e.g...
1. Who did the research and when?
2. Where was the research done? – geographical spread
3. What are were the main themes?
4. What methods were used?
5. What subjects examined?
6. What variables measured?
7. What patterns found in results?
8. What are the gaps and future trends?
Step 3. Key words

• Need to identify relevant literature, but not lots and lots of irrelevant literature
• Trial and error
• May need synonyms
• Talk to university librarians

Example... (also use wildcards)

Step 4. Search databases relevant to your field

1. Google Scholar
2. Science Direct
3. Scopus,
4. ProQuest
5. Web of Knowledge
6. Sage
7. Bio Med
8. Hein Online
9. Westlaw
10. OVID
11. EBSCOHost
Step 5. Read and assess papers

For each publication:
• Is it relevant?
• Abstract for some, whole paper for others
Need criteria for inclusion – reproducibility
• Original research papers only? (may want to limit to certain types of research)
Use reference lists and citations of the paper to cross-check you have all (most!) papers – that its systematic.

How many relevant papers did you find?
• If <15 papers – narrative might be better, or broaden topic
• If ~>300 may need to narrow topic
Creating your own database

Step 1: Define topic
Step 2: Formulate research questions
Step 3: Identify keywords
Step 4: Identify & search databases
Step 5: Read & assess publications
Step 6: Structure database
Step 7: Enter first 10% papers
Step 8: Test & revise categories
Step 9: Enter bulk of papers
Step 10: Produce & review summary tables
Step 11: Evaluate key results & draft results section
Step 12: Draft methods
Step 13: Draft introduction
Step 14: Draft discussion & abstract
Step 15: Revise paper till ready for submission

Step 6: Structure database

Work out categories and subcategories...
This provides structure for the review
Include data on..
Who does research, where, using what methods, what response variables, what subjects, what types of analysis was used, what found?

Excel works well but can use other programs
• Each paper is a row
• Categories/subcategories are columns
May want to use word clouds to help work out categories, terms and themes

Categories about the paper

Full reference details: Authors names, Year, Journal title, Journal discipline, Article research discipline

Categories about geographic location of research

City, State, Country, Continent, Climatic zone, General habitat types, others
**Categories for subjects of research**

For Birds

- Number and name of bird species assessed.
- Conservation status of the birds?
- Type of foraging guild?

**Categories for response variables**

For birds

- Individual response? (physiological or behavioural),
- Population level response? (density/abundance),
- Reproductive response? (number of nests, number eggs laid, number of chicks that hatched or fledged)?

**Categories about the methods used**

What you include depends on the discipline...... Some examples...

- Observational vs experimental?
- Was it a BACI design or what.. What statistics were used....?
- Natural science, social science or mixed?
- Which qualitative approach(es)? (interviews, content and text analysis, case studies, observations, focus groups, archival research),
- Which quantitative approach(es)? (questionnaire surveys, field-surveys and samples, field experiments, GIS, remote sensing and satellite imagery)
- Which mixed approach? (including existing data base and records searches, or other literature analysis).
Weighting methods/studies.....

Weight studies by types of evidence?
1. Randomized control trails (number replicates, effect size etc)
2. Before, After, Control, Impact (BACI) experiments
3. Experiments with controls
4. Observational studies with ‘controls’, Quasi-experimental designs,
5. Observational studies without ‘controls’,
6. Cohort studies
7. Case studies

Can also use checklists to compare studies using similar methods – high, moderate and low quality....

Problem if interdisciplinary study in how to assess different types of evidence....

Categories for results

• Studied and discussed, or actually demonstrated?
• Outcomes positive, negative, neutral, mixed or other?
• More detailed results – Statistically significant, size effect/number of replicates, power of analysis?
• Others?
Step 7. Enter around 10% of papers

- Step 1: Define topic
- Step 2: Formulate research questions
- Step 3: Identify keywords
- Step 4: Identify & search databases
- Step 5: Read & assess publications
- Step 6: Structure database
- Step 7: Enter first 10% papers
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Step 8. How well do the categories work?
- Are they to narrow or broad?
- Do you need additional values, new subcategories?
- Do the criteria apply to categories work in reality?
- Reflection now saves lots of time later!

Step 9: Enter rest of papers
- Again cross check your categories and criteria
- Check your database is comprehensive (reference lists)
Step 10: Produce and review summary tables so you can....

1. Check your database is accurate (entry errors)
2. Start to work out the most important results

A few examples of tables from papers...

<table>
<thead>
<tr>
<th>Country</th>
<th>Community Gardens</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>51</td>
<td>119</td>
</tr>
<tr>
<td>Australia</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Canada</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>UK</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>South Africa</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Spain</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Cuba</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Mexico</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Portugal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Israel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other Africa</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>195</td>
</tr>
</tbody>
</table>

Where studies?

# papers on community gardens by countries and # countries authors from (based on author affiliations).

**Figure 1.** Location in USA of gardens in the literature.
Can get fancy now with Google maps and GIS

Abstracts from conferences

Definitions used in papers

<table>
<thead>
<tr>
<th>Category</th>
<th>Total USA</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics of gardens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>31</td>
</tr>
<tr>
<td>Typology</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Food produced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>75</td>
<td>46</td>
</tr>
<tr>
<td>Food only</td>
<td>47</td>
<td>22</td>
</tr>
<tr>
<td>Food and flowers</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>Food &amp; revegetation</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not specified</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

Methods used in papers

<table>
<thead>
<tr>
<th>Category</th>
<th>Total USA</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social science</td>
<td>76</td>
<td>43</td>
</tr>
<tr>
<td>Natural science</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mixed</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview</td>
<td>53</td>
<td>28</td>
</tr>
<tr>
<td>Case study</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>Observation</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td>Survey</td>
<td>27</td>
<td>18</td>
</tr>
<tr>
<td>Text analysis</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Focus groups</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Natural science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Type of data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualitative</td>
<td>51</td>
<td>28</td>
</tr>
<tr>
<td>Quantitative</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Both</td>
<td>31</td>
<td>19</td>
</tr>
</tbody>
</table>
### Number of papers by discipline and results

<table>
<thead>
<tr>
<th>Journal discipline</th>
<th>Positive</th>
<th></th>
<th>Negative</th>
<th></th>
<th>Neutral</th>
<th></th>
<th>Mixed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>US</td>
<td>Other</td>
<td>US</td>
<td>Other</td>
<td>US</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>14</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Enviro. &amp; planning</td>
<td>16</td>
<td>5</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Health</td>
<td>9</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economy</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>17</td>
<td>7</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Biology</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>67</td>
<td>35</td>
<td>32</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

**Trends over time**

Social Science abstracts = 485 (64%) (86 mixed)
Leximancer analysis of themes


Map concepts by extracting and ranking a list of key words and phrases from source texts. Then uses intelligent algorithm to iteratively build a thesaurus of concepts from more than one or two keywords. Concepts are indexed and weighted.

Identify related concepts, but also topics missing

3. Writing the review

Step 1
Define topic

Step 2
Formulate research questions

Step 3
Identify keywords

Step 4
Identify & search databases

Step 5
Read & assess publications

Step 6
Structure database

Step 7
Enter first 10% papers

Step 8
Test & revise categories

Step 9
Enter bulk of papers

Step 10
Produce & review summary tables

Step 11
Evaluate key results & draft results section

Step 12
Draft methods

Step 13
Draft introduction

Step 14
Draft discussion & abstract

Step 15
Revise paper till ready for submission
Although its a literature review it could have a standard paper structure

<table>
<thead>
<tr>
<th>Sections</th>
<th>Order written</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>7</td>
</tr>
<tr>
<td>Introduction</td>
<td>3 (aims) 5/6 rest</td>
</tr>
<tr>
<td>Methods</td>
<td>1</td>
</tr>
<tr>
<td>Results</td>
<td>2</td>
</tr>
<tr>
<td>Discussion</td>
<td>5/6</td>
</tr>
<tr>
<td>Conclusion</td>
<td>4</td>
</tr>
<tr>
<td>Reference</td>
<td>8</td>
</tr>
</tbody>
</table>

More time thinking about what to say = less time writing

Step 11: Methods

Need details about
- Key words
- Databases searched
- PRISMA statement
- Criteria for using a paper
- Categories/subcategories – what, why and how values assigned
- Data analysis/issues examined
Step 12: Key results are....

So what was the
• Breadth?
• Depth?
• Methods?
• Main results?
• Key gaps?

Of research on this topic currently....

Results need to match research questions – so update as required

Revising your Aims so match the results

Update your aims. They are the last paragraph of the introduction – often a list of aims

This paper assesses....

1.
2.
3.
4.

Mind map what you need to say in the rest of the paper before writing
12: Writing the Results

*Results should document – quantitative!*

1. How many papers?
2. Who publishes?
3. Where has research been done?
4. What disciplines do research on this topic?
5. What methods are used?
6. What's been found/demonstrated?
7. What's missing – gaps?

Text to highlight key results from tables...

**The golden thread**

13. Introduction

- Carefully stepped out argument from the most general to the most detailed – e.g. your aims
- ~4-5 paragraphs for a paper, longer for a thesis/report?
- Remember its a stepped argument, so everything needs to lead to the aims...
- Which need to be good and match what you actually did and found....
14a. Discussion

• Discuss the results in relation to the literature...
• For this literature review discuss the implications of what you found.

  e.g. From Guitart et al. it was...
  1. Community gardens literature is geographically limited
  2. Community gardens literature is diverse
  3. Current research reflects USA social-political context
  4. Future directions

14b. Abstract

Word limit
Make every word count
Remember its not your aims its everything so need methods, results, discussion and conclusion in there...
Step 15: Revise the paper till ready for submission

More practice = fewer drafts – but few people get it right first go as different drafts have different functions.

- Early drafts are about getting the information on paper
- Mid drafts are about working out a better way to convey the information
- Later drafts are about checking it’s all there and polishing.

So as you can see...

1. Straight forward structure/process for undertaking and writing review
2. Maps the literature by – finding geographic, scalar, theoretical and methodological gaps
3. Useful to demonstrate what you will do in your PhD
4. Can be rapidly turned into paper
5. Database can be easily updated
6. Database useful for intro/discussion of other PhD papers
7. Easier to use for final thesis without having to re-read the whole literature again!
Remember the supporting material


Includes —
1. Youtube videos on each stage,
2. Papers outlining the approach,
3. Lots papers published using the method,
4. Youtube videos of students talking about the method
5. Youtube video on why publish during your PhD
6. Example databases

Pass on link to others who may find useful!
Hopefully soon this is you.....