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

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Online supporting material
http://www.griffith.edu.au/environment-planning-
architecture/griffith-school-environment/
/research/systematic-quantitative-literature-review

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 PhD
6. Example databases
Pass on link to others who may find useful!

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...

Questions you may have today...

Literature Reviews – we all produce them, but...
1. 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?

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

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
1. What's my research question?
2. What are the related broad discipline areas? & how do they fit together?
3. What literature do I need to read?
4. What is it an important topic & how do I structure/justify the topic?
4. How do I structuring my literature review?  
Turning circles into a triangle

What methods are available?
1. Traditional narrative
2. Meta-analysis
3. Systematic quantitative literature review

4. e.g. why it is an important topic & the structure/justification of the topic

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

The literature to review

The text of the literature review

Aims

1. Traditional narrative
2. Meta-analysis
3. Systematic quantitative literature review

The text of the literature review

Stepped out argument
Leading to the aims

1 2 3 4

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Aims

The literature to review
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...

What about systematic approaches?

• Rigorous
• Comprehensive
• Reproducible
• Clear rules for inclusion/exclusion of literature

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?


Records identified through database searching
Records after duplicates removed
Records screened
Full-text articles assessed for eligibility
Studies included in quantitative synthesis
Records excluded
Additional records identified through other sources
Full-text articles excluded, with reasons
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!
- Deals with issues of low sample sizes and voodoo correlations in some single studies.

See interesting new meta-analysis of the literature assessing relationships between student evaluations of teaching (SET) and student learning including critiquing previous meta-analysis and conducting a much more rigorous one.

And basically it says student satisfaction is NOT linked to leaning success


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

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)


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 & revise summary tables
Step 11 Evaluate key results & drill results section
Step 12 Draft methods
Step 13 Draft introduction
Step 14 Draft discussion & abstract
Step 15 Revise document till ready for submission

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!

Summary of the different methods

<table>
<thead>
<tr>
<th>Method</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>

Systematic quantitative literature views

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!

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Being systematic when fishing

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

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

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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)

May want to use word clouds to help work out search terms

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**

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

**When to stop on Google Scholar**

Google scholar = broad net and large pond

It applies the Boolean operators (AND, OR and NOT) automatically and priorities matches to your search

Includes more than just papers

If 5 pages of google scholar search results are not relevant... the probability the next example will be is less than 1/50, so can stop searching.
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

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 behaviour),
• 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).

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?

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....

Step 7. Enter around 10% of papers
Step 8. How well do the categories work?

- Are they to narrow or broad?
- Do you need additional values, new subcatagories?
- 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></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

Country Community Gardens Authors
USA 51 119
Australia 12 26
Canada 5 17
UK 8 18
South Africa 2 3
Netherlands 1 3
Singapore 1 2
Spain 1 2
Cuba 2 1
Mexico 1 1
Portugal 1
Sweden 1 1
Israel 1
Brazil 1
Other Africa 2
Philippines 1
Total 89 195
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>Yes 30</td>
<td>18 12</td>
</tr>
<tr>
<td></td>
<td>No 55</td>
<td>31 24</td>
</tr>
<tr>
<td></td>
<td>Typology  3</td>
<td>2 1</td>
</tr>
<tr>
<td></td>
<td>Food produced Yes 75</td>
<td>46 29</td>
</tr>
<tr>
<td></td>
<td>Food only  47</td>
<td>22 25</td>
</tr>
<tr>
<td></td>
<td>Food and flowers 25</td>
<td>23 2</td>
</tr>
<tr>
<td></td>
<td>Food &amp; revegetation 4</td>
<td>2 2</td>
</tr>
<tr>
<td></td>
<td>No Not specified 12</td>
<td>8 4</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>Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social science</td>
<td>76</td>
<td>43 33</td>
</tr>
<tr>
<td>Natural science</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mixed</td>
<td>9</td>
<td>6 3</td>
</tr>
<tr>
<td>Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview</td>
<td>53</td>
<td>28 25</td>
</tr>
<tr>
<td>Case study</td>
<td>23</td>
<td>11 12</td>
</tr>
<tr>
<td>Observation</td>
<td>26</td>
<td>12 14</td>
</tr>
<tr>
<td>Survey</td>
<td>27</td>
<td>18 9</td>
</tr>
<tr>
<td>Text analysis</td>
<td>14</td>
<td>10 4</td>
</tr>
<tr>
<td>Focus groups</td>
<td>13</td>
<td>8 5</td>
</tr>
<tr>
<td>Natural science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>11 6</td>
</tr>
<tr>
<td>Type of data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualitative</td>
<td>51</td>
<td>28 23</td>
</tr>
<tr>
<td>Quantitative</td>
<td>5</td>
<td>4 1</td>
</tr>
<tr>
<td>Both</td>
<td>31</td>
<td>19 12</td>
</tr>
</tbody>
</table>

Number of papers by discipline and results

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

Trends over time

Cluster analysis of related theory/theorist
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

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

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: Draft methods

Step 12: Draft introduction

Step 13: Draft discussion & abstract

Step 14: Draft methods

Step 15: Revise paper till ready for submission

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

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

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

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 it's not your aims it's 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.....