

Nurse Author & Editor

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Simplifying Synthesis

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As a faculty member, journal manuscript reviewer, grant reviewer, and mentor for scholars I have the opportunity to read many manuscript drafts, student papers, dissertations, scholarly reports, and grant proposals. Writers that I work with can easily summarize material but seem to struggle to adequately synthesize knowledge about their topic and express that in their writing. Synthesizing materials for a literature review seems to be particularly hard for writers to do well.

Until recently I struggled to articulate how to do this work and thought if I just told others to synthesize they would understand what that meant, but that wasn't the case. It turns out I wasn't alone facing this teaching challenge as faculty who typically guide students find it challenging to help students learn how to synthesize

material (Blondy, Blakesless, Scheffer, Rubenfeld, Cronin, & Luster-Turner, 2016; Kearney, 2015). Also, since there are many ways to synthesize the same information, it can be approached in different ways, making it even harder to explain to novices. Many writers need help learning how to perform this challenging task and there may be some ways to explain and guide this process for struggling writers.

Synthesis requires decision making, analysis, evaluation, and creation of new material, all rather high levels of thinking. These are skills that people use every day in nursing practice and probably don't even think about it. The Merriam-Webster dictionary defines synthesis as something that is made by combining different things or the composition or combination of parts or elements so as to form a whole (Synthesis, n.d.). In other words, it involves taking information from a variety of sources, evaluating that information and forming new ideas or insights in an original way.

Building solid synthesis skills is important for nurses, writers, and researchers. Quality evidence-based practice initiatives and nursing care are based on understanding and evaluating the resources and research available, identifying gaps, and building a strong foundation for future work. Putting the data gathered, references read, and literature analyzed together in a new way that shows connections and relationships is what good synthesis is all about.

STEPS TO SYNTHESIS

Synthesizing literature requires the use of several steps of the taxonomy of cognitive learning. The first step involves identifying the topic or defining the problem. Having a clear focus on the issue will help as you search the literature for relevant resources to review. It is important to have sufficient references to ensure that you have an adequate knowledge base about the topic. As you read

the references you have gathered, learn what is known about the topic. Apply your critiquing skills and consider what was reported, what the findings mean in relationship to the topic, and what contribution it makes to the literature. Analyze each part of the reference and identify important information. Think about conclusions you can draw from the readings and how the references are related. As you evaluate the merit of each reference, appraise the work and compare and contrast what you are reading. At this point you will be using critical thinking skills to make judgments about the readings and assessing strengths and weaknesses. The last step of synthesis involves creating, the highest level of cognitive learning in the most recent revision of Bloom's taxonomy of learning (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths, & Wittrock, 2001). Creating involves the construction of a new product. This is more than just repeating what is found in the original sources. It involves mental reorganization or drawing from those sources to generate a new idea. You will be combining the information from the readings into something new.

Many people find it helpful to create a literature review matrix or summary table to help sort and organize information and guide the synthesis process. This matrix is basically a table that summarizes key components of the readings. Information from each source reviewed is entered horizontally on the table. If reviewing research articles, the vertical columns of the matrix might include items such as the research problem/purpose, variables, design, sample, methods, findings, implications, and limitations. See Table 1 for a literature review matrix table template. After critically reading and appraising the rigor of the work, extract critical information from the article and enter that onto the literature review matrix. Record information in each column for all sources read and evaluated. Many novice writers simply use this table to then summarize each article when writing their literature review; however, this is not sufficient. To truly synthesize the literature, new information needs created. So, review the columns of the matrix

and look for commonalities, areas of agreement and disagreement, and patterns of findings between studies. Compare and contrast the information across the different readings (Blondy et al., 2016). As you complete the matrix, review each column of the matrix and consider how the information is related. Make judgments about the readings and their relationship to each other. Pay particular attention to the findings column as you make your assessments from study to study. If there are many sources it may be helpful to use colored highlighters to visually identify and group common elements found in the matrix (Pinch, 1995). Use the common elements or themes that emerge from this critical review to organize your writing and construct your new ideas. As you review the columns you will also want to look for missing elements that emerge in the literature as those gaps will be important to report. Those gaps will provide you with suggestions for future research needed about the topic.

Once you have completed this review it is time to begin writing. Sometimes it is helpful to start writing the literature synthesis with an overview or general statement about common themes that emerged. Then, move onto writing about the specific components of the reviewed studies that provide support for your synthesis. You will be providing enough supportive details from the articles reviewed to build your case for your conclusions. The details you include when writing about the reviewed studies should provide the reader with context but should not resemble an abstract of the reviewed study. Refrain from using too many quotes for the reviewed articles (Galvan, 2009). The work that is found in good synthesized literature reviews will use your own words and not just excerpted statements from the references.

Table 1. Literature Review Matrix Template

Source	Problem/ Purpose	Design	Sample	Methods	Instruments (include reliability & validity)	Findings	Implications	Limitations
Study 1								
Study 2								
Study 3								
Study 4								

Remember you are organizing the review by ideas and not by sources. The literature review is not just a summary of the already published works. Your synthesis should show how various articles are linked. Use connecting words or words that show transitions such as argues, suggests, agrees, disagrees, similarly, also, likewise, alternatively, conversely, in contrast, furthermore, or additionally to show how the references are related. These words, along with details from the sources, help to demonstrate your comparison and synthesis of the readings.

PITFALLS

There are some common problems that writers experience when synthesizing literature and some things that can tip you off that you may not be writing the synthesis correctly. Of course, there are exceptions to these suggestions, but the items described below should force you to at least take a second look and question if your work is synthesizing the readings appropriately. There is not one absolute right way of writing about the synthesis as each topic and the literature may lead to differing approaches, but there are some correct ways to write about the findings and some common errors.

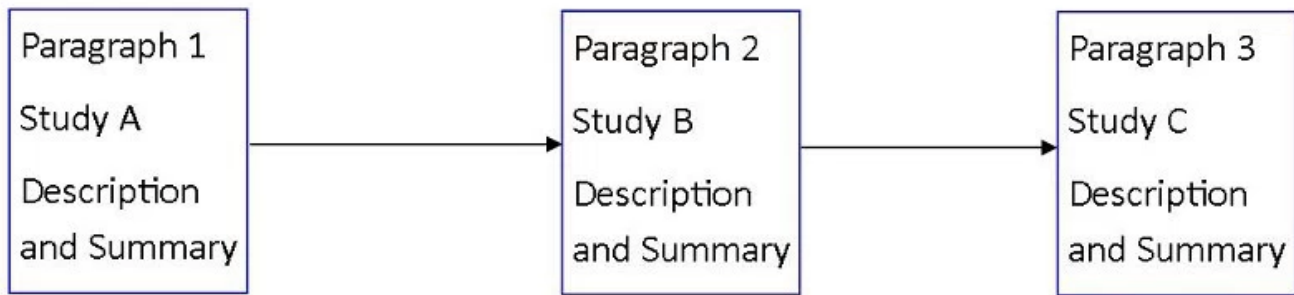
One error previously mentioned involves summary. If each paragraph of your literature review only describes one article then you may not be connecting

references and creating new information appropriately. It is difficult to compare if you are only describing one source. Many writers that struggle with synthesizing literature use a cookie cutter approach. I typically see this used by graduate students who have many references and are writing the literature review portion for a capstone project or dissertation. They are struggling to incorporate a large number of readings and have limited time to complete their work. Some try to simplify their writing by using the same standard format for each paragraph or section that they write. Study information is very repetitive and easy to spot as information is just replaced from paragraph to paragraph. The template they use is something like the following: Authors YYY and ZZZZ studied variables AAA and BBB using tools Q, R, and S in their sample of X number of participants. Using statistical tests MM and NN they found OO and TT. Of course, there is a little more information reported and the order of information may change but you get the idea of how easy it would be to just substitute various components from the literature review matrix for each study. In an inadequate effort to make connections, those linking words mentioned above are inserted to transition from one study to the next or from paragraph to the next. When authors write using this format their work resembles an abstract or summary of the study and is not sufficient for a literature review that should be demonstrating synthesis and creation of new ideas. The writer needs to go beyond summary, repetition and even critique.

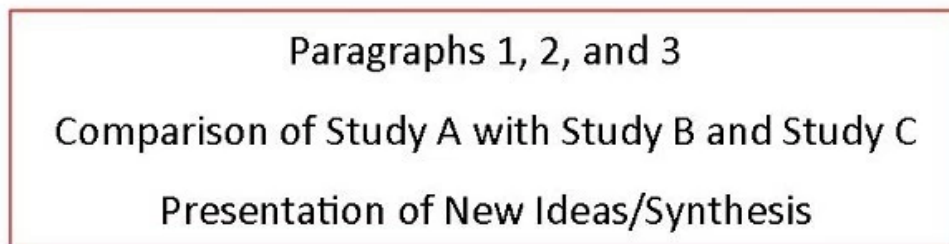
Unfortunately there is no exact or prescriptive approach that can be used as a guide when doing this writing. It will vary with each topic synthesized. Figure 1 may help to illustrate the difference between summary and synthesis.

Figure 1.

Literature Not Synthesized



Literature Synthesized



Completing a synthesis of the literature also requires an adequate familiarity of the topic. Ensuring that you have read enough literature about the topic is critical. Sometimes beginners gather only a few articles about a topic or locate articles that are loosely related and then try to synthesize information. Novice writers may have difficulty because there is inadequate information or limited materials for comparison. Ensuring that a comprehensive literature search was conducted can help to alleviate this potential problem. Another related problem involves overlapping articles or studies with conflicting findings. Slight discrepancies between sources may be difficult to understand and explain. Students may not have the necessary skills for reading and critiquing difficult and complex research articles. They need to have developed strong foundational research knowledge and understand the research concepts before they can effectively read, filter, and analyze research reports.

Lastly, writing a synthesized literature review is risky. It requires the writer to be

open minded and articulate new ideas. For some writers who are used to just repeating what is already in the literature, this is a new and potentially challenging experience.

HELPFUL HINTS

Faculty and writing mentors who have good synthesis and writing skills can do some things that will assist others to learn this skill. They can role model the approaches used. It is helpful to show examples of the work they have done that involves synthesis. Showing struggling writers copies of completed literature review matrices and the corresponding finished literature reviews may be helpful. This teaching tool can visually show new writers how to move from the matrix to the paragraph. It is also helpful to encourage novices to read a variety of literature and suggest they examine the literature reviews and see how others have synthesized information.

Since synthesis involves the use of critical thinking, analysis and evaluation skills developing those skills can be crucial for success. Use the following questions to guide your reading. Review literature with these questions in mind. Faculty can also help students by using these sort of questions when teaching or discussing literature.

- What is the purpose of the reading?
- What issues are raised?
- What evidence is given?
- Why is this important?
- What are the implications?
- What are the strengths?

- What are the weaknesses?
- How is this reading like others I have read?
- How is this reading different than the other articles?
- What might be influencing the findings?
- What common elements are seen?
- What information is missing?
- What are the gaps?

Literature that is synthesized and reported properly contributes to nursing knowledge. It plays a vital role in guiding nursing practice and advancing research helping readers to understand what is known and not known about a topic. Synthesizing literature may still be challenging but understanding the steps to follow, adhering to the helpful hints, and avoiding the common pitfalls may assist in development of this important writing skill.

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