

Using Thinking Maps to Facilitate Research Writing in Upper Level Undergraduate Classes

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It is increasingly important that students who intend to become nutrition professionals acquire the skills to routinely read, understand, and critically evaluate the primary research literature in nutrition. American Dietetic Associate (ADA) accreditation standards require that the undergraduate curriculum include evaluation of primary literature. Hierarchical and sequence thinking maps were used to assist students in developing a process for obtaining the necessary skills in critical evaluation of the literature in an increasingly complex area, nutrition sciences.

What Are Thinking Maps?

Tools that correspond to thinking processes help students organize ideas and in the long run help them to read, write, and think better. Thinking maps are such visual tools. They are graphic representations of how to organize, analyze, and evaluate what one reads, writes or thinks about (Hyerle, 2000). Thinking maps are similar to concept maps which are often used in teaching sciences to visualize complex key concepts (i.e. control of blood glucose in biology). While concept maps focus on specific details of a concept (Chan, 2007), thinking maps organize or display a broader picture (O'Bannon et al, 2006; Hyerle, 1996, 2000). An example of a thinking map is the organization chart which is a type of hierarchical or tree map. These types of maps can also be used to show relationships, as between main ideas and supporting details. In addition to hierarchical maps, Hyerle (1966) described four additional types of thinking maps: dialogical, metaphorical, systems, and evaluative. Dialogical maps help define ideas or things in context and are helpful when presenting a point of view. Metaphorical maps help to explain analogies. Systems or flow maps show processes or events in sequence or show causes and effects of events and predict outcomes. Evaluative or bubble maps are used to describe qualities or compare and contrast qualities. Maps can become more complex as the student's thinking and comprehension increases (O'Bannon et al, 2006). It is, therefore, likely that multiple maps or different maps should be used for different thinking and writing assignments. Therefore, instructors who use maps need to choose those that are useful for what one wants to achieve, but also allow for alternative ways of mapping and thus thinking and writing.

Using Thinking Maps in Research Writing for Undergraduates

As the overall US population becomes more biomedically sophisticated, it is becoming increasingly important that students who intend to become nutritional professionals acquire the skills to routinely read, understand, and evaluate the primary research literature in nutrition (ADA, 2007). American Dietetic Associate (ADA) accreditation standards require that the undergraduate curriculum include evaluation of primary literature (ADA, 2007). Most students do not intuitively have such skills. At our university, the Advanced Nutrition and Metabolism course, which is also writing intensive, is where evaluation of primary literature was incorporated into the curriculum. Thinking maps were used for four semesters to assist students in developing a process for obtaining the necessary skills in literature evaluation while meeting

intensive writing requirements. The assignments associated with primary literature evaluation included written critical analyses of five primary research articles centered around a central idea or theme and a summary paper that included data from the five primary articles as well as secondary sources to draw an overall conclusion regarding the central idea or theme.

When students initially begin to write about new data in the literature of nutrition, their work often looked very similar to the thinking map in Figure 1. This map is called a bubble map. The student is able to determine a central idea (i.e. trans fatty acids in the diet may be linked to disease). They can also use other information to describe or indicate a relationship to the central idea. However, they are not able to evaluate the information or data they find and draw objective conclusions of their own around the idea. In fact, they are often unable to summarize the major findings around the idea. Much of the problem seems to be related to students' lack of critical analysis of the work about which they are reading and writing.

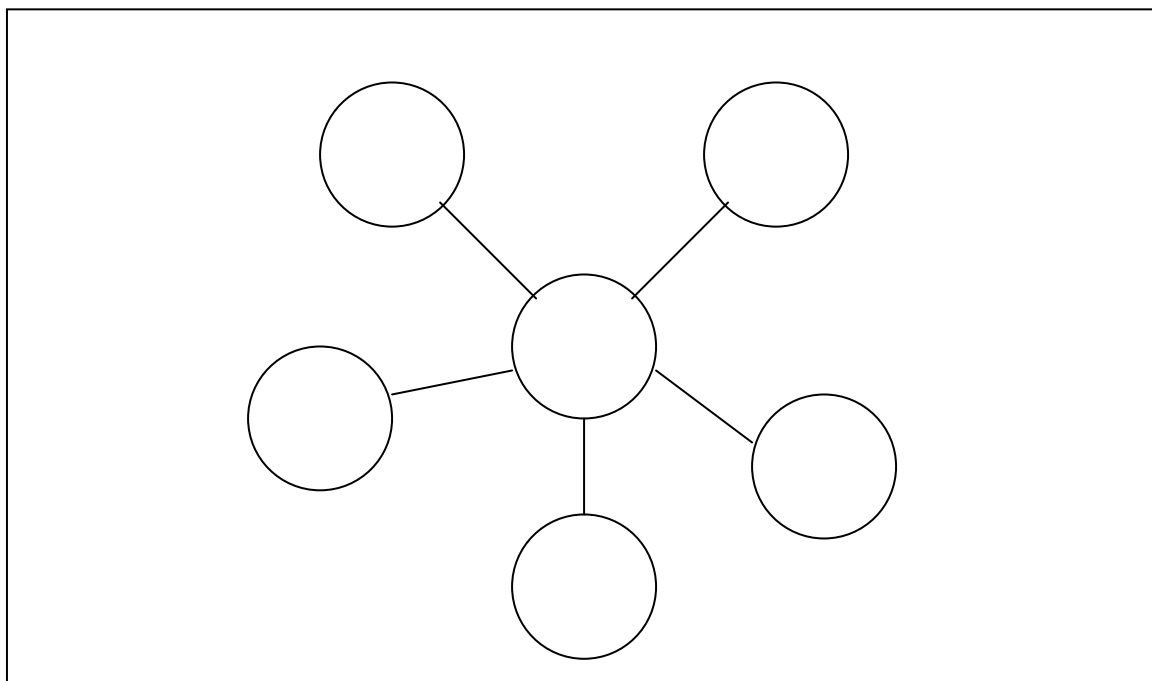


Figure 1. A simple bubble map best illustrates the thinking process used by students new to research writing. The maps are often for evaluative thinking such as description and comparing and contrasting.

The scientific method is at its core a sequence of events. Therefore, a flow or sequence map is a good way of thinking and writing about papers that have used the scientific method to discover information. The instructor constructed a dual sequence (flow) map (Figure 2) to help the student: 1) recognize the flow or sequence of processes that should be able to be identified in a primary research paper and 2) critical evaluate each of these processes so as to determine the overall significance of the work. This map is similar to the reasoning maps proposed by White (2004). Dual flow maps allow the students to visualize the processes by which the research was conceived and planned, as well as what outcomes (data) were produced. In addition the student is given permission to critique the work at each stage of the process. Flow maps are highly structured and specific to reading and evaluating primary research articles and students were able to utilize these maps effectively.

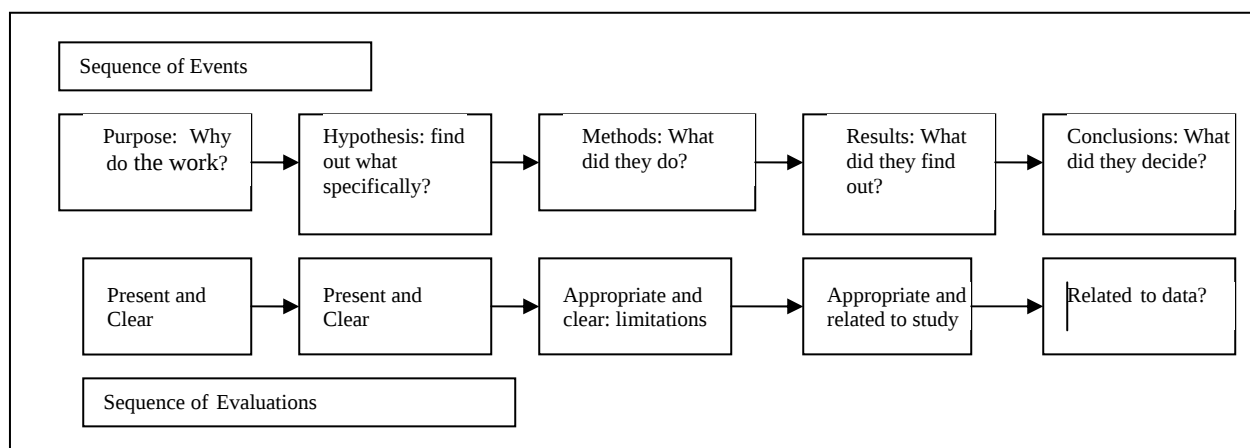


Figure 2. Diagram of how a flow or sequence map can be used for describing process and evaluating that process in evaluation of refereed primary journal articles.

However, flow maps do not assist in visualization of the relationship of information from a series of primary research articles to a main idea or in evaluating the value of each article in elucidating the idea. For such a process the map that proved most effective in the advance nutrition class was a hierarchal or tree map (Figure 3).

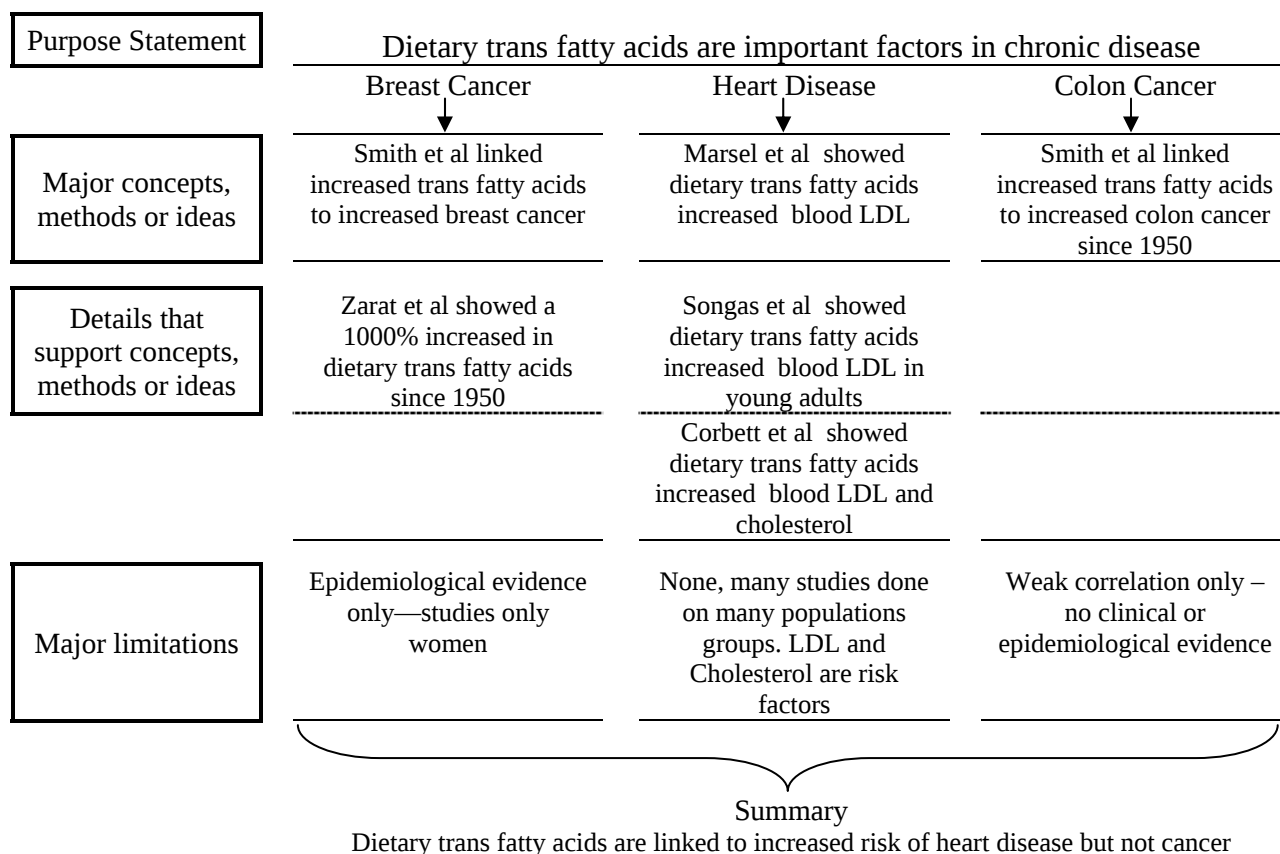


Figure 3: Example of a modified tree map to visualize the structure of research paper summarizing and evaluating finding of a number of primary research studies.

The tree map allows the student to visualize and identify major parts of a research paper that has as its major purpose the summation and evaluation of a number of similar studies. First, the writer defines clearly and concisely the major idea, purpose, or thesis statement. Secondly, the writer can arrange the information by concepts, methodologies, or primary articles (least desirable). And finally, because the information has been arranged in a format that allows the writer to see all data at the same time, an overall conclusion can be more easily drawn from the readings around the major idea. In the case of the example in Figure 3 study limitations are specifically noted in arrangement of information, since many novice students are hesitant to look for limitations in published studies.

Conclusion

Overall, the use of thinking maps in the advanced nutrition course improved the organization and clarity of writing in the four semesters it was implemented. Student critics of primary literature indicated that they had a better understanding of the research process and were able to write about each article in a more concise and deliberate manner.

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About the author

Margie Lee Gallagher holds a PhD from the University of California, Davis and is also a registered Dietitian. She holds the rank of Professor and serves as Associate Dean for Research and Graduate Studies for the College of Human Ecology at East Carolina University. She has received several teaching awards including the Scholar-Teacher Award for 2004-2005.

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