



Measuring Thinking Worldwide

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Evaluating a Nutritional Supplement with SOAP Notes to Develop CT Skills

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Like many of the other chapters of this book you will see that Dr. Greg Brown stages this exercise, first talking with students about the strategy that will be used (a SOAP note) to analyze the class material(advertisements about nutritional supplements). Then, once the strategy is understood, it is practiced, evaluated and then practiced again. Most importantly there is a debriefing of the process that includes a specific discussion about how students thought through the exercise and an expectation that they will be able to articulate the reasons behind their judgments. We really like this staged approach that guides students through an analysis and evaluation process on a content area where they are sure to have interest. Dr. Brown's style of requiring his students to provide an explanation of their work is a model for teaching for thinking.

Background

The use of nutritional supplements to enhance health or physical appearance is widespread (Kibble, Hansen, & Nelson, 2006; Mason, Giza, Clayton, *et. al.*, 2001; Allen, Thomson, Emmerton *et. al.*, 2000). Frequently, the advertisements for nutritional supplements contain claims and testimonials that sound extremely attractive to consumers; yet these claims may or may not be supported by scientific evidence (Brown, Vukovich, & King, 2006; Froiland, Koszewski, Hingst, *et. al.*, 2004; Kamber, Baume, Saugy, *et. al.*, 2001). Because of confusion regarding the advertised claims for nutritional supplements, consumers frequently ask health care professionals about the safety and effectiveness of nutritional supplements (Brown, *et. al.*, 2006; Froiland, *et. al.*, 2004). Therefore it is important for students in health

related majors, such as physical education, health education, nutrition, exercise science, and the medical fields to know how to analyze and compare the advertised claims with the available objective scientific facts about nutritional supplements. The session asks students to use SOAP notes to evaluate a nutritional supplement.

Class session and students: This paper describes an assignment that has been used successfully in an undergraduate class titled “Nutrition for Health and Sport” to help students develop critical thinking skills by using SOAP notes to evaluate a nutritional supplement. Prior to taking this class, students have taken introductory nutrition, anatomy & physiology and exercise physiology, as well as other classes in chemistry, physics, and biology, and most students are in their 6th – 8th semester (late junior to senior years) in college. At this point they have mastered an adequate amount of theoretical and practical content knowledge in nutrition that can be used to address the analysis and evaluation of the advertisement and I am calling on them to use this content knowledge to inform the critical thinking learning activity.

Learning Objectives for the Project

- 1) At the completion of this course, students will be able to interpret advertised claims about a specific nutritional supplement, research these claims in the scientific literature, and analyze the benefits and harms associated with the supplement.
- 2) Students will develop a plan for assessing the efficacy and safety of a nutritional supplement using the SOAP note strategy and practice this strategy by evaluating one nutritional supplement in depth.
- 3) Students will demonstrate the critical thinking skills of *interpretation* (of the claims about the supplement), *inference* (about potential risks and benefits), *analysis* (of the information provided by the supplement), and an *evaluation* based on research of why they see the supplement as safe, beneficial, or unsafe, non-beneficial.

As indicated above, although the scientific support for their claimed benefits may be sparse, the use of nutritional supplements to enhance health, physical appearance and athletic performance is widespread. One age old and commonly used tool in the medical field for the comparison of the advertised claims with objective scientific facts for a product is SOAP notes (Kibble, *et. al.*, 2006). The SOAP in SOAP notes stands for **S**ubjective **O**bjective **A**ssessment **P**lan (Sleszynski, Glonek & Kuchera, 1999). In this assignment the students will use SOAP notes to evaluate a dietary supplement that is claimed to enhance health or exercise performance. By using SOAP notes as a strategy to guide their thinking when evaluating a nutritional product, a health professional can compare advertised claims with scientific facts about the product. The evaluation will be helpful to both the student themselves and consumers who they may later counsel.

Important: It is not suggested or required that the students purchase the supplement that they are analyzing. And it is stressed that I am not advocating their personal use of any of the supplements that are being evaluated by the class. Students often look to me to validate their assessments of particular products, and this is a teaching moment for critical thinking. If I simply answer ‘yes’ that’s right or ‘no’ that’s wrong, I risk communicating that their own evaluation is less adequate. For this to be a critical thinking exercise, I need to be sure that the emphasis is not on me as expert, but on them as evaluator. Rather than simply questioning me, they need to draw their own inferences about the product and seek out their own evidence for the evaluative judgment they are asked to make.

General Overview of the Project

Just to be sure everyone in the class is familiar with the SOAP note process, I begin the classroom discussion with a description of a SOAP note and how one thinks through the process of writing one. I give the students an example of a well written SOAP note by developing one in class using PowerPoint.

As a part of this lesson I ask students to evaluate one nutritional supplement that is of interest to them and to consider its value for their own personal use. I give them guidelines for this task (SOAP Notes OVERVIEW). They are encouraged to think in terms of their own lives and personal characteristics (age, gender, lifestyle, fitness, disease risk or symptoms, body composition, etc.). This assures that the case history of the client that they are analyzing is familiar to the student and can easily be incorporated into the SOAP notes process. Otherwise those students who were not adept at taking case histories would be overly challenged by the exercise. Providing a target audience for the students helps them tailor the tone of their writing.

This project is spread across a semester with the students completing the assignment in stages. The students use content knowledge that they are mastering in other parts of the course or in other parts of their programs. There are four stages to this exercise, each stage completed and turned in following a class discussion of the new part of the exercise, highlighting the goals and concepts included in the stage. Students have several weeks to research and prepare each of the stages.

After the students have submitted each stage, it is reviewed, graded, and returned to the student with comments to help improve the complete SOAP note that will be submitted at the end of the semester. The timeline indicated below is based on a 16 week semester.

The students are given two weeks to complete stage 1, which is simply some personal information and the selection of a supplement to evaluate. Then they have three weeks to complete stage 2, which involves finding advertisements and information about the supplement from popular media. Stage 3 is one of the more challenging parts of the project, because it requires the students to find peer reviewed research data regarding their supplement (four weeks). Stage 4 requires the students to complete the exercise by comparing and evaluating the popular media information and advertisements for the supplement against the scientific data using the resources they have gathered (two weeks). Then a complete SOAP Note document on their supplement, with revision based upon instructor comments, is submitted in the last week of the semester.

Students are given the following SOAP Notes overview in the syllabus on the first day of class and Tables 1-4 are provided to the students as a separate detailed assignment description with the due dates for each stage listed. The students are then given more specific details and an example each time we begin a new stage of the exercise. Each state must be completed before we can optimally begin the next component of the exercise, so I stress the importance of working through the exercise completing each stage on time.

SOAP Notes Stage 1: Personal Information

In class, we discuss why people use and buy supplements. In general, supplements are used to improve the health of the person taking the supplement (Allen, *et. al.*, 2000; Kibble, *et. al.*, 2006). This often leads to an interesting discussion with students who have used supplements and have or have not noticed effects (either positive or negative) associated with their supplement use. It is then explained to the students that they need to evaluate their health and lifestyle in order to identify a reason they may want to try and use a nutritional supplement much like a consumer would before choosing a supplement. So, for the next two weeks, students are instructed to evaluate their health, fitness, and lifestyle as completely and possible in order to identify something that they may wish to enhance through supplement use, and select an appropriate supplement. The assignment for evaluating the personal health includes completing the information in Table 1.

Table 1 of your SOAP Notes: Personal Information

Provide your demographic and health status information and then answer all the remaining questions as completely as possible.

1. Student Name
2. Gender
3. Age
4. Body Height
5. Body Mass
6. What is your Body Mass Index or percent body fat? How does your body composition rate based on established norms?
7. What is your VO_2 max?
8. How does your aerobic fitness rate based on established norms?
9. What is your strength to body mass ratio for bench press and leg press?
10. How does your muscular fitness rate based on established norms?
11. How often do you exercise and what type of exercise do you do?
12. Do you have any known illnesses or allergies that may influence the desirability or safety of using a nutritional supplement?
13. Are there any other lifestyle or health factors that may influence your need for a supplement?
14. What is the name for the supplement you have chosen to evaluate?
15. What is the main (or active) Ingredient?
16. Are there any other ingredients? If so, what are they?
17. Why did you select this supplement, and how might it enhance your health?

SOAP Notes Stage 2: Subjective Information

Each student identifies an advertisement for the supplement they plan to review. I help them locate Internet sites making claims about or advertising nutritional supplements. Another good source of this information is the *Sports Supplement Review* (Phillips, 1997). It is important, of course, that the example I use as my own in class is not one that any of the other students will be using for their project. I want them to use the thinking strategies that I demonstrate on their new problem case.

Each student presents their analysis of their advertisement, describing the health claims being made about the supplement. Then, as a class, we begin to evaluate these claims ('well grounded' or 'too good to be true'). Through this discussion students see that nutritional supplements are frequently advertised with testimonials as evidence of safety and efficacy, but that these testimonials are not always well supported with sound data or science. They also observe that many supplements are advertised with very technical sounding descriptions that are intended to impress the average consumer with scientific jargon and terminology. Over the next three weeks I challenge them to explore, analyze, and assess for themselves all of the claims contained in the advertisement. They begin with a Subjective assessment (Table 2), responding in a narrative style, or short answer responses by questions number. Personally, I like students to write most of the SOAP note in a narrative style.

Table 2 of your SOAP Notes: Subjective Information
<p>Assess the claims or advertisements about the supplement on the basis of the popular literature and the internet (not the literature from your own reading of scientific journals at this point). You can search aggressively in all other published materials for this information. Your assessment must include references to at least one website that is directly selling the supplement, one "informational" website that is not directly selling the product, one resource from a non-scientific journal (e.g. <i>Runners World</i>, <i>Muscle and Fitness</i>, <i>Reader's Digest</i>, etc) and one news article from a source such as <i>CNN</i>, <i>Time</i>, <i>Newsweek</i>, etc. (this may be an internet source for news such as Yahoo! news).</p>
<p>Answer all questions as completely as possible.</p> <ol style="list-style-type: none">1. What sources of information do you have about the supplement?2. Are they primarily companies selling the supplement, or are these sources just providing information about the supplement?3. Is the supplement a single ingredient supplement or does it have many ingredients? What are they?4. What is the function of each ingredient?5. What claims are being made for the supplement?6. Is this supplement "specially formulated" in any way that is purported to enhance efficacy?7. Who are the target consumers for the supplement? Who should or should not use the supplement?8. What have you been told about the supplement by friends or sales people?9. Who produces the supplement? What is the producer's reputation (if known)?

SOAP Notes Stage 3: Objective Information

I've learned that I need to help students think about how they will objectively evaluate their chosen nutritional supplement. The objective assessment draws upon their knowledge of anatomy, physiology, and nutrition, as well as other sources of information that were not used in the Subjective assessment. I find it helps the students if we practice this part of the assignment together using an example such as androstenedione, which was claimed to increase testosterone and strength without any negative side effects. In fact, the research indicates that these claims are almost completely without scientific merit (Brown, *et. al.*, 2006; King, Sharp, Vukovich, *et. al.*, 1999). The purpose of this discussion is not to convince students that nutritional supplements are ineffective or unsafe, but more to educate the students that distortions are common in the advertisements. Frequently the claims made for nutritional supplements are either exaggerations of what has been found through research, or the claims only mention the positive findings from research and either downplay or ignore the negative findings.

Some key content for this portion of the lesson is the legal definition of a nutritional supplement as defined by the Dietary Supplement Health and Education Act (DSHEA) of 1994 (FDA, US. Gov. 1995). Under DSHEA, as nutritional supplement is defined as

- a product (other than tobacco) that is intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total daily intake, or a concentrate, metabolite, constituent, extract, or combinations of these ingredients.
- is intended for ingestion in pill, capsule, tablet, or liquid form.
- is not represented for use as a conventional food or as the sole item of a meal or diet.
- is labeled as a "dietary supplement."
- includes products such as an approved new drug, certified antibiotic, or licensed biologic that was marketed as a dietary supplement or food before approval, certification, or license (unless the Secretary of Health and Human Services waives this provision).

Furthermore, claims may not be made about the use of a dietary supplement to diagnose, prevent, mitigate, treat, or cure a specific disease. Knowing this, the students can now also evaluate whether the supplement that they are reviewing is in compliance with this standard.

Although students should know how to find and evaluate scientific literature at this point in their academic career, I also find it useful to demonstrate how to search a scientific database, such as PubMed, for scientific findings about a given supplement and also how to find the literature in the university library. An in class discussion of a primary research article about a nutritional supplement can also be useful to help solidify the students understanding of how to read primary research literature. It is also useful to discuss with students some basic of research design, such as double blind and placebo control, and why these concepts are so important when testing a product for safety and efficacy.

This part of the project is more difficult for many students, as they may have difficulty finding or reading the scientific literature relevant to their supplement. During this stage is when students express the most frustration as they frequently discover that the scientific literature regarding their supplement is not as clear or prevalent as would appear from the subjective information. I have found that four weeks for this stage allows the students enough time to do a literature search, retrieve their sources, and synthesize answers to the questions. It is also important to have a mid-stage progress report, a consultation with the instructor, or at least an in-class discussion about how the students are progressing.

Table 3 of your SOAP Notes: An Objective evaluation of the supplement
<p>Objective: Assess the safety and efficacy claims about the nutritional supplement by consulting the scientific literature yourself. You must include references to at least 5 peer reviewed research articles. These cannot be editorials or opinion pieces. Use only research studies about the supplement in which variables are measured and an hypothesis is tested, and accepted or rejected. Ideally the studies should be testing the claims made by the advertisements. You are also encouraged to consult DSHEA guidelines and NIH Office of Dietary Supplement fact sheets, but these do not count towards the required 5 peer-reviewed articles.</p>
<p>Answer all of these questions as completely as possible using your scientific sources. Your answers should not just be 'yes' or 'no' responses. You will need to <u>explain why</u> and reference your scientific source.</p> <ol style="list-style-type: none">1. Are the supplement claims in accordance with DSHEA guidelines for what a supplement can or cannot claim to do or be?2. Is the supplement safe?3. What are the possible negative side effects to using the supplement?4. What is known about the efficacy of the supplement? (e.g. does the supplement do what is claimed, if so, how well?)5. Does the preparation method affect potency or safety?6. What does the active ingredient do?7. What is known about each ingredient (if there are multiple ingredients)?8. Are there any known synergistic or antagonistic effects of the ingredients?9. What is the recommended dose? Is there a safe, or tolerable upper limit for the ingredients in the supplement?10. What is the medical or biological need for the supplement?11. Are there contraindications to using the supplement?12. How might your health or fitness affect the effectiveness and safety of the supplement?13. What is the likelihood of an adverse reaction to the supplement?

SOAP Notes Stage 4: Assessment and Plan

The final stage for the SOAP notes assignment is where the students focus their critical thinking skills on a comparison of the advertised claims with the research findings. This is the place where they are asked to examine all of the information that they have found about the supplement and make a judgment about whether the supplement in question is safe and, if so, whether it will help them realize their health goals. The students are also asked to develop a plan for monitoring the safe use of the supplement if it was to be adopted for use for themselves or others. They need to explain how they would monitor safety and efficacy. The questions in Table 4 help guide the students through this stage.

A key concept in this stage is to impress students is that they must support their judgment with an evidence base. It will not be enough to simply state “I think this supplement...” without supporting such a statement with findings from the scientific literature. I also find that some students even need to be given a sentence format to help them think clearly about how they will present the report. I suggest that they could use a statement such as “Supplement X is advertised to do Y and Z. However, so and so (cite a reference) observed that neither of these occurred when subjects were administered the supplement in a dose of XX. Instead, W occurred in the subjects.” If the time in the course allows, I ask each student to make an in-class presentation on their supplement. This presentation can be very brief, including a discussion of what the supplement was advertised to do, what the research indicates about the safety and efficacy of the supplement, and their assessment and plan for using the supplement (or warning against the supplement). Preparation for a short oral presentation is another way to practice critical thinking skills because students will need to compose a clear description of the supplement and its proposed effects and also compose their arguments about risks and benefits about the supplement and defend their plan for monitoring its use.

Assessment

Student responses for any of these Stages could serve as classroom level assessment data. They can be examined later by me or anyone for evidence of demonstrated critical thinking skills (analysis, inference, evaluation). Asking for a thorough response to many questions that require critical thinking provides ample evidence of the students’ critical thinking skills for this type of analysis.

Table 4 of your SOAP Notes: An Assessment of the Supplement and a Plan for Safe Use
<p>Assessment: This is the most important part of the project. Compare the advertised claims with the research. Determine if the supplement is safe and effective or not, and discuss why you are making this judgment. Notice that these are not the same things, so you will need to provide BOTH a discussion of safety and a discussion of efficacy.</p>
<p>Answer all of these questions as completely as possible</p> <ol style="list-style-type: none">1. Are the advertised claims in agreement with the scientific knowledge regarding the supplement? Why or why not?2. What are the benefits associated with taking the supplement?3. What are the risks associated with taking the supplement?4. What evidence is there to support the use of this supplement? (In essence, summarize the claims relative the to scientific facts)5. Should this supplement be eliminated from consideration? Why or why not? (be specific)

Plan: This is also an important consideration. Using your knowledge of health science develop a plan for monitoring the safety and efficacy of the supplement for those who elect to use this supplement. Make the plan as if you would use the supplement. That is, use your own demographic and health status data provided in Stage 1 to make this monitoring plan:

Answer all of these questions as completely as possible

1. How will potential side effects be monitored? (What exactly will you measure and when?)
2. How will side effects be reported?
3. What dose will be administered? Why?
4. How long will the supplement be used? Why?
5. How will effectiveness be monitored? (What exactly will you measure and why?)
6. When and how will the supplement be discontinued if effectiveness is not demonstrated or safety becomes an issue? (Describe in detail)

Quite a number of critical thinking dispositions are also called into play in this exercise (Facione & Facione, 1996). Most assignments that ask students to research the popular and scientific literature are aimed at increasing their inquisitiveness. The SOAP is a systematic approach to the analysis of the supplement, and so the exercise practices the students in systematicity. Finally, the structure of this exercise asks students to suspend their judgment about the supplement until they have searched several sources of information. Even though they might prematurely judge the supplement either safe and efficacious or the opposite, the SOAP note format encourages a reconsideration and demands that students explain why they judge the supplement as safe/unsafe or efficacious/not efficacious. I'm challenging them to develop the cognitive maturity needed to reconsider in the face of new evidence. And, of course, courageously seeking the best possible knowledge regarding the supplement means that they are developing and reinforcing the disposition of truth-seeking.

Many other outcomes are also achieved. After using the SOAP notes technique, in addition to increasing their knowledge of the safety and efficacy for a specific nutritional supplement, the students will have developed their skills in reading scientific literature and in critically evaluating a nutritional product using their health science knowledge.

Student Feedback

I have received many favorable comments about this assignment from my students. Many students say that they did not realize how scarce the research is on many products sold as nutritional supplements. Others say that they assumed that nutritional supplements were subject to the same testing and research as prescription medications, but they have learned through this assignment that supplements are instead regulated like food products with no requirement for pre-marketing research. I always like to conclude this assignment by telling the students that nutritional supplements may or may not enhance health. Some supplements have quite solid evidence supporting their advertised claims, some supplements have had their claims refuted by solid science and in many cases the research is insufficient to either accept or reject the advertised claims. Overall, the best advice one can take when considering nutritional supplements is "Caveat Emptor" (let the buyer beware).

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Some Interesting Links about Supplements

NIH ODS Dietary Supplement Fact Sheets

http://dietary-supplements.info.nih.gov/Health_Information/Information_About_Individual_Dietary_Supplements.aspx

Are Herbal Supplements Hurting You? New Book Says It's A Buyers-Beware Market For Herbal Remedies CBS Evening News, January 15, 2007

http://www.cbsnews.com/stories/2007/01/15/eveningnews/main2359540.shtml?source+RSSattr=Health_2359540

How Should FDA Regulate Diet Supplements? Dietary Supplement Health And Education Act Regulates Supplements As Foods, Not Drugs CBS Evening News, January 16, 2007

<http://www.cbsnews.com/stories/2007/01/16/eveningnews/main2364595.shtml>

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