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## Michelle Cook

# Using Problem-Based Learning to Teach about Nutrition

Problem-Based Learning (PBL) is an instructional approach in which learning occurs as a result of students' efforts to solve a problem (Pederson, Lui, and Williams, 2002). While it was first implemented in medical education, PBL is versatile, usable; it can be used in a variety of settings with different students; however, the assumptions, major components and outcomes remain the same (Cook, 2008). Regardless of the setting, the idea behind PBL is to give students an ill-structured, interdisciplinary, authentic problem so that they may acquire the knowledge and skills necessary in the real world. PBL is very different from traditional methods. It is not enough for students to passively receive knowledge transmitted from a teacher with PBL; they must actively and socially construct it using their what they already know. Knowledge is acquired in a context so that the learner may recognize when to use it again (Loyens *et al.*, 2015). Students cannot be expected to apply information to a problem when the information was taught out of context in the first place. The problems must come first; then the student must research and learn the content necessary to arrive at a feasible solution (Goodnough and Cashion, 2006). Starting with a problem helps the students perceive the relevance of the concepts to be learned.

PBL has several benefits. It encourages social interaction, since students must have group discussions to negotiate meaning. Students are engaged as active learners, instead of passively participating (Wilder, 2015). In turn, students are more motivated as they work to solve an authentic problem (Akinoglu and Tandogan, 2007; Pedersen, 2003). PBL encourages reflection and metacognition, as students are thinking about their learning process (Kim and Pedersen, 2011). And finally, students use critical thinking skills by

developing and evaluating multiple viable solutions.

The purpose of this article is to take readers through the process of developing and implementing a PBL activity using a problem scenario related to nutrition as an example. This PBL activity is designed for high school students; however, it can be adapted to middle school or college levels. The PBL activity is suggested to take four 90-minute classes to complete.

### **Procedure: What Are the Stages of Problem-Based Learning?**

#### **Selecting and Presenting a Suitable Problem**

A considerable amount of thought must go into problem selection or development. Specifically, the following five problem characteristics should be taken into account (Torp and Sage, 2002).

1. The problem needs to be realistic and have personal relevance to students.
2. The problem needs to be interesting and motivating to students.
3. The problem needs to be interdisciplinary.
4. The problem needs to be concrete enough for students to investigate and grasp important concepts.
5. The problem needs to be ill-structured, complex, and lack an obvious solution.

Once the problem is selected, the students must "meet the problem." The problem is generally presented to students through a newspaper article, a memo, a video, a computer simulation, or skit. In the PBL used in my classroom, my students were presented the problem through a "meet the problem" memo. They were introduced to Mary's problem through a memo from her doctor, which included Mary's background information and

results of a physical examination (see Figures 1 and 2, p.38-39). In most PBL activities, students are asked to take on the role of a stake-holder. In this case, students were role-playing a registered dietician, Judy Thomas.

Prior to instruction, it is also important to consider student learner characteristics and what content and topics the problem will cover. PBL should direct students to specific content and topics and should help students learn new ideas or skills. The objectives of the PBL should align with to school-, state-, or national-level curriculum standards. A helpful strategy is to map out the problem to visualize, make connections between ideas, and anticipate where students might go with it. Specifically, this PBL addresses the following National Health Education Standards:

**Standard 1.12.7** Compare and contrast the benefits of and barriers to practicing a variety of healthy behaviors.

**Standard 2.12.1** Analyze how the family influences the health of individuals.

**Standard 3.12.1** Evaluate the validity of health information, products, and services.

**Standard 5.12.4** Generate alternatives to health-related issues or problems.

**Standard 5.12.5** Predict the potential short-term and long-term impact of each alternative on self and others.

**Standard 5.12.7** Evaluate the effectiveness of health-related decisions.

### **Developing a Problem Statement, Gathering Information, and Generating a Solution**

Once the students meet the problem and have developed a personal stake in the problem by having a role, the students must identify what they know to activate prior knowledge. In addition, they need to define what they need to know to drive research and ideas on causes and solutions. Teachers may need to guide this brainstorming process by posing questions such as, *"How do you know this?"* or *"How can you document this?"* to make sure what the students think is known is actually known. Also, teachers can ask questions about the unknowns, such as, *"How might you find out?"* or *"What resource might you go to find that information?"* My students generated a long list of knowns and unknowns, some of which are included in Table 1 (p.40).

Next, the students must define the problem statement to ensure they truly understand the situation. In my class, the students developed the following statement:

How can we as dieticians, decide on nutritional plan and a strategy for weight loss for Mary in such a way that the strategy:

- 1) consists of all the macronutrients, vitamins, and minerals and is balanced,
- 2) includes exercise,
- 3) is easy to maintain,
- 4) is financially reasonable,
- 5) addresses eating disorders and
- 6) is presentable in four days in a detailed, written form.

I split my class into groups of three or four to gather and share the information needed. During this process, my students needed coaching from me. At times, they needed someone outside of their group to listen to their discussion and help them to move forward. At other times, they needed help finding an appropriate resource to answer their questions. As a class, we had discussed resources we could use to find answers to our unknowns, however, students often had to dig deeper to fully answer a question fully. Finally, sometimes students needed assistance in understanding difficult content they might be gathering and the connections between the new content and other things we had previously learned. This assistance can require whole-class instruction. Based on the information gathered, the students must generate a list of possible solutions. As a group, they must analyze each solution by examining the consequences and benefits of each one (see Table 2, p.41). Finally, they rank the solutions from most viable to least viable and prepare to present and support the one they selected.

### **Presenting a Solution**

Because the PBL environment can be out of student's 'comfort zone' initially, assessment techniques should not heighten these feelings. It is important to create a supportive environment where students feel safe to make mistakes. Authentic assessments where students receive appropriately focused informal and formal feedback tends to be successful with PBL. Instructor-structured paired with instructor- and student-judged evaluations are common with PBL. Students are able to evaluate their own

performance and progress by considering what they have learned and how it would apply in a real situation.

The student groups present the most viable solution in a capstone presentation. The presentation can be in multiple formats—an oral presentation, a written document, a skit, or a video. The capstone should be authentic to the problem. In this PBL, the students are taking on the role of a registered dietician and researching healthy, effective, and detailed plans for weight loss. The capstone relates directly to the objectives of the PBL stated above. In the capstone associated with this PBL, the students were responsible for the three components below.

- **Written Plan of Action:** Each group is responsible for a written plan of action for a healthy, effective weight loss strategy to be given to Mary. The plan of action will be turned in and evaluated by the teacher and registered dietician.
- **Skit:** Each group is responsible for creating a 5-10 minute skit (live or recorded). The roles that must be represented in the skit are that of Mary, her mother, and the registered dietician. An optional fourth role may be included if desired. Using the skit, the characters will discuss Mary's current weight loss plan, the positive and/or negative consequences, and whether it should be continued. The characters should also detail the warning signs and health consequences of eating disorders and present a plan of action for healthy weight loss (while discounting those other diets considered "unhealthy"). The skit will be presented to and evaluated by a registered dietician in the field, the teacher, and fellow students.
- **Self-Evaluation:** Each individual is responsible for answering the following questions after the skits that will be evaluated by the teacher.
  - What were the most interesting/surprising things you learned in this investigation? Did any of the new information make you change your mind about something you previously believed?
  - How does this problem relate to you personally?
  - What new skills did you learn as you researched? Did you consider researching to be a difficult task?

- How well did your group function? Are you satisfied with the role you played in the group? What improvements could be made for next time?
- How can you apply the knowledge and skills gained in this problem in the future?
- After seeing other groups' skits, compare your solution to others you heard. What strengths and weaknesses do you see with your solution? How about the strengths and weaknesses of other groups' solutions?

Each group presented their solution to the class in a live or recorded skit. The characters discussed Mary's current weight loss plan, the benefits and/or consequences, and whether it should be continued. They also detailed the warning signs and health consequences of anorexia and bulimia and presented a plan of action for healthy weight loss (while discounting other diets considered "unhealthy"). All of the students in the class, along with the teacher and a registered dietician, saw each of the skits. The audience also reviewed the written plan of action to become more familiar with the solution. Finally, the student capstone presentation was evaluated using the rubric found in Table 3 (p.42) by the instructor, the students, and the registered dietician.

### Debriefing the Problem

After every skit, students are asked to meet as a group for a debriefing session. They were asked to meet back with their group to discuss the solution they heard presented in the skit. The students were responsible for creating a chart of the advantages and disadvantages of the solution (pros/cons) and of the consequences of the solution, similar to what is presented in Table 2 (p.41). They followed this procedure after each group had performed their skit. This group work began to get them thinking about how the solutions they heard could be compared with one another and even their own solutions. This group work was also a good opportunity for students to see if they had a different understanding of a particular concept, or interpreted something differently. After all of the groups have performed their skit, each group was left with a list of pros, cons, and consequences list for each of the different solutions presented by each of the different groups.

Next, a class summary of the pros, cons, and

consequences of each solution was created on the board (or large sheets of paper). Students volunteered or were selected to lead this process of gathering the information to add to the class lists. Many of the items on the class list were already discussed by students in their groups, but the advantage of this type of work is that some groups came up with something that none of the groups had previously considered. After a class list was generated, a class discussion took place. Each solution--its pros, cons, and consequences--was discussed one at a time. When students are unfamiliar with the PBL process, the teacher will likely have to coach the discussion. Students will find it easy to generate a class list of pros, cons, and consequences, since all that really entails is reading off of the list creating during their group work. However, systematically looking at the pros, cons, and consequences and deciding on the best solution will not feel as natural to them. Teachers may have to ask questions such as:

"Why exactly is that a disadvantage?"

"There seem to be a number of cons to that solution, so why do you think they chose it?"

"What led you to believe that a balanced-diet was the best solution?"

"Where did your research come from to support that statement?"

"Are there any other consequences that haven't been mentioned?"

"If you believe that is an important issue that needs to be added, why do you think they left it out?"

"How does this solution compare with your group's?"

"Why do you think they interpreted that piece of information differently?"

"Where would we need to go to look that up?"

"How do you know that is true?"

As students become more familiar with the process, hopefully someone in the class will feel comfortable leading the discussion. When the class discussion of each solution is completed, the students individually selected (by voting) the "best" solution from the ones presented (as is, with no modifications). Good solutions should have far many more advantages than disadvantages.

After the "best" solution is selected, another class discussion was used to determine whether minor changes needed to be made in order to

make the solution better. It is possible that the students will wish to remove a part of what they considered to be the "best" solution. For example, students may agree that Mary needs to be on a balanced diet, but may also believe that she may be more successful if she reduced her fat intake even further than originally suggested. On the other hand, students may feel that the "best" solution is lacking a vital component. For instance, they may believe Mary needs to be on a regular diet, but may feel that Mary needs to exercise more than three times a week. Regardless, after they have chosen the best solution, adding to the solution or removing part of the solution can be done by taking a class vote after their discussion.

It is possible that students may completely neglect to research issues the teacher felt were important to cover in the PBL unit. For example, what if none of the groups research the effects of Zoloft and depression in general on weight? In that case, the teacher will have to guide them so that they will be exposed to the content. Here again, the students may be able to answer questions once asked just by what they have learned through their extensive research. However, if that is not the case, students will be responsible for looking up the issue or the teacher can instruct his/her students on the issue. If the issue is an important one, it would be better to have the students complete the research on their own.

## Conclusion

While it may appear that the teacher is inactive during the PBL process, this perception is only an illusion. PBL can be compared to an adventure that requires a great deal of front-end planning (Torp and Sage, 2002). On an adventure, one must know where s/he is going, how to get there, and what is needed once s/he arrives. In PBL, teachers must know what the learning objectives of the problem are (where they are going). Teachers must also decide what roles students will take on, how they will encounter the problem, how they will gather information, what resources are necessary, how time constraints might play a role, and what questions will help facilitate learning (how they will get there). And finally, teachers must decide on the specifications of the culminating product and develop assessments and rubrics (what is needed once they arrive).

In summary, PBL encourages a deep approach

to learning, focusing on understanding underlying meaning rather than a surface approach of memorizing details. PBL encourages self-directed learning with the students functioning independently of the teacher, taking responsibility, dealing with ambiguity, and apply existing knowledge to new situations. During a PBL unit, students engage in cooperative learning, higher order thinking, data collection, communication, research, and other skills that are invaluable in real world settings. Finally, once students are familiar with the process, they become more motivated to learn new content and skills.

#### References

Akinoglu, O. and Tandogan, RO. (2007). The effects of problem-based active learning in science education on students' academic achievement, attitude, and concept learning. *Eurasia Journal of Mathematics, Science, and Technology Education*, vol. 3, no. 1, pp. 71-81.

Cook, M. (2008). Problem-based learning as the backbone for educational game design in Annetta, L. (ed), *Serious Educational Games: From Theory to Practice*, pp. 57-63. Sense Publishers, Rotterdam, Netherlands.

Goodnough, K. and Cashion, M. (2006). Exploring problem-based learning in context of high school science: Design and implementation issues. *School Science and Mathematics*, vol. 106, no. 7, pp. 280-295.

Kim, HJ. and Pedersen, S. (2011). Advancing young adolescents' hypothesis-development performance in a computer-supported and problem-based learning environment, *Computers & Education*, vol. 57, no. 2, pp. 1780-1789.

Loyens, SMM., Jones, S., Mikkers, J. and van Gog, T. (2015). Problem-based learning as a facilitator of conceptual change, *Learning & Instruction*, vol. 38, no. 1, pp. 34-42.

Pedersen, S. (2003). Motivational orientation in a problem-based learning environment, *Journal of Interactive Learning Research*, vol. 14, no. 1, pp. 51-77.

Pedersen, S., Lui. M. and Williams, D. (2002). Alien Rescue: Designing for student-centered learning, *Educational Technology*, vol. 42, no. 5, pp. 11-14.

Torp, L. and Sage, S. (2002), *Problems as possibilities: Problem-based learning for K-12 education*, Association for Supervision and Curriculum Development, Alexandria, VA.

Wilder, S. (2015). Impact of problem-based learning on academic achievement in high school: A systematic review, *Educational Review*, vol. 68, no. 4, pp. 414-435.

Figure 1. Meet the problem memo

**Wilmington Family Practice**  
**211 Oleander Drive, Suite 203**  
**Wilmington, NC 28403**  
**(910) 392-2615 Phone**  
**(910) 392-4486 Fax**

<p>Gregory Benson, MD          Scott Dudley, MD, MPH          Elizabeth Grace, MD          Virginia Greenberg, MD</p>	<p>Alexander Jones, MD          Jonathan Nelson, MD          Laura Palmer, MD, PhD          Michael Stenner, MD</p>
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Date: 6 March, 2014

To: Judy Thomas, RD

From: Michael Stenner, MD

Subject: Referral of Mary Parker

I examined this patient on 4 March and have enclosed general information and my examination notes. The patient's mother expressed concerned about the patient's new diet geared toward weight loss and also suspects an eating disorder may be present. The patient's physical examination revealed no abnormalities. At my suggestion, the mother has set an appointment with you next Thursday, 13 March. At that time, the mother would like to discuss and seek advice on the patient's current weight loss plan, which consists of a very low-carbohydrate diet and dietary supplement, Metaboloss. Particularly, the mother wants to know if the patient should continue the diet—it has been successful, but are there negative consequences? She would also like more information on the warning signs and health consequences of eating disorders, specifically anorexia nervosa and bulimia nervosa. I have enclosed the patient's blood work so that you may make a diagnosis. Finally, she would like a healthy, effective, and detailed strategy for weight loss for the patient, whether that means continuing the current diet or implementing a new plan.

Figure 2. Patient information and examination forms

Patient Information		Patient Examination	
Patient's Full Name: <u>Mary Anne Parker</u>		Patient's Full Name: <u>Mary Parker</u>	
Age: <u>16</u> Sex: <u>F</u>		Height: <u>65 in.</u>	Weight: <u>159</u>
SECTION I (Only fill out this section if you are a new patient or if information has changed since last visit)		Temperature: <u>97.6</u>	BP: <u>110/72</u>
Date of Birth: <u>7/22/97</u> Place of Birth: <u>Wilmington, NC</u>		Pulse: <u>75</u>	
Home Address: <u>704 Country Club Rd</u>		<b>Lab Work</b>	
<u>Wilmington NC 28403</u>		Total Cholesterol: <u>198 mg/dL</u>	Platelets: <u>230,000/mL</u>
Home Phone: <u>(910) 465-2371</u> Work Phone: _____		HDL: <u>61 mg/dL</u>	Hemoglobin: <u>13 g/dL</u>
Work Address: _____		LDL: <u>127 mg/dL</u>	Hematocrit: <u>36 %</u>
Occupation: <u>Student - JUNIOR</u> <u>Wilmington Prep</u>		Triglycerides: <u>116 mg/dL</u>	Electrolytes: Na <u>137 mEq/L</u>
If patient is a minor (under age 18)		Blood Glucose: <u>72 mg/dL</u>	K <u>3.5 mEq/L</u>
Mother's Name: <u>Nancy Parker</u> Father's Name: <u>William Parker III</u>		Iron: <u>121 mg/dL</u>	Cl <u>97 mEq/L</u>
Occupation: <u>Stay at home mom</u> Occupation: <u>Lawyer</u>		Erythrocytes: <u>4.2 mill/mL/cuan</u>	Ca <u>8.7 mg/dL</u>
Home Phone: <u>(910) 465-2371</u> Home Phone: <u>(910) 465-2371</u>		Leukocytes: <u>7200 cells/mL/cuan</u>	Mg <u>1.6 mEq/dL</u>
Work Phone: _____ Work Phone: <u>(910) 392-4932</u>		CO <sub>2</sub> : <u>32 mEq/L</u>	
SECTION II		<b>Examination</b>	
Date: <u>3/4/14</u>		History - Pt gained 20 lbs last year	
What is the reason for your appointment today? <u>lost 10 lbs in 1 month</u>		lost 18 lbs last month /w new diet pills	
What concerns would you like to discuss with the doctor? <u>Diets (best one), diet pills</u>		Low-carb diet - began 2/1/14	
Current medications/supplements? <u>Zoloft, Multivitamin, Metabolism</u>		high fat/protein	
Allergies? <u>None</u>		less than 15g carbs/day	
I certify that the above information is accurate to the best of my ability. I understand that it will be kept confidential and will only be share with my permission.		no fruit/veggies, occasional salad	
<u>Nancy Parker</u>		daily multi-vitamin	
Patient's signature (or guardian's if under 18)		weight loss decreased w 2/1/14	
<u>4 March 2014</u>		Metabolism - diet pill - began ~ 2/20/14	
Date		in addition to low carb diet	
		no exercise to 1x/week	
		Zoloft for depression	
		Family - Mom - on Weight Watchers; injured if diet (low carb) is healthy and should she switch over	
		Dad - No weight problems; successful attorney, avid bike runner	
		Sister - in college - Harvard, no weight problems	
		Physical Exam - normal	

Table 1. Student-generated list of knowns and unknowns

Knows	Unknowns
<ul style="list-style-type: none"> <li>• 16 year old female, junior in high school</li> <li>• On a new weight loss plan which includes</li> <li>• A low-carb diet, started 2/1/14- high protein and fat, less than 15 g of carbs/day, no fruit/veggies, occasional salad</li> <li>• Metaboloss, started 2/15/14 when weight loss decreased</li> <li>• No exercise</li> <li>• Lost 18 lbs. on this diet in last month</li> <li>• 65 inches tall, 159 lbs. (after the 16 lb. weight loss)</li> <li>• On Zoloft (sertraline)</li> <li>• Mom suspects eating disorder</li> <li>• Have examination results-no abnormalities</li> </ul>	<ul style="list-style-type: none"> <li>• What is a low-carb diet? Examples? What is the premise behind it?</li> <li>• What are the positive and negative consequences of a low-carb diet?</li> <li>• Why are fats, proteins, and carbohydrates important? How are they processed in the body? What are they used for in the body? What are their recommended intakes?</li> <li>• How do you read food labels?</li> <li>• Are certain minerals and vitamins lacking in a low-carb diet? Can they be received in the form a pill?</li> <li>• How does exercise help contribute to weight loss?</li> <li>• What is Metaboloss? Is it safe? What are the positive and negative consequences of taking it?</li> <li>• What is an acceptable amount of weight loss? What caused her to lose 18 lbs. in one month?</li> <li>• What is Zoloft and why would she be on it? Would it affect her weight?</li> <li>• What are the pressures on a 16 year-old? Self-esteem issues?</li> <li>• Is 159 lbs. and 65 inches normal? Is she overweight? Is she obese?</li> <li>• What are eating disorders? What are the warning signs and health consequences of anorexia nervosa and bulimia nervosa?</li> <li>• Is her blood work normal? Or does it indicate her diet is unhealthy or that an eating disorder may be present?</li> <li>• In what ways could her mom and dad be contributing to her weight problem?</li> <li>• Is her current method an effective and healthy way to lose weight?</li> <li>• What are healthy and effective ways to lose weight?</li> </ul>

Table 2. Possible solutions with pros, cons, and consequences

Possible Solution #1	Pros	Cons	Consequences
<p>Choose a balanced diet that includes all the major food groups--grains, fruits, vegetables, dairy, and meat. Ensure that Mary is getting the RDA values for carbohydrates, proteins, fats, vitamins, and minerals. Ensure the diet is varied and that consumption of foods is in moderation. Present a 2-week sample menu to get Mary started. Include a low-impact physical activity (walking) 3 times a week for 30 minutes each time. Address eating disorders with information, even though it is likely that she doesn't have one. Discontinue the use of Metaboloss. Encourage her family to follow the same plan of action, since it is a balanced diet.</p>	<ul style="list-style-type: none"> <li>• Mary will eat foods from all the major food groups</li> <li>• Mary will have a sample menu for the first 2-weeks of her diet</li> <li>• Mary will be getting much needed exercise</li> <li>• Mary does not have to have a different menu from her family</li> <li>• Mary will not be at risk for any harmful effects from Metaboloss</li> <li>• Mary and mom will get information on eating disorders</li> </ul>	<ul style="list-style-type: none"> <li>• Mary needs more exercise to lose weight; that amount is only good for maintaining weight</li> <li>• No consultation with physician about blood work. Dietician is not qualified to interpret blood-work</li> <li>• No consultation with psychologist about depression or self-esteem issues</li> <li>• Does not address mom's own weight problems, which could be influencing Mary</li> <li>• No mention of how Mary should plan her diet after the 2 weeks are up</li> <li>• No investigation of why Mary is overweight or why she gained 20 pounds in the last year</li> </ul>	<ul style="list-style-type: none"> <li>• Mary will have a healthy diet and receive all major nutrients, vitamins, and minerals</li> <li>• Mary may not lose any additional weight, or may lose weight at a slower rate</li> <li>• Mary will protect herself from other health problems like heart problems, high cholesterol, and cancer with her new diet and exercise program, however, she may still be overweight</li> </ul>
Possible Solution #2	Pros	Cons	Consequences
<p>Continue the low-carb diet and multivitamin to ensure Mary is getting her vitamins and minerals. Continue the diet until weight goal is met and gradually increase carbohydrates over a month long period. Discontinue the use of Metaboloss. Get Mary on an exercise plan, 5 times a week, possibly with a personal trainer. Select an enjoyable physical activity Mary could do once a week with other family members. Speak to mom privately about eating disorders, since Mary does not have one. Discuss mom's own weight loss problems and their effect on how she perceives Mary's current weight loss plan--possibly encourage Mom to begin the low-carb diet. Opt not to consult psychologist since this is not a body-image problem, Mary is indeed overweight.</p>	<ul style="list-style-type: none"> <li>• Mary will be taking a multivitamin to get required vitamins and minerals</li> <li>• Allows for gradual increase of carbohydrates once goal is met so that change is not too quick</li> <li>• Mary will not be at risk for any harmful effects from Metaboloss</li> <li>• Mom will get information on eating disorders</li> <li>• Family will get involved in physical activity together--will help with weight loss and overall self-esteem</li> <li>• Mom's weight loss struggle will be addressed along with its effects on Mary.</li> </ul>	<ul style="list-style-type: none"> <li>• Mary will not be eating a balanced diet. She will not be eating enough grains, fruits, and vegetables</li> <li>• The human body absorbs vitamins better when they are received in food, not from a pill</li> <li>• Mary's dad (and possible mom) will not likely eat the same meals</li> <li>• If Mary does have an eating disorder, the RD will miss the opportunity to give her more information on them</li> <li>• Does not take into account that weight may be tied to depression or self-esteem issues</li> <li>• No investigation of why Mary is overweight or why she gained 20 pounds in the last year</li> </ul>	<ul style="list-style-type: none"> <li>• Mary will not be getting enough carbohydrates and her body will begin to compensate for it in a negative way.</li> <li>• Mary can expect to experience more weight loss</li> <li>• Mary may be protecting herself from other health problems by exercising and losing weight, however a high-fat, high-protein diet will only be increasing her chances for future health problems</li> </ul>



Table 3. Assessment rubric

Criteria	"Excellent Performance"	"Mediocre Performance"
Introduction  <i>10 points</i>	<ul style="list-style-type: none"> <li>Introduce the situation and bring the audience up to speed</li> <li>Capture the audience with introduction <b>10</b></li> </ul>	<ul style="list-style-type: none"> <li>Introduce the situation but do it in such a manner that the audience is not enticed OR</li> <li>Capture the attention of the audience, but do not give enough background information to properly acquaint audience with situation <b>8</b></li> </ul>
Content  <i>15 points</i>	<ul style="list-style-type: none"> <li>Cover the following information in skit: explanation about blood work, current weight loss plan (low-carb diet and Metaboloss), eating disorders, other dieting methods, and a healthy plan of action for losing weight <b>15</b></li> </ul>	<ul style="list-style-type: none"> <li>Fail to cover one of the topics: explanation about blood work, current weight loss plan (low-carb diet and Metaboloss), eating disorders, other dieting methods, or a healthy plan of action for losing weight <b>12</b></li> </ul>
Support  <i>10 points</i>	<ul style="list-style-type: none"> <li>Problem is well-researched</li> <li>Provide examples and verifying information on all topics covered (ex. who says Metaboloss is/isn't harmful, who says low-carb diets are/aren't harmful) <b>10</b></li> </ul>	<ul style="list-style-type: none"> <li>Do not provide examples or verifying information on all topics covered</li> <li>Audience is left wanting more information, or wondering where group got the information <b>8</b></li> </ul>
Solution  <i>10 points</i>	<ul style="list-style-type: none"> <li>Solution is reasonable and workable</li> <li>Solution is detailed</li> <li>Solution is supported by evidence <b>10</b></li> </ul>	<ul style="list-style-type: none"> <li>Solution is detailed and supported by evidence but not very feasible OR</li> <li>Solution is reasonable but audience is not given enough detail or solution is not supported with enough evidence <b>8</b></li> </ul>
Organization  <i>5 points</i>	<ul style="list-style-type: none"> <li>Background information is given and the problem is introduced before the solution <b>5</b></li> </ul>	<ul style="list-style-type: none"> <li>Solution is given before the audience has a thorough grasp of the problem and background information <b>4</b></li> </ul>
Importance  <i>10 points</i>	<ul style="list-style-type: none"> <li>Main points and examples/verifying evidence are emphasized <b>10</b></li> </ul>	<ul style="list-style-type: none"> <li>Main points are generally emphasized but the group presents irrelevant information or goes off on a tangent <b>8</b></li> </ul>
Familiarity/ Comprehension  <i>10 points</i>	<ul style="list-style-type: none"> <li>Appears as if skit has been practiced</li> <li>Appear comfortable with content and their understanding of the problem</li> <li>Know problem well enough to give quality answers to questions from audience <b>10</b></li> </ul>	<ul style="list-style-type: none"> <li>Group is familiar with problem and content, but skit appears to be thrown together without much thought or practice OR</li> <li>Skit is well-rehearsed but group does not seem to have complete grasp of the problem, the content, or the solution <b>8</b></li> </ul>
Enthusiasm/ Believability  <i>5 points</i>	<ul style="list-style-type: none"> <li>Maintain roles throughout entire skit</li> <li>Show enthusiasm during performance and convey that to audience <b>5</b></li> </ul>	<ul style="list-style-type: none"> <li>Maintain roles throughout skit, but audience is bored because of lack of enthusiasm shown by the group OR</li> <li>Show enthusiasm, however students do not maintain their roles throughout skit <b>4</b></li> </ul>
Speech  <i>5 points</i>	<ul style="list-style-type: none"> <li>Speak clearly with appropriate volume and inflection <b>5</b></li> </ul>	<ul style="list-style-type: none"> <li>Difficult to hear all students because they are not loud enough or they are mumbling <b>4</b></li> </ul>
Eye Contact  <i>5 points</i>	<ul style="list-style-type: none"> <li>Maintain consistent eye contact with other members of the group during the skit, and with the audience during the question/answer period <b>5</b></li> </ul>	<ul style="list-style-type: none"> <li>Show some evidence of eye contact during the skit and question/answer period, but not consistently <b>4</b></li> </ul>
Time  <i>5 points</i>	<ul style="list-style-type: none"> <li>Skit falls between 5 and 10 minutes</li> <li>Pace is appropriate <b>5</b></li> </ul>	<ul style="list-style-type: none"> <li>Skit is less than 5 minutes or more than 10 minutes (but is only 1 minute off)</li> <li>Feels like students are rushing or it is dragging on <b>4</b></li> </ul>
Teamwork  <i>10 points</i>	<ul style="list-style-type: none"> <li>Teamwork is evident; group appears to communicate with one another well</li> <li>Every student is participating in some fashion <b>10</b></li> </ul>	<ul style="list-style-type: none"> <li>Group has issues that are evident to the audience; they don't seem to work well together</li> <li>One student in the group is not participating <b>8</b></li> </ul>

Grade out of 100 points: \_\_\_\_\_