

## Formative Assessment Planning Process Case Review — Part 1 Middle School Science

### Case Overview

Alexa is a middle school science teacher who has been teaching science for 10 years. During the last five years she has taught grade 7 science in a rural middle school. Because she works in a very small school, she has no other colleagues who teach science at her grade level. While she does meet weekly in a grade level team to discuss general student learning needs, she has felt isolated in her planning for science instruction. She feels she is doing quite well with her students. As evidence, her students score well on the state science assessment, and she gets good feedback from her principal. She reports, however, that she misses having the opportunity to meet with science colleagues to reflect on lessons, as she had in her previous school.

In the year prior to this case review, the district hired a retired math/science teacher to serve as an academic coach to the district. The coach works with middle school math and science teachers once per week. The coach, Margaret, was hired to help teachers review content standards, align lessons to standards, and implement more “research-based” instruction. Alexa has enjoyed having a colleague with whom she can discuss her lesson planning.

The previous summer, the district sponsored a few short workshops on research-based instruction and classroom assessment practices. Following the workshop, the school principal asked each teacher to revise four instructional units during the school year to include classroom formative assessment and learning tasks that were aligned to the academic content standards. The math/science coach attended the session with the faculty and was scheduled to meet with each teacher monthly.

### Review of the Existing Unit Plan

Alexa selected a life science unit on human digestion as a unit that she would “tweak” by adding some of the newly required elements. Her existing unit plan is in Table 1, on the next page. At her first planning session with the instructional coach, Alexa reported that, overall, she was pleased with the digestion unit. She indicated that the direct instruction was at the right level, that the tasks were engaging, and that students were actively involved throughout the unit.

To begin, Alexa and Margaret pull out their notes from the summer workshop to review key principles for writing learning goals and developing big ideas (See Table 2). Margaret asks Alexa to reflect on the digestion unit plan in light of this new information. Alexa indicates that the big idea feels like it meets the criteria in Table 2, but she notes that her learning goals are primarily activity based. While she feels that the goals do get students to understand key elements of the standard, she also indicates that she would be helped by reframing these into more precise language.

**Table 1**  
**Grade 7 Digestion Unit - Initial Unit Plan Outline (before formative assessment practices)**  
**Formative Assessment Case Review**

Lesson Planning Element	Teacher Plans	
<b>State academic standards</b>	<ol style="list-style-type: none"> <li>1) Identify the functions of the human body's systems, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, and protection from disease; and describe how they interact with one another.</li> <li>2) Explain that multi-cellular organisms have specialized cells, tissues, organs, and organ systems that perform certain necessary functions, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, and protection from disease.</li> <li>3) Describe the structure and function of organs. Diagram and label the structure of the primary components of organs in animals and plants.</li> </ol>	
<b>"Big Idea"</b>	The human body is made up of different systems, each of which addresses a different function.	
<b>Student learning goals</b>	<ul style="list-style-type: none"> <li>• Students complete the digestive system summary sheet.</li> <li>• Students draw a life-sized representation of digestive organs that accurately shows and describe all the organs.</li> <li>• Students will view the film "The Passage of Food".</li> <li>• Students will be able to correctly identify key vocabulary related to digestive system.</li> </ul>	
<b>Instruction at beginning of unit (Description of modeling and direct Instruction)</b>	Teacher will: <ul style="list-style-type: none"> <li>• Introduce organs of the digestive system using organ diagram.</li> <li>• Discuss the role and function of each organ.</li> <li>• Highlight the nature of digestion.</li> <li>• Show film "The passage of food".</li> <li>• Revisit diagram of digestive system and model how to accurately label and explain each major organ.</li> </ul>	
<b>Instruction during middle of unit (Guided practice)</b>	Students will: <ul style="list-style-type: none"> <li>• Complete a diagram of the digestive system and label the major organs.</li> <li>• Explain the function of each organ from their diagram.</li> <li>• In small groups, complete "yarn" activity to show the relative size of different organs in the digestive system.</li> <li>• In pairs, read "Where does the food go"</li> </ul> Teacher will: <ul style="list-style-type: none"> <li>• Provide additional instruction on digestive process to introduce the role of enzymes.</li> </ul>	
<b>Instruction at end of unit (Independent student work)</b>	Students will: <ul style="list-style-type: none"> <li>• Work independently to complete life-sized diagram of digestive organs, correctly labeled and functions outlined.</li> </ul>	
<b>Materials/Resources</b>	<ul style="list-style-type: none"> <li>• Textbook chapter — Human Body Systems</li> <li>• Digestive system diagram with labels</li> <li>• Measuring tools</li> <li>• Large rolls butcher paper for life sized drawing</li> </ul>	<ul style="list-style-type: none"> <li>• Video — The Passage of Food</li> <li>• Vocabulary worksheet</li> <li>• Markers, tape, for all students</li> <li>• Yarn</li> </ul>
<b>Homework and assessment plan</b>	<ol style="list-style-type: none"> <li>1. Matching activity — correctly match organs to functions (day 2)</li> <li>2. Digestive system summary sheet — label organs and describe their functions (day 3)</li> <li>3. Vocabulary worksheet (day 4)</li> <li>4. Written essay documenting the passage of food through the system (due day 5)</li> <li>5. Final assessment — accurate life-sized model of digestive organs and functions (see rubric, add extra credit includes additional information on key enzymes covered in class) (class activity day 6 and 7, due day 7)</li> </ol>	

**Table 2**  
**Key Principles for Writing Big Ideas and Learning Goals**

Big Ideas	Learning Goals
<ul style="list-style-type: none"> <li>• Highlight essential insights about a discipline</li> <li>• Help students link important facts and skills into a more coherent “mental map”</li> <li>• Have lasting value that is likely to be transferred to other disciplines</li> </ul>	<ul style="list-style-type: none"> <li>• Are directly aligned to the academic standards</li> <li>• Are focused on what students will learn, rather than what they will do</li> <li>• Are written at the same level of understanding that is implied by the academic standard</li> <li>• Use clear and precise language</li> <li>• Help students make connections to prior learning</li> </ul>

To revise the learning goals, Margaret and Alexa spend 20 minutes of their planning meeting discussing the unit as it has been taught in the past. They focus on what Alexa wants students to learn through the unit, and how students move to independent work. As this review unfolds, Margaret helps Alexa clarify her learning goals by asking the following guiding questions:

1. Specifically, which Bloom’s Taxonomy level is attained in the current unit?
2. Specifically, which Bloom’s Taxonomy level does the standard address?
3. To what degree will they learn? What is the depth and breadth you hope to have them reach on this standard?
4. By the end of the lesson, what do you want students to know and be able to do?
5. How might you see students demonstrate their learning?
6. Can you explain your learning goals to students?

During their dialogue, Alexa identifies several points that help her clarify what she can do to revise her learning goals. First, she feels that students usually have a pretty good grasp of the digestive system organs and their functions, and that many students have that even before the lesson begins. While students are very engaged during the final assessment task (in which they develop life-sized posters showing the digestive organs correctly represented and labeled) she recognizes that for some students, simply developing an accurate labeling, though valuable, does not quite take them to the next level she wants to see in their learning.

Going back to the state standards, she sees that she has not clearly focused on certain aspects of the standards, in particular how specialized cells support the processes of the digestive system. She wants her students to better understand the actual pathway of digestion, and beyond knowing the function of each major organ, she wants students to be able to articulate how each organ has a specialized set of processes, each of which is absolutely essential in the entire process of digesting food.

Reviewing the standard leads Alexa to shift her understanding of the big idea. She sees that her big idea captures only a small part of the standard, and, in this way, does not represent the “essential insight” she wants students to understand. She realizes that this unit is more about being a stepping stone to helping students have a conceptual idea that all parts of a system are related and inter-dependent. This idea, which is essential to understanding a big idea in science about how systems operate, helps her re-think the enduring ideas of this unit, and what she can do to help students transfer that knowledge to other areas of science.

Alexa and Margaret review Bloom’s Revised Taxonomy to explore the level of thinking that is required in this standard. They begin the discussion by identifying key verbs in the standards — identify, describe, explain, and diagram. They clarify that the current unit instruction is at the knowledge and understand levels, which meets the written language of the state standard. However, for students to understand digestion as a “system”, they feel that this moves the learning to a higher level on Bloom’s Taxonomy. They understand the Bloom’s analyze level to focus on the students’ ability to analyze information, see patterns, and understand component parts of a system. Alexa notes that she wants to be sure that students are able to understand both the effect of the whole system of digestion, as well as the important facts about how each organ affects the entire system. This will need to be addressed in the new learning goals.