

Final Literacy Project

TE846 – 736 Accommodating Differences in Literacy Learners

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## **I. Brief Background & Reason for Project**

In order to prepare our youngsters for success in a world increasingly focused on non-specific content knowledge, but on “21<sup>st</sup> Century Skills” such as problem solving and critical thinking, it becomes essential to provide opportunities for students to engage literacy deeply in all subject-area classrooms (Samuels & Farstrup, 2011). As a science teacher, I recognize that *what* my students learn is not nearly as important as *how* they learn – and if it is my goal for my students to become scientifically literate adults who contribute positively to society, it is imperative that I work to develop their fluency in scientific reading and writing (Rutherford & Ahlgren, 1991). With the understanding that all students progress at their own pace through a regular developmental path, differentiation of material, both literacy and content-based, becomes an integral instructional strategy (Mandel-Morrow & Gambrell, 2011). Differentiation is a key aspect of my practice, especially when working with multi-aged and thus multi-ability groups of middle school students. I have the amazing opportunity to teach and mentor my students for the three years that they are in middle school, and best practices in reading comprehension suggest that a teacher maintaining a positive relationship with a struggling student is one of the most profound strategies involved in improvement – particularly over the course of two or more years (Samuels & Farstrup, 2011). The following case study documents an in-depth look at my work with one of my students, who is a struggling reader, in my attempts to provide her with additional support in scientific literacy.

## II. Home & Family

The student I selected for this study is Haley, a 14 year-old seventh grade student. She is an outgoing young woman and an extraordinarily hard worker who currently has an IEP (Individualized Education Program) for her learning disability in speech and language and has been receiving language therapy since preschool. Haley has also been diagnosed with Brown's syndrome, an eye muscle problem where her eyes do not move together. This only impacts her when she wants to look somewhere in her peripheral vision, as she must turn her whole head instead of just moving her eyes. Haley is on our school's TST (Teacher Support Team) caseload where she receives her Special Education services, including assistance with both reading and writing. She is an only child and her parents are very involved in her education, advocating for her on a regular basis through frequent communication with me, including several in-depth conferences each year.

Haley generally reads for pleasure once or twice a week at home – although she admits that she only reads when she has nothing else to do. Usually, this involves reading by herself or having her mom read aloud to her. When her mom reads with her, she will ask Haley questions about the content to make sure she is listening. Haley enjoys mystery and fantasy books, and *Chasing Brooklyn* was the last book she read on her own. Most of the books in Haley's house are purchased, and though she occasionally makes trips to the library, she prefers to get her books from yard sales or bookstores. When interviewed about her reading habits, she said, "I'm not a good reader, but it's fun to look at books." Although she normally engages with text through storybooks, Haley feels comfortable using the Internet for schoolwork, and she also reads magazines and instructions for her Wii and DS games.

The most complicated part of reading for Haley is ensuring that she understands the words she is reading. Occasionally she will skip or misread a word, which makes comprehension difficult for her. When she gets to a sentence she does not understand, Haley will sound out complex words and reread until she grasps the meaning. She also will ask an adult the meaning of words she cannot define herself. Haley prefers reading fiction books for pleasure rather than for a school-related assignment because she has no deadline by which to complete them. She believes informational text is hard to understand, especially when she is not interested in the topic.

### **III. Emotional Climate**

Haley's parents are very encouraging of her, especially when it comes to improving her reading comprehension. When Haley was dismissed from her first Speech and Language IEP early last year, her mom came to me and asked for assistance in re-qualifying her so she could continue to receive additional support in school, as well as mandatory accommodations on standardized tests. Due to the support and insistence of Haley's parents, we were able to work with her speech pathologist in order to re-test her, and she was again eligible for an IEP – this time qualifying for a general learning disability. Haley feels very comfortable asking for help from both her general education and special education teachers, and she usually receives push-in assistance in the classroom.

At home, Haley's parents constantly push her to read, whether it is a book for school or for pleasure. Because her dad works full time and is often away on business, Haley's mom is usually the one to read with her. There are no rewards or punishments for reading or the lack thereof in Haley's house, but Haley knows the natural consequences of not completing her work so she always makes time to sit down with her mom and read through her books assigned for

school. Haley has a very optimistic attitude and rarely gets frustrated about her struggles with reading comprehension, but generally chooses to spread her reading out to only a few chapters at a time so she does not lose interest.

#### **IV. Literacy History**

Haley has been receiving special education services for reading and writing since she started kindergarten. Haley's mom does have some training in early child development, and began reading to her when she was an infant. However, when she noticed that Haley was not progressing along the normal developmental continuum with her speech around the age of preschool, her mom had her tested for a speech disorder. Haley attended Sylvan Learning Center for four years during elementary school, and repeated fourth grade to gain additional experience with literacy.

Now in middle school, Haley receives support in both reading comprehension and writing through scaffolded assignments, as well as accommodations when necessary. These include getting tests read to her, using graphic organizers and outlines for her writing, and providing her with appropriate leveled texts to read in all content areas. She began using SOLO Literacy Suite this year for her written work, an online program that reads back to her what she has typed so she can identify and correct errors in her tenses and sentence structure. It was Haley's goal at her most recent IEP to recognize at least 90% of the mistakes in her own writing by spring of next year, and she is well on her way to accomplishing that goal.

Although Haley is a straight-A student and member of our school's Junior National Honor Society, her MEAP test results and Performance Series scores (a web-based assessment required by Central Michigan University who authorizes our school's charter) indicate that she is either partially proficient or below average in reading.

## **V. Assessments Given & Summary of Assessment Results**

Two assessments were given to Haley to identify (1) her knowledge of reading comprehension strategies for expository text, and (2) her ability to understand specific scientific vocabulary gained through activities and lessons during a science unit heavily grounded in promoting scientific literacy. The results of the post-assessment, the Hydrology Unit Assessment, will be discussed in greater detail in Section VII. Reflection on Differentiated Lesson Plan.

### **(1) Textbook Reading/Study Strategies Inventory (TRSSI) – Pre-Assessment**

The TRSSI was the first assessment given to Haley, in order to gain additional information about the strategies with which she is familiar and uses regularly to read and study for tests. I read the directions to her and clarified what each strategy meant. She identified and then filled out her familiarity and actual use of each strategy. Her TRSSI form can be seen as Artifact 1.

Haley's TRSSI revealed that she is familiar with many reading and comprehension strategies, though she rarely utilizes them to their full extent. Some of the strategies with which she is most comfortable and applies regularly throughout her expository reading include: using an online dictionary or glossary to define unknown words; previewing chapters or sections of the text before she reads; underlining key concepts while she is reading; monitoring her comprehension while she reads and using appropriate strategies when she does not understand; creating mental pictures of what she reads; adjusting her reading rate when she gets to more complicated text; and practicing for tests using recitation and repetition strategies. There were several important strategies that Haley recognized but did not use, such as using context clues to get the meaning of unknown words, creating flashcards for key concepts, predicting the types of

questions teachers might ask on tests, and using specific strategies to study for different types of assessments. Although she does take notes on a regular basis, Haley had never heard of SQ3R (Survey, Question, Read, Recite, Review) notes, and she did not know how to use punctuation clues to understand difficult sentences.

There are several implications that can be drawn from these TRSSI results. The first is that Haley already has some effective strategies in place to help her with reading comprehension. Because I have a strong relationship with her, I can confidently state that she knows her strengths and weaknesses and normally correctly identifies when she needs to take advantage of these reading strategies. However, the TRSSI also conveyed that there are several areas that Haley could improve upon to further develop her comprehension. Reading comprehension is best developed when embedded directly into content area curriculum, in order to be utilized as a tool to help students gather information in inquiry-based lessons (Samuels & Farstrup, 2011). Based on Haley's TRSSI results, I sought to integrate instruction on the strategies with which she still struggled and that I believed to be the most essential for the science content she was learning throughout this term. Specifically, I wanted to work with her in trying to use some of the strategies that she was familiar with on a more regular basis in order to best support her scientific literacy. The two strategies I wanted to focus on in Haley's differentiated lesson were using context clues to get the meaning of unknown words and identifying key concepts and vocabulary in preparation for a test.

### (2) Hydrosphere Unit Assessment – Post Assessment

At the end of my instruction with Haley, she took the unit assessment on the concepts covered throughout our unit on the hydrosphere. It was comprised of not only vocabulary comprehension, but also general understanding of the major processes involved in the hydrologic

cycle as well as how pollution contaminates groundwater. Haley received a “middle-level” version of this test, in that she was given a word bank to label the diagrams, but was not given multiple-choice options for the vocabulary definitions. She also had the directions and questions on this exam read aloud to her. Haley’s copy of the assessment can be seen as Artifact 2, and a more in-depth analysis of her results is discussed in Section VII.

Although the TRSSI was used as a pre-assessment and the Hydrosphere Unit Assessment was more of a concluding evaluation of Haley’s learning, both were essential in creating an effective formative assessment cycle for me as her instructor – which according to Gallagher (2007), involves gathering information about students’ understanding, analyzing this information, then adjusting teaching appropriately. This is a practical method of connecting both the literacy aspect of this case study with science comprehension, as I used my findings from Haley’s TRSSI to inform my instruction of science content (focusing on using context clues and identifying key concepts), which in turn led to my assessment of Haley’s understanding of the hydrosphere through literacy-related material. Her performance on the Hydrology assessment could then lead to additional adjustments in my teaching of scientific literacy in the future.

## **VI. Differentiated Lesson Plans**

*“I Can...” Statements and Related Standards Addressed in Both Lessons:* My middle school team uses Understanding By Design as a guide to construct our integrated, thematic units (Wiggins, G. & McTighe, J., 2005). This involves unpacking state benchmarks to make them more accessible and comprehensible to our students in the form of “I can...” statements. Below are several of our “I can...” statements for our “American Odyssey” unit, which was the basis for the lessons I taught to my entire group of middle school students – including Haley.

1. **I can tell where water comes from and where it goes.** Michigan Science Content Standards, Hydrosphere EH V.2, Middle School: *Describe the characteristics of water and where water is found on Earth.* Michigan Science Content Standards, Hydrosphere EH V.2, Middle School: *Explain how water exists below the Earth's surface and how it is replenished.*
2. **I can explain how water gets polluted.** Michigan Science Content Standards, Hydrosphere EH V.2, Middle School: *Describe the origins of pollution in the hydrosphere.*

Because I work with a group of middle school students who are in multi-aged classrooms, I am regularly teaching science content to students working at a reading comprehension level of anywhere from third grade to high school. It becomes essential to differentiate on a daily basis in the content I provide my students with, the process by which they learn, and the products they produce to demonstrate their learning (Tomlinson, 2001). For this particular case study, I wanted to differentiate Haley's work specifically based on my knowledge of her study strategies from the TRSSI to develop her understanding of not only the above science content standards, but also several literacy benchmarks. I felt it was important to purposefully build in opportunities for Haley to improve her reading comprehension within the context of constructing her scientific knowledge, as research shows that this is best practice (Samuels & Farstrup, 2011).

Lesson 1: Water Cycle Lab

<b>Lesson Foci/Date</b>	<b>Objectives</b>	<b>Instructional Materials</b>	<b>Ongoing Assessment</b>
Using context clues appropriately to generate understanding. May 23 –	Haley will use context clues appropriately in a scientific text to determine the meaning of unknown words.	The main instructional materials are several lab documents/instructions which Haley has to read through to comprehend what she will be doing in the lab. There are	Haley will need to follow the lab directions to complete the activity, so I will assess her progress on this objective by monitoring how many



<p>Beginning of “American Odyssey” Unit.</p>	<p>Michigan ELA Content Standards, Vocabulary Acquisition and Use, R.WS.07.01: <i>Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.</i></p>	<p>scientific words in the instructions she would not normally encounter in everyday reading, so this fits the objective well.</p> <p>All other lab materials (listed in detailed lesson plan) are necessary as well.</p>	<p>times she asks for help or does not understand what she should do next.</p> <p>Haley also has to write a lab report on what she learned from this activity. If she did not fully comprehend any of the directions, this will be evident in her report.</p> <p>If Haley is unable to use context clues to help her understand what she is reading, I will provide her with some more background information about the vocabulary she will encounter in this unit.</p>
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Lesson 2: A Day in the Life of a Raindrop

<b>Lesson Foci/Date</b>	<b>Objectives</b>	<b>Instructional Materials</b>	<b>Ongoing Assessment</b>
<p>Utilize appropriate reference materials to determine meanings of words and then use them properly in context.</p> <p>Recognition of key concepts in informational text.</p> <p>June 11 – End of “American</p>	<p>Haley will use a dictionary to determine the meaning of scientific vocabulary, then demonstrate her understanding of the words in context.</p> <p>Michigan ELA Content Standards, Vocabulary Acquisition and Use, R.WS.07.07: <i>Consult general and specialized reference materials (e.g.,</i></p>	<p><i>Science Explorer: Earth’s Waters</i> textbook</p> <p><i>Dewey’s First Adventure</i>, children’s book written by a former student.</p> <p>Science vocabulary from hydrology unit.</p>	<p>Haley will define each of the vocabulary words in her own words, then create a picture to go with each. If she does not fully understand what she read in the dictionary, this will be apparent in her definition.</p> <p>Using the vocabulary and her own definitions, Haley will write a story from the perspective of a rain drop going through the</p>

<p>Odyssey” Unit.</p>	<p><i>dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.</i></p> <p>Michigan ELA Content Standards, Vocabulary Acquisition and Use, R.WS.07.07 R.CM.07.04: <i>Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.</i></p>		<p>water cycle. I will assess her understanding of the scientific vocabulary through the readability of her story.</p> <p>Finally, Haley will use what she read in the textbook to create flashcards to study for her unit assessment.</p> <p>I will monitor Haley’s progress through defining the vocabulary and writing her story. If I feel she is struggling with either using context clues or identifying key information, I will continue to develop these skills as she prepares for her test.</p>
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**VII. Reflection on Differentiated Lesson Plan**

I believe that my differentiated reading instruction provided Haley with additional positive support that contributed to developing her scientific literacy. Through the results of her TRSSI, I was able to select several reading strategies for Haley to focus on as she built her scientific knowledge: using context clues to identify unknown words, using dictionary definitions to aid in comprehension of new vocabulary, and recognizing key concepts in informational text. Haley practiced these skills as research suggests best supports the growth of reading comprehension – through hands-on, inquiry based science lessons, such as building a

model of the water cycle using two-liter bottles and researching the different ways authors convey information through informational and narrative texts (Samuels & Farstrup, 2011).

Haley utilized the comprehension strategies effectively, as demonstrated by her 95% on the Hydrosphere Unit Assessment. She clearly demonstrated her knowledge of the hydrosphere by correctly labeling the diagram of the water cycle and aquifer, defining multiple relevant vocabulary terms in her own words, describing how groundwater becomes polluted, and explaining ways to conserve water around her community. As seen on the document, Haley used the word banks to her advantage by not only crossing off words once she was certain they were labeled correctly, but also by ensuring that her spelling on the diagram was correct. Utilizing key information, in the form of correctly spelled words, was a strategy that Haley used effectively on this test. Her spelling and sentence structure on other parts of the test were not quite as proficient, most likely due to the fact that she was concerned more with the content she was writing and not her delivery. Through her correctly defined vocabulary words, it was evident that the strategies I focused on in my differentiated lessons with Haley were effective.

Ultimately, vocabulary comprehension is key in teaching scientific literacy, and throughout my work with Haley, I utilized several of the best practices in vocabulary instruction. One of the techniques I used was to have Haley draw pictures for each vocabulary term she defined in her own words in order to form a relationship between the new material and her existing base of knowledge. For the term condensation, Haley drew a picture of a glass of ice water with condensation forming on the outside. As Mandel-Morrow & Gambrell (2011) suggest, this helped her make a connection between the new term (condensation) and a phenomena she already knew existed (moistness on the outside of a cold glass of liquid). Haley was also able to see water actually condense in the lab activity, and through this as well as her

dictionary definition and drawing, she was provided with multiple sources of meaning in order to create context for the new vocabulary she was learning (Mandel-Morrow & Gambrell, 2011).

When Haley and I were working together on specific comprehension strategies, such as using context clues appropriately to better understand the lab directions, I first modeled the strategy for her, allowed her to try it with guided assistance, then gave her the opportunity to practice it independently. This gradual release of responsibility from teacher to student is an effective way to help struggling readers like Haley gain confidence in practicing new strategies (Samuels & Farstrup, 2011). Motivation is another key aspect in improving endurance when readers are working with more complex texts, as the textbook was for Haley (Samuels & Farstrup, 2011). Although Haley is least comfortable with reading informational text, I provided motivation for Haley in this particular instance by combining the textbook reading with a children's book, emphasizing the importance of the different formats of information and asking Haley to compare them (Mandel-Morrow & Gambrell, 2011). It was also wonderful to be able to include a book written by a former student, and to discuss with Haley how the former student took the same assignment Haley was working on all the way to the level of publication.

If I were given an opportunity to extend this case study, I would continue to embed the teaching of literacy and reading comprehension strategies into science content instruction. I believe Haley had appropriate opportunities for engagement and motivation, as well as to make relevant connections between the new vocabulary she was learning and her background knowledge. In my post-assessment of Haley's understanding of the scientific vocabulary, it was evident that spelling and sentence structure were two areas where she continues to struggle. Samuels and Farstrup (2011) assert that an area of the brain called the visual word form area responds to and makes connections between the spelling and pronunciation of words. This linkage is strengthened with continued experience, becoming almost automatic for fluent readers.

Haley could benefit from additional instruction focused on her decoding fluency through choral and repeated reading, practicing phrasing words in meaningful groups, and wide readings of multiple texts (Samuels & Farstrup, 2011).

### **VIII. Recommendation to Teachers & Parents**

Dear Parents of Haley,

Thank you for the opportunity to work individually with Haley over the past few weeks. It is such a pleasure to see a student so motivated and eager to learn. As a reader, she is dedicated and persistent, and enjoys engaging in new experiences.

I have been working with Haley on developing her reading comprehension, specifically through scientific literacy. I gave Haley a survey asking her to identify what strategies she is familiar with and uses on a regular basis to aid in her understanding of written material. From that, I was able to pinpoint several key strategies that Haley recognized but does not frequently apply when reading scientific texts: using context clues to identify unknown words, using dictionary definitions to aid in comprehension of new vocabulary, and recognizing key concepts in informational text. Through several targeted inquiry-based science lessons, I created opportunities for Haley to develop these strategies. After several weeks of practice, Haley clearly demonstrated her ability to use these skills effectively by writing a creative story using scientific vocabulary appropriately in context, as well as earning a 95% on the Hydrology Unit Assessment. Although Haley has mastered these strategies, I would encourage you to remind her to use them in the future when she encounters difficult texts or is learning new vocabulary words.

Another area for Haley to focus on is her spelling and sentence structure. You can work with her on this at home by modeling your own reading and writing. For example, when reading aloud discuss how you use your voice expressively to emphasize certain words or phrases. It is good to model negative examples too! The more experience Haley has with spelling and pronouncing words, the stronger and more automatic her decoding strategies will become.

Thank you again for the chance to work with such an amazing young lady! Enjoy the summer.

-Ms. Frazer

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## **X. Artifacts/Additional Materials**

### Lesson 1: Water Cycle Lab

## ***Lesson Plan 1 – Water Cycle Lab***

***Date:*** June 11 – End of “American Odyssey” Unit.

This is a two-hour block of science. Haley was working with her peers, however this lesson plan describes the specific differentiations that Haley received within the large group lesson.

***Objective(s) for today’s lesson:*** Haley will use context clues appropriately in a scientific text to determine the meaning of unknown words.

Michigan ELA Content Standards, Vocabulary Acquisition and Use, R.WS.07.01: *Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.*

***Rationale:*** In order for Haley to be a scientifically literate adult, she needs to use context clues when reading to identify the meaning of unknown words. All lab exercises come with a set of directions, and not all of the words she encounters will be words she recognizes. Using the words and phrases around an unknown word to create understanding is a great strategy for Haley to use regularly.

***Materials & supplies needed:*** Lab instruction sheets (see “Lesson 1 Handouts” below), sand, water, ice, two 2-liter pop bottles.

***Procedures and approximate time allocated for each event***

***Introduction to the lesson (10 minutes)***

Ask Haley what she already knows about the water cycle.

***Academic, Social and Linguistic Support during each event***

Write Haley’s ideas on the whiteboard.

Write the three main processes – evaporation, condensation, precipitation – on the whiteboard. Define in “basic” scientific terms. Tell Haley we will be learning MUCH more about these processes through the lab today.

Give Haley some “interesting” facts about the water cycle, such as:

- The Earth’s water supply is made up of 97% salt water, 2% icecaps/glaciers, and only 1% fresh water.
- Water is the only substance found naturally in all three states: solid, liquid and gas.
- One thunderstorm can send down over 125 million gallons of water.
- There is the same amount of water on Earth now as there was when the planet was formed.
- The water you used to brush your teeth this morning could have been digested by a dinosaur!

***OUTLINE of key events during the lesson (1 ½ hours)***

Give Haley a copy of the lab direction sheets.

Read first page, “Introduction to Soda Bottle Hydrology Labs” out loud with Haley. Stop after every paragraph and ask her to identify at least one word that she did not understand. Model with her how to use context clues to better understand unknown words – for example, how parenthetical phrases often contain definitions.

Have Haley read the lab direction sheet, “Investigation 1: The Hydrologic Cycle,” out loud. Encourage her to pause when she gets to words she does not understand in order to use the words around it for help. Discuss other strategies such as looking for definitions around bolded words as well.

When she has read through the instruction sheet, ask her to explain the directions in her own words. This is what she needs to write down in her lab report.

Allow Haley to work in a small group to carry out the lab. Check in with her group regularly, asking prompting questions such as “what is this part of your lab representing about the water cycle?” and “why do we need the ice in this lab?”

• ***Closing summary for the lesson (10 minutes)***

Ask Haley to say the words out loud, monitor for correct pronunciation.

Circle words Haley does not understand and underline context clues that may help her to provide a more concrete, visual representation.

Monitor how many times Haley asks for help or does not understand what she should do next – as this will show that she does not understand the lab directions.



<p>When Haley has completed the lab and cleaned up her materials, invite her to review the main steps in the lab and at what step she was able to see each of the three main processes in the water cycle: evaporation, condensation and precipitation. Work together to draw and label a picture on the whiteboard. Ask if she has any questions.</p>	<p>Write Haley's ideas on the whiteboard.</p>
<p><b><i>Assessment</i></b></p> <p>The main assessment in this lesson for Haley is to see whether or not she can accurately follow the lab directions to create a functional model of the water cycle. If she appropriately uses context clues and refers back to her lab instruction sheet, she should be able to carry out this lab activity.</p> <p>Haley also has to write a lab report on what she learned from this activity. If she did not fully comprehend any of the directions, this will be evident in her report.</p> <p>If Haley is unable to use context clues to help her understand what she is reading, I will provide her with some more background information about the vocabulary she will encounter in this unit.</p>	

Lesson 1 - Handouts

**Introduction to Soda Bottle Hydrology Labs**

These activities are to help you better understand concepts relating to groundwater, aquifers, and hydrology. The first activity, Pre-Lab Construction, must be done before any of the other activities can be done. Your teacher will talk to you about getting the supplies you need.

Hydrology refers to the study of water. In this set of activities we will be studying groundwater. Groundwater makes up only 0.61% of the Earth's total water supply but accounts for approximately 5% of the Earth's total fresh water supply. When it rains some of the water flows down into the ground into regions called aquifers, which are porous rock structures that hold water (sometimes for thousands of years). Water under the ground is not pure and it dissolves small amounts of soil and rock.

We tend to take the abundance and purity of our water for granted, but we shouldn't. There is not an endless source of fresh water, and some scientists fear we could run out of it someday. Pollution and contamination of both surface and groundwater reduce the amount of clean, fresh water available. Common pollution sources include: chemical fertilizers, pesticides, waste discharge, leachate from waste dumps, accidents, leaking underground gasoline/fuel storage tanks, and illegal dumping.

Since Americans use an average of 325 liters or about 85 gallons of water a day, it is very important to understand where our water comes from and how it gets there. These activities will give you a glimpse at the fascinating world of water.

## Investigation 1: The Hydrologic Cycle

Name:

Advisory:

**Materials:** Sand Water Ice Model Bottle Water-based Marker Pen Bottle Bottom

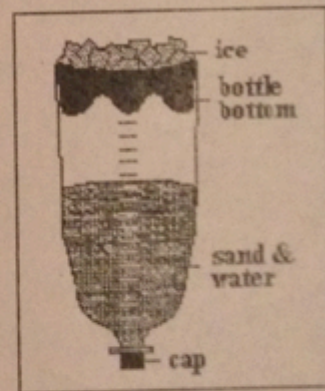
### Background:

Scientists call the constant endless movement of water from the atmosphere to earth to groundwater to river to ocean the **hydrologic cycle**. How long it takes water that falls from the clouds to return to the atmosphere varies greatly. Scientists predict it would take nine days to replace all of the atmospheric water and 37,000 years to replace all of the water in the ocean. In this activity we will create a **hydrologic cycle**.

### Procedure:

1. Put the screen into the model bottle and put a cap on it.
2. Fill your model bottle with sand to the 1,000 milliliter mark.
3. Holding the bottle with your hand or a ring stand, slowly pour in 200 milliliters of water.
4. Let the water settle.
5. Turn the cut out bottle bottom upside down and insert it into the top of the model bottle, so you can add material to the bottle bottom.
6. Put some crushed ice into the bottle bottom (which is at the top of the model bottle).
7. Set the bottle in a ring stand in sunlight or beside a strong lamp and observe.
8. With your marker, based on your observations and the descriptions above, label the groundwater model bottle with the following and include a drawing in your lab report:

9. *Groundwater*  
*Surface water*  
*Evaporation*  
*Condensation*  
*Precipitation*



10. *Draw AND Label the water cycle in your Lab Report.*

**Complete and Turn-in Your Lab Report !**

## ***Lesson Plan 2 – A Day in the Life of a Raindrop***

**Date:** June 11 – End of “American Odyssey” Unit

This is a two-hour block of science. Haley was working with her peers, however this lesson plan describes the specific differentiations that Haley received within the large group lesson. Haley used several additional class periods to complete her assessment/raindrop story.

**Objective(s) for today’s lesson:** Haley will use a dictionary to determine the meaning of scientific vocabulary, then demonstrate her understanding of the words in context.

Michigan ELA Content Standards, Vocabulary Acquisition and Use, R.WS.07.07: *Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.*

Michigan ELA Content Standards, Vocabulary Acquisition and Use, R.WS.07.07 R.CM.07.04: *Acquire and use accurately grade- appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.*

**Rationale:** In order for Haley to be a scientifically literate adult, she needs to use have the correct strategies in place when she encounters a vocabulary word she does not know. In any scientific text, whether from a magazine or Internet article, there are content-related words that are not normally used in everyday speech. Using a dictionary to look up these words to find a definition is an excellent strategy for Haley to use regularly. She also needs to be able to define unknown words in a way that makes them accessible for her to use in appropriate context.

**Materials & supplies needed:** *Science Explorer: Earth’s Waters* textbook, *Dewey’s First Adventure* (children’s book written by a former student), Science vocabulary from hydrology unit.

### ***Procedures and approximate time allocated for each event***

- ***Introduction to the lesson (10 minutes)***

Create a Venn Diagram on the whiteboard, labeling one side “Textbook” and one side “Story.” Ask Haley to fill out characteristics of textbooks and stories.

Tell Haley we will revisit this diagram later, and that we will be

### ***Academic, Social and Linguistic Support during each event***

If she has trouble coming up with features, allow her to look at the two texts we will be investigating through the lesson, and prompt her with questions such as, “What do

adding to it as we read parts of both a textbook and a story about the water cycle.

• ***OUTLINE of key events during the lesson (1 ½ hours)***

Show Haley list of vocabulary words from “American Odyssey” Unit. Tell her that she will be writing a definition in her own words and drawing a picture for every vocabulary word. She can use the dictionary, but needs to make sure she is not just copying down their definition.

Once Haley has had an opportunity to define and draw all of the vocabulary words, open the textbook to page 32. This section is about the water cycle. Ask Haley to read the section to herself as many times as she needs, stopping to utilize context clues, her vocabulary book, or other strategies if needed.

Once she has finished reading, ask her if there is anything she wants to add to the Venn Diagram.

Next, allow Haley to read *Dewey’s First Adventure*. To increase motivation, explain that this was a story written by a former student (for the assignment Haley is about to complete!) who has now gone on to publish her own book. Remind Haley that she can stop to utilize context clues, her vocabulary book, or other strategies as needed.

Ask Haley once again if there is anything to add to the Venn Diagram, particularly in the center section.

Discuss the different characteristics she included in her Venn Diagram, and whether or not they could provide opportunities for Haley to use strategies when she reads. For example, bolded words in informational text help identify definitions, while pictures in a children’s book might help provide clues about the “action” in the story.

• ***Closing summary for the lesson (10 minutes)***

Introduce the “Day in the Life of a Raindrop” story to Haley. Go through the directions and rubric, and explain that she will be using her scientific vocabulary to write a story demonstrating her understanding of the water cycle.

Give Haley a copy of the study guide for the unit assessment, and have her use the remaining time to start filling it out using what she

you notice about the font/pictures/audience?”

Ask Haley if she would prefer to read silently or aloud.

Add these to the whiteboard.

Ask Haley if she would prefer to read silently or aloud.

Add these to the whiteboard.

Have Haley add these strategies next to the characteristics in the Venn Diagram.



read in the textbook.

### ***Assessment***

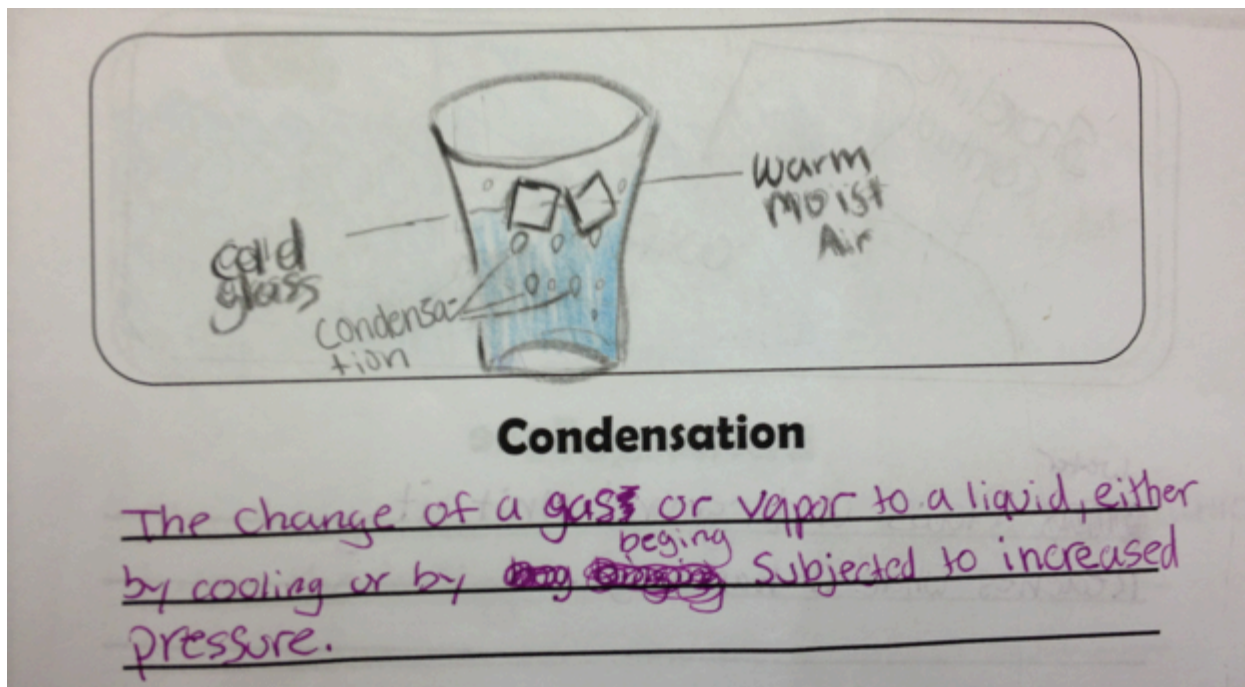
There are several checkpoints for assessing throughout this lesson. First, Haley will define each of the vocabulary words in her own words, then create a picture to go with each. If she does not fully understand what she read in the dictionary, this will be apparent in her definition.

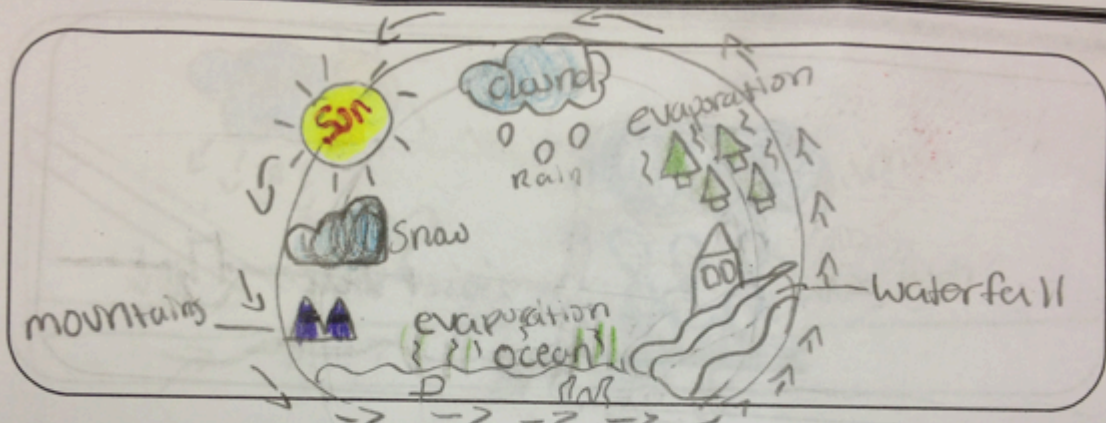
Using the vocabulary and her own definitions, Haley will write a story from the perspective of a rain drop going through the water cycle. I will assess her understanding of the scientific vocabulary through the readability of her story.

Finally, Haley will use what she read in the textbook to create flashcards to study for her unit assessment.

I will monitor Haley's progress through defining the vocabulary and writing her story. If I feel she is struggling with either using context clues or identifying key information, I will continue to develop these skills as she prepares for her test.

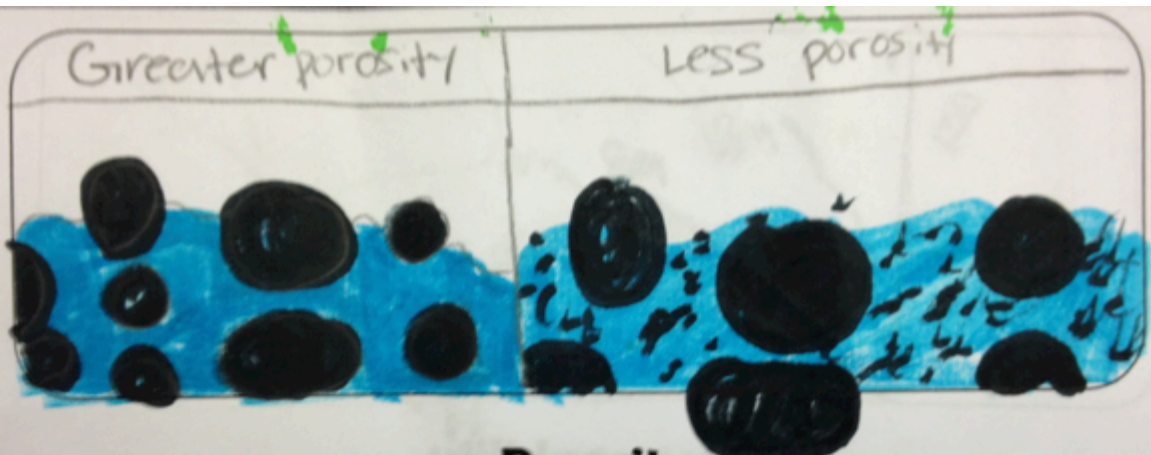
### Lesson 2 – Haley's Vocabulary Definitions/Pictures





### Hydrologic Cycle

(also known as a water cycle) is the journey water takes as it circulates from the land to the sky and back again.



### Porosity

is a measure of how much air or liquid can be absorbed by these materials.



Artifact 1: Haley's Textbook Reading/Study Strategies Inventory

FORM 9.3. Textbook Reading/Study Strategies Inventory

**Textbook Reading/Study Strategies Inventory (TRSSI)**

*Directions:* The purpose of this scale is to learn more about your perceptions of various reading and study strategies. We are interested in knowing how familiar you are with different strategies, how effective you feel the strategies are in helping you learn, and how often you use the strategies to read and study for tests.

For example, you may be very familiar with how to outline textbook chapters, so your familiarity rating might be a 5. However, because outlining is very time-consuming, you use that strategy only rarely, so your use rating might be a 2.

Rate each of the strategies below on a 1–5 scale (1 = low; 5 = high) in terms of familiarity and use. Circle the number of your rating for each strategy in the appropriate column.

Strategy	Familiarity					Actual use				
	1	2	3	4	5	1	2	3	4	5
1. Identify prefixes and suffixes to pronounce words or get the meaning of words.			3				2			
2. Use context clues to get the meaning of words.			3			1				
3. Use the glossary or dictionary to define words in textbooks.					5	1	2			
4. Conduct a chapter preview before you read.					5	1	2	3		
5. Read chapter introduction and summary before reading the whole chapter.			3			1				
6. Underline key concepts in the textbook.				4		1		3		
7. Make notes on key concepts presented in the textbook.				4		1	2			
8. Take notes on key concepts presented in the textbook.				4		1				
9. Outline textbook information.				4		1				
10. Create tables or charts of textbook information.				4		1				
11. Draw semantic maps of textbook information.				4		1				

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Adapted from Saumell, L., Schumm, J., & Post, S. (1993). *College Students' Perceptions of the Feasibility of Reading and Study Strategies*. Paper presented at the College Reading Association Conference, Richmond, VA. Reprinted in *Reading Assessment and Instruction for All Learners*, edited by Jeanne Schumm. Permission to photocopy this form is granted to purchasers of this book for personal use only (see copyright page for details).



Strategy	Familiarity					Actual use				
12. Use study questions presented in the textbook to guide your reading or review of a chapter.	1	2	3	4	5	1	2	3	4	5
13. Develop flashcards of key textbook information.	1	2	3	4	5	1	2	3	4	5
14. Reread chapters to prepare for tests.	1	2	3	4	5	1	2	3	4	5
15. Use chapter headings and subheadings to guide reading and study.	1	2	3	4	5	1	2	3	4	5
16. Monitor your understanding while you read, and take action to use "fix-up" strategies when you don't understand.	1	2	3	4	5	1	2	3	4	5
17. Identify main ideas of paragraphs as you read.	1	2	3	4	5	1	2	3	4	5
18. Identify most important details as you read.	1	2	3	4	5	1	2	3	4	5
19. Use paragraph organization (such as cause and effect or problem and solution) to help you understand as you read.	1	2	3	4	5	1	2	3	4	5
20. Use punctuation clues to help you understand difficult sentences.	1	2	3	4	5	1	2	3	4	5
21. Use typographic aids such as boldface type and italics to help identify key information.	1	2	3	4	5	1	2	3	4	5
22. Use multistep reading strategies such as SQ3R.	1	2	3	4	5	1	2	3	4	5
23. Relate new information to what you already know.	1	2	3	4	5	1	2	3	4	5
24. Create mental pictures or images to envision what you are reading.	1	2	3	4	5	1	2	3	4	5
25. Anticipate or predict what the author will say next as you read.	1	2	3	4	5	1	2	3	4	5
26. Predict questions teachers might ask on tests.	1	2	3	4	5	1	2	3	4	5
27. Write summaries to reflect on key information in chapters.	1	2	3	4	5	1	2	3	4	5

(cont.)



FORM 9.3. (page 3 of 3)

Strategy	Familiarity					Actual use				
	1	2	3	4	5	1	2	3	4	5
28. Adjust your reading rate to your purpose for reading and the level of difficulty of the material.				4				3		
29. Practice for tests using rehearsal or recitation strategies.					5			3		
30. Use mnemonic or memory systems to remember information for tests.				4			2			
31. Read chapter before taking notes on the topic in class.				4			2			
32. Review lecture notes within 24 hours after taking the notes.				4		1				
33. Rewrite lecture notes.				4		1				
34. Examine author's ideas to judge the use and value of the reading assignment.				4		1				
35. Identify facts and opinions as you read.				4			2			
36. Set goals and schedule for study sessions.				4		1				
37. Use specific strategies to study for different kinds of tests (e.g., multiple-choice, essay, identification).				4		1				
38. Use performances on first test in a class to adjust study strategies for subsequent tests.				4			2			
39. Prepare for tests by meeting with a study partner or study group.				4		1				

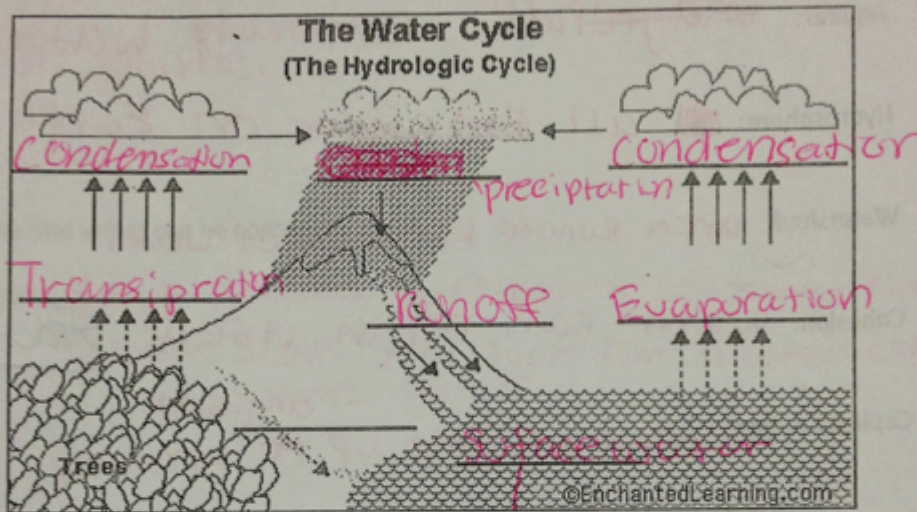
Artifact 2: Haley's Hydrosphere Unit Assessment

# Hydrosphere Unit Assessment

$$\frac{52}{55} = \frac{95}{100} \underline{\underline{A}}$$

Name: Haley [redacted]  
Advisory: Frazer

1. Using the diagram; Label the processes of the hydrologic cycle:  
(Evaporation, Condensation, Precipitation, Transpiration, Run-Off, Surface Water)



Surface Water

2. Comprehensively define the three (3) main processes associated with the Water Cycle:

Process #1: Evaporation - Rain drop are evaporation from heat. become gas.

Process #2: Condensation - Condensation is when the ~~precipitation~~ <sup>gas</sup> turn back into a Rain drop

Process #3: Precipitation - IS Rain and Snow, sleet or hail



3. Define the following terms:

Porosity: How much water fit in aquifer

Permeability: How fast water can go through aquifer

Aquifer: ~~underground~~ <sup>underground</sup> natural water storage

Hydrosphere: ~~all~~ all the water on Earth

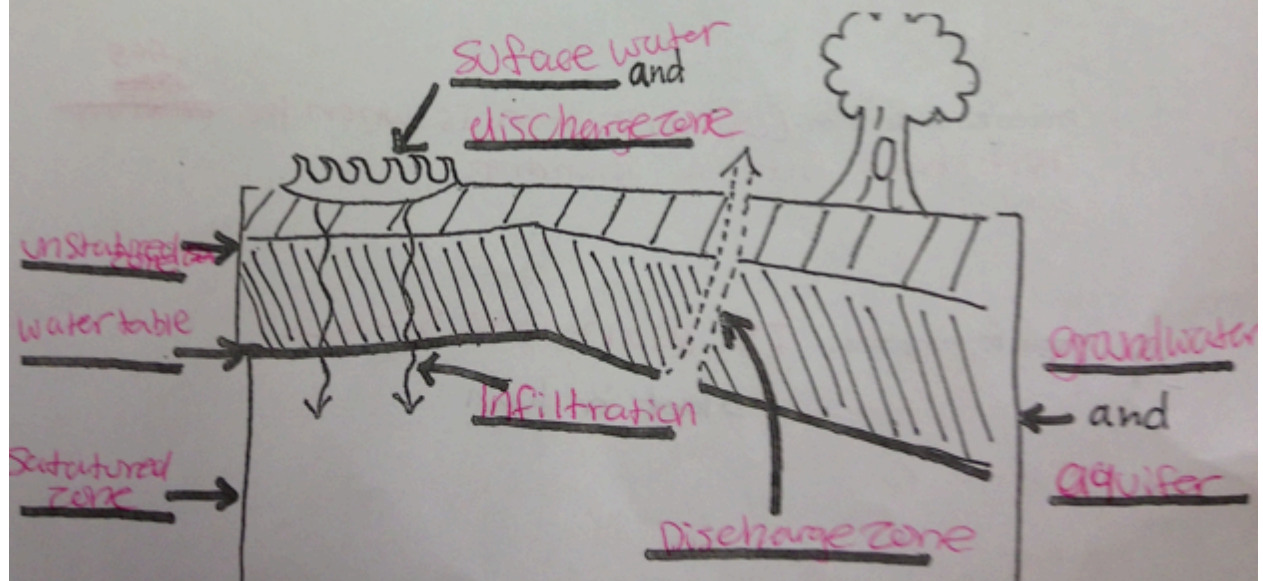
Watershed: area runoff from body of water

Cohesion: water can fit in itself stick together

Capillary Action: <sup>against</sup> water moving up to gravity

Parts Per Million: mixture of 1 part million pollution of 1 million

4. Using the diagram; Label the parts of an aquifer (Aquifer, Groundwater, Saturated Zone, Unsaturated Zone, Water Table, Surface Water, Discharge Zone, Recharge Zone, Infiltration)



5. Describe how pollutants enter the groundwater using the following terms appropriately in your explanation: Solubility, Cohesion, and Pollution Plume

Bad chemical they can dissolve in water  
water stick to the chemical (cohesion)  
and goes into the ground - making  
~~plume~~ plume.

6. List ways that water can be conserved at

CSPA: don't go the bathroom so many time  
make sure you turn the water off when  
you are done

Home: brushing your teeth  
don't take so much shower in a week

Brighton: Bring <sup>a</sup> water bottle with you  
so you don't have to use other water.

7. List 3 Unique Properties of Water

1. cohesion
2. naturally 3 states
3. capillary action