Building Reading Fluency in Elementary Science *through* Readers' Theatre

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Abstract. Because of difficult academic vocabulary and ambiguous explanations of many concepts, science texts are hard for students to read and understand. To become skilled readers of content material, students need to learn the meanings of the academic science vocabulary. They must also be able to understand the concepts presented in the textbook. Readers' Theatre is a strategy that can assist students with the difficulty of the vocabulary and concepts and help them become fluent readers of science content material.

Keywords: academic vocabulary, fluency, Readers' Theatre, science literacy

In today's world of high-stakes testing, the main focus of many primary classrooms is reading. Because of pressure on teachers to raise reading achievement, science is omitted from many students' early school experiences. They move into the upper elementary grades with large deficits in their vocabulary (Cunningham and Allington 2007) leaving them unable to read the technical language of the science texts. Understanding this technical language and the academic vocabulary of a content area is a strong predictor of how well students will learn a particular subject (Wilcox 2006).

Science textbooks used in the upper-elementary classrooms contain many content-specific words that students must understand to get the meaning from the text. These words are usually presented in bold print, and definitions are in the glossary at the end of the book or chapter. Unless the classroom teacher specifically asks the students to look up the definition, many students simply read the words (or skip over them) and do not attempt to find out the meanings. Students cannot comprehend the text if they do not understad the vocabulary. Also, many times concepts appear in ambiguous, confusing language that students can read but do not understand. Through the use of *Readers' Theatre*, a strategy in which students read a scripted text for an audience, students can uncover the meanings of the science vocabulary and elaborate on confusing or puzzling concepts as they read and write the scripts to be performed. Readers' Theatre is a proven strategy that improves reading fluency, which is an essential component of becoming a good reader (Corcoran 2005). It requires repeated readings of the scripts students will perform, which provides them with a lot of practice in reading the scientific content.

The National Reading Panel (National Institute of Child Health and Human Development [NICHD] 2000) identified fluency as one of the five essential components of learning to read. In 1995, the National Assessment of Educational Progress (NAEP) found that only 44 percent of the nation's fourth-graders could read fluently (Abadiano and Turner 2005). Elementary science textbooks are difficult, if not

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impossible, for many students to read, much less read fluently. To meet the National Science Education Standards (National Research Council 1996), students must understand the science material that they read. The No Child Left Behind (NCLB) act mandates that educators test students' knowledge of science along with reading and mathematics in the 2007–2008 school year. This makes it even more essential for teachers in the elementary grades to focus on the content language of the science materials used and help children understand what they read.

The National Reading Panel defines *fluency* as reading text "with speed, accuracy and proper expression" (NICHD 2000, 3–11). Many definitions of fluency in addition to this one refer to oral reading ability; however, if establishing meaning is the ultimate goal of reading, then comprehension must be addressed in the definition. Pikulski and Chard (2005) synthesized a definition from the *Report of the National Reading Panel* (NICHD 2000) and *The Literacy Dictionary* (Harris and Hodges 1995) that includes comprehension:

> Reading fluency refers to efficient, effective word recognition skills that permit a reader to construct the meaning of text. Fluency is manifested in accurate, rapid, expressive oral reading and is applied during, and makes possible, silent reading comprehension (510).

When students read science material, comprehension is the main purpose of reading the text; therefore, the establishment of meaning should be included in the definition of fluent reading of science materials.

Classroom teachers can support students in their efforts to read difficult science content and assist them in becoming fluent readers who comprehend the text through the use of Readers' Theatre.

Background

Readers' Theatre is a strategy used to build fluency. The strategy is usually taught using narrative text that contains large amounts of dialogue; however, it can also be used with science texts and informational science trade books. In Readers' Theatre, students perform a rehearsed reading of a script (Flynn 2004). Students do not use props, costumes, or stage settings, and do not memorize the script. Rather, the Readers' Theatre group reads a script after repeated rehearsals. The students read or perform the script in front of an audience. This provides motivation for the group to rehearse the script in order to perform successfully. When students know they are going to be performing for an audience there is a natural incentive for them to rehearse (Rasinski 2006).

As the scripts are prepared, teachers—and eventually the students—can elaborate on the text by defining and explaining the vocabulary words within the passages. They can define terms, describe what the words mean, and add explanations to difficult concepts.

Materials

Implementing Readers' Theatre into the elementary science classroom requires the science textbook or an informational science trade book, and a pencil and paper or a computer with a word-processing program. Although many materials are not necessary in creating a script, it takes time to create it; teachers can choose which parts of the science text will be better understood by the students when presented in this format. Over time, teachers can add to their collection of scripts. The teacher should write the script based on the text until the students become familiar with the strategy. Once they understand how the strategy works, students in grades 3–6 are capable of creating the scripts themselves.

Procedure

Teachers can take content from science textbooks and trade books and transpose it into a Readers' Theatre script. In writing the script, it is important to add more explicit explanations of words and concepts, especially when using content from the textbook, rather than simply copying the text. Teachers can add explanations of words and concepts that are unclear. This increases students' comprehension and provides a more exciting script. For example, if the students are studying a unit on geology and a sentence in the text states, "A geologist studies rocks," the teacher can expand on this and the script might read, "A geologist is a special scientist or person that has been to school and taken special courses to know how to look at rocks and find out important things about them." By putting definitions of vocabulary words into the context of the Readers' Theatre, students will have an understanding of the language of science and will remember the vocabulary because they will rehearse a number of times prior to their performance. When they begin writing the scripts, they will have to look up words and concepts to write the definitions and explanations within the script.

Teachers should fully explain Readers' Theatre to the class prior to its implementation, and provide several examples for students to perform. Teachers should promote discussion regarding the importance of reading the dialogue smoothly, clearly, and with expression. Instuctors should remind students that good actors use lots of expression in movies and on television. If the teacher emphasizes that this is a performance and that students are actors, the students will understand the importance of rehearsal. Once the students understand the strategy, teachers can follow these steps for writing a Readers' Theatre script from a science textbook or a children's information book:

1. Look over the content to be used and decide how many actors' parts can be created from the text. This will depend on how many students will work together in the Readers' Theatre performance. When too few students are in a group, they will have too much dialogue to read,

Table 1. Mineral Identification Table (Used for Creating Rap)

Mineral	Color	Luster	Streak	Hardness	Other
Galena	silver gray	shiny like a metal	gray	scratched by copper and iron	splits into cube shapes
Pyrite	brassy yellow	shiny like a metal	greenish-black	not scratched by testers	looks like gold; breaks unevenly
Quartz	colorless, white, pink, purple	glassy	white	not scratched by testers	breaks unevenly
Mica	colorless, silvery, brown	may look glassy	white	scratched by fingernail	splits into thin sheets
Talc	pale green, white	pearly, dull, greasy	white	scratched by fingernail	flakes or crumbles easily
Feldspar	yellow, white, gray, red, brown	glassy, pearly	white	not scratched by testers	splits easily in two directions
Hornblende	green, black	glassy	brown, gray	not scratched by testers	splits easily in two directions
Calcite	colorless, white	glassy	white	scratched by copper and iron	splits in three directions

which may defeat the purposes of increasing comprehension and fluency; however, too many students assigned to the group may not provide enough dialogue to each actor to aid in increasing comprehension and building fluency.

2. Write the script following the format used to write a play. Write the characters' names down the left-hand side of the page and the dialogue to the right of each character.
3. Assign students to Readers' Theatre groups. This decision will be based on the students' individual reading abilities. A mixture of reading levels works well in these groups because the higher-level readers can assist those reading on lower levels.
4. Students meet in their small groups and practice the parts. This could be done during the literacy block as part of a center activity, thus integrating science with language arts. The students should spend at least two days rehearsing and becoming familiar with the parts they have been assigned. The length of rehearsal time is contingent upon the individual group, the length of the script, and how well the students work together.
5. When they have rehearsed several times and all believe that the actors are ready for the performance, present the Readers' Theatre to the rest of the class.

We created the script from the text by adding explanations and elaborations to vocabulary and concepts as well as a rap for students to perform as part of the script that is based on Table 1. This is one way that students' creativity can be incorporated into the text through Readers' Theatre. The table presents the characteristics of minerals in the form of a semantic feature analysis. Students may normally view this as completely foreign, or something they must memorize for a test. A word of caution to teachers: these activities require a lot of time for planning, rehearsing, and performing. They should be selected according to comfort level and teaching style as well as the requirements identified by the administrator, county, parish, and state.

When students spend the amount of time that is needed on activities such as writing and performing a Readers' Theatre script in the classroom, teachers often ask: "How am I going to assess or grade this assignment?" A rubric is a very effective assessment tool for this activity because it shows students the criteria they must meet to earn a passing grade.

The rubric displayed in Table 2 is an example of how a science teacher could assess the Readers' Theatre activity. It should be used when students work together and write the Readers' Theatre script from a science textbook or a science trade book. It allows for assessment in three areas: (1) the ability to plan and work together as a Readers' Theatre group, (2) the explanations and elaborations of the academic science vocabulary within the Readers' Theatre script, and (3) the aspects of reading fluency they exhibit during the Readers' Theatre performance. Scores range from 6–24.

Extensions

Readers' Theatre scripts can be used in any science content area. This strategy effectively integrates language arts into other areas of the curriculum. A wonderful extension of these activities is the Scholastic Book series Magic School

Table 2. Sample Rubric for Assessing Reader's Theatre Activity

Criteria	1	2	3	4
Group participation	Little or no cooperation during group meetings and little or no participation with group was exhibited.	Cooperation took place at times in group meetings and participation in rehearsals was sporadic.	Worked cooperatively through most group meetings and participated in the majority of rehearsals.	Worked cooperatively during group meetings, fully participated in rehearsals.
Science learning	Little or no explanation of science vocabulary was exhibited. Little or no elaboration on concepts within script was exhibited.	Gave some explanations of sciece vocabulary and elaborated on some concepts within the script.	Explained most science vocabulary and elaborated on most science concepts within the script.	Fully explained science vocabulary and elaborated on all science concepts within the script.
Expression and volume	Read with little expressin or enthusiasm in voice. Read words as if simply to get them out. Little sense of trying to make text sound like natural language was exhibited. Tended to read in a quiet voice.	Some expression was exhibited. Began to use voice to make text sound like natural language in some areas of the text, but not others. Focus remained largely on saying the words. Still read in a quiet voice.	Sounded like natural language throughout the better part of the passage. Occasionally slipped into expression-less reading. Voice volume was generally appropriate throughout the text.	Read with good expression and enthusiasm throughout the text. Sounded like natural language. The reader was able to vary expression and volume to match his or her interpretation of the passage.
Phrasing	Monotonic with little sense of phrase boundaries, frequent word-by-word reading was exhibited.	Frequently used two- and three-word phrases giving the impression of choppy reading; used improper stress and intonation that fail to mark ends of sentences and clauses.	Used mixture of run-ons, midsentence pauses for breath, and possibly some choppiness; used reasonable stress/ intonation.	Generally phrased well, mostly in clause and sentence units, with adequate attention to expression.
Smoothness	Exhibited frequent extended pauses, hesitations, and false starts, sound-outs, repetitions, or multiple attempts.	Several "rough spots" in text where extended pauses, hesitations, etc., were more frequent and disruptive.	Exhibited occasional breaks in smoothness caused by difficulties with specific words or structures.	Reading was generally smooth with some breaks, but word and structure difficulties were resolved quickly, usually through self-correction.
Pace (during sections of minimal disruption)	Reading was slow and laborious.	Reading was moderately slow.	Exhibited uneven mixture of fast and slow reading.	Reading was consistently conversational.

Note. Adapted from "Training Teachers to Attend to Their Students' Oral Reading Fluency" by J. Zutell and T. V. Rasinski, 1991, *Theory into Practice*, 30, pp. 211–17.

Bus, particularly *Magic School Bus Explores Inside the Earth* (Cole and Degen 1987).

Conclusion

Readers' Theatre scripts bring science content to life and are more motivating to students than simply reading from their science text or trade books. Students can add their individual personalities to the parts through expression, pitch, and pauses. This is fluent reading and even the most struggling readers feel success because of the rehearsals that take place prior to the performance. The more students understand that reading in the content area of science can be a learning adventure, the more they develop a love for the subject rather than see it as another boring textbook chore. They have fun while developing their reading skills and adding to their knowledge of the content area of science.

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Appendix A
Readers' Theatre Script 1

Characters:

Narrator #1	Mineral Detective #1
Narrator #2	Mineral Detective #2
Narrator #3	Mineral Detective #3

Narrator #1: Have you ever noticed how rocks come in different colors, shapes, and sizes? Rocks are solid materials that make up the outer layer of Earth. Geologists are scientists that have been to school to learn all about rocks. They study all different kinds of rocks and examine the properties, or characteristics, of rocks to tell how the rocks may have formed.

Narrator #2: One way that geologists study rocks is to look for minerals in the rock. Rocks are made of minerals. Minerals are naturally occurring substances that are not living. Minerals are the building blocks of rocks.

Mineral Detective #1: Do you know how you can identify minerals? You can become mineral detectives like us.

Mineral Detective #2: Each mineral has properties you can use as clues. One property of minerals is color.

Mineral Detective #3: However, color is not always a useful property. A mineral may come in several colors. Mica, for example, can be silvery or black. Quartz can be white, pink, or purple. What's more, both mica and quartz may be colorless. Another reason color is not always a useful property is that two or more minerals may have the same color.

Narrator #1: A mineral detective looks for properties other than color.

Mineral Detective #1: You can tell some minerals by the way light bounces off them. This property is called luster. Some minerals are shiny like a new metal pan or coin. Other minerals are not shiny. They may look dull, glassy, or even "greasy."

Mineral Detective #2: Another clue comes from rubbing a mineral gently but firmly on a streak plate. A streak plate is a rough piece of white porcelain (like what some kitchen sinks are made out of) used by geologists to test the streak of minerals. When you rub the mineral, the powder leaves a mark, or what we detectives call a streak. You often see a streak that's the same color as the mineral surface. However, there is a mineral called pyrite that is yellow. When you rub it on a streak plate, you see a thin trail of black powder. What a clue!

(Appendix continues)

Appendix A (continued)

Mineral Detective #3: Another clue is how hard a mineral is. The harder it is, the less likely it will be scratched.

Narrator #2: You can use a fingernail, a penny, or an iron nail to test a mineral's hardness.

Narrator #3: A soft mineral, such as talc or mica, can be scratched with all three. Calcite is a harder mineral than mica. It cannot be scratched by a fingernail but can be scratched by a penny.

Mineral Detective #1: A harder mineral, such as fluorite, can be scratched with a nail.

Mineral Detective #2: Many minerals, such as quartzite, are too hard to be scratched by any of the testers.

Narrator #1: There are some minerals that can split easily along flat surfaces. Like mica—it splits into thin sheets and galena splits along flat surfaces in three directions forming a cube. Then there are some minerals that split unevenly like quartz and talc.

Narrator #2: Some minerals have special properties that make them stand apart from the other minerals. One of these is magnetite—a magnet attracts it. That is easy to remember because of its name!

Narrator #3: Our mineral detectives have a rap that shows the different properties of some of the minerals. They are going to perform it for you now!

Mineral Detective #1, #2, #3: **(Perform Rap)**

All Detectives:
Minerals can be fun and if you will pay attention
Then this rap we have will help your comprehension!

Mineral Detective #1:
Galena is a color that's silver or gray
It has a shiny luster like metal in a way.
It has a gray streak; can be scratched by iron or copper
And it splits into cube shapes nice and proper.

Mineral Detective #2:
Pyrite's brassy yellow—has a shiny metal luster
The streak is greenish-black are ya lis-nin' now, buster?
Pyrite's really hard and it can't be scratched
It looks like gold and that's hard to match!

Mineral Detective #3:
Quartz can have no color or be purple, white or pink
Its luster is glassy like the dishes in a sink.
It has a white streak and you can't scratch it
It breaks unevenly and you can't patch it!

Mineral Detective #1:
Mica's colorless, brown, or silver like a zipper.
Its luster may be glassy like Cinderella's slipper.
It has a white streak and a fingernail can scratch it
And it splits into sheets if you try to snatch it.

Mineral Detective #2:
Talc has colors of white or pale green
And a greasy, pearly or dull luster can be seen.
A fingernail can scratch it; its streak is white
It flakes and crumbles like a cracker held too tight.

Mineral Detective #3:
Yellow, white, gray, red, or brown
Are the colors of feldspar if you see it around town.
White is the streak that feldspar makes
It can't be scratched by testers real or fake.
In two directions, feldspar can split
It happens easily bit by bit.

(Appendix continues)

Appendix A (continued)

Mineral Detective #1: Hornblend has colors of green or black
It has a glassy luster now don't talk back!
Its streak is brown or gray and a scratch it won't take
It splits in two directions and we ain't a fake!

Mineral Detective #2: Calcite's either colorless or white
Are ya getting this now—are we rappin' all right?
Its streak is white; its luster is glassy
Listen to us now and don't be sassy!
It can be scratched by iron and copper
It splits in three directions—we won't tell a whopper!

All Detectives: Rap with us now don't be shy
And you'll learn these minerals
In the blink of an eye!!

Narrators #1, #2 and #3: We hope you have learned about the properties of rocks today.

Mineral Detective #1, #2, and #3: And all about minerals and how to identify them. The more you know then the sooner you can become mineral detectives just like us!!

Note. Adapted from *Science* by R. Moyer, L. Daniel, H. P. Baptiste, P. Stryker, and J. Vasquez, New York, McGraw-Hill, 2002.