

Forces of Nature:

Incorporating literacy elements to promote an understanding of forces and motion in relation to weather

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Overview

As a student in my educational journey through different school settings, I remember being particularly interested in the scientific aspect of learning. In high school, I remember excelling in biology and chemistry because I just "got it." I suspect my interest was due to an early conceptual understanding of science and the world around us. Maybe it was the efforts and intriguing lessons from my teachers. I would like to think it was a combination of both.

Science, in general, has always been interesting to me. Experiments were always a great way to break up the mundane seatwork and also helped me socially mature as a young adult.

As a first grade teacher in an elementary school setting, the general focus on my performance is teaching students how to read. Young readers take the leap from *learning to read* to *reading to learn* around third grade. Instead of drawing the line in the sand with the upper grade teaching strategies, I decided to merge the two topics at an early age while introducing interesting scientific concepts to further challenge and enrich the minds of young students I come across. What a better way to try out my efforts than to integrate this material, *learning to read and reading to learn*, in our new objectives dealing with forces and motion.

Another area that I am passionate about is sustainability. Not only do I want to encourage students to learn about science and promote their reading, I wanted to create activities and sustainable materials used in activities for teaching forces and motion. This effort would utilize the least amount of materials and give opportunities for students to be able to access the materials and information year after year.

While attending the seminar, "The Science of NASCAR" led by Peter Tkacik from The University of North Carolina at Charlotte, I began to realize how I could use scientific concepts of forces and motion along with ideas of sustainability to help master literacy skills in the classroom in regard to vocabulary and fluency while maintaining a scientific approach.

Science is very versatile but speaks to a large audience due to its interesting subject matter and topics. It is up to me as an elementary school teacher to promote experiences for learning forces and motion as well as designing opportunities for sustainable learning.

Throughout Dr. Tkacik's seminar, I have learned the process and importance of science in the classroom and throughout life. Presently, too many children are directed away from "fun" and "messy" experiments because it's easier to have them sitting at desks doing independent work. In an effort to regain some of the creativity and problem-solving skills children possess, I have designed a literacy unit that encourages students to use reading skills and science concepts in order to succeed in the classroom and in life.

Content Objectives

I will use literacy elements in a literacy setting to generate a literacy unit promoting the science topics in the form of forces and motion to help master reading skills such as:

- decoding
- word recognition
- vocabulary
- fluency and
- comprehension

The plan is to make this curriculum unit available for other teachers to utilize this literacy unit for not only promoting literacy skills such as decoding, word recognition, vocabulary, fluency and comprehension, but also giving students the ability to "think outside the box" and to be creative in the classroom. By incorporating artistic expression, reluctant and or struggling readers can participate and engage in promoting literacy skills and exercising the individual scientists within them.

School Demographics

Bain Elementary School is an elementary school serving over 1000 students in kindergarten through fifth grade. The school is located in Mint Hill, North Carolina in the Charlotte-Mecklenburg School District. This school system is the second largest in North Carolina and the nineteenth largest in the nation.

Teachers at my school use flexible grouping to differentiate student instruction based on individual needs. Programs such as “Accelerated Reader”, “Math Investigations” and hands-on science lessons, help reinforce concepts learned in the classroom in a more interactive approach.

Technology is constantly used to enhance learning opportunities on a daily basis. Teachers in grades K-2 have their own document camera to utilize in all subjects at any time throughout the day. Teacher in grades 3-5 have individual Smart Boards in order to promote visual and hands on learning for all students. Teachers also have subscriptions to online magazines such as *Scholastic News* and teaching resources such as readinga-z.com, Raz-kids.com and Discovery Education.

In regard to the literacy curriculum, the newly adopted “Daily Five/CAFE” is currently used. The “Imagine It” curriculum is used as well as novel studies, guided reading, small group instruction, flexible grouping, book clubs, and vocabulary studies. These are just a few of the techniques and teaching strategies used on a daily and weekly basis.

I am currently a first grade teacher at our school. This is my ninth year in the Charlotte-Mecklenburg school district and I have taught first, second, and third grades.

I have experienced the vertical planning aspect by teaching in a variety of grades over the past nine years. I have seen the developmental process of students *Learning to Read* in grades K-1 and also *Reading to Learn* in grades 2-3. Learning to Read and applying that information is a vital skill for success throughout one's education endeavors as well as a life skill that must be mastered.

I am one of seven first grade teachers and teach using the North Carolina Common Core standards (NCCC). I incorporate various literacy-based teaching methods including: Daily Five, Pat Cunningham's Four Blocks, Guided Reading, differentiated teaching methods, flexible grouping, 21st century skills, technology and current research-based strategies to teach and promote reading skills.

Rationale

This science-based literacy unit is intended for **first graders** to help master literacy skills, increase vocabulary and ultimately promote fluency and comprehension. This unit will be based on understanding the concepts of forces and motion in the classroom while maintaining a degree of sustainability of materials.

- Students will be exposed to various activities and classroom strategies/experiments in order to fully understand concepts of forces and motion.

- A strong focus will also take place on learning and retaining vocabulary in this curriculum unit.
- Further attention to vocabulary will increase understanding and overall knowledge of forces and motion.

Since many of my students need additional fluency practice as well as opportunities to engage in science-based learning, this unit will be useful to developing students' scientific and environmental awareness of the world.

My unit will begin with an introduction to the newly introduced objectives of forces and motion. Students will have the ability to explore with familiar materials such as toy race cars (Hot Wheels) and student made ramps as well as sustainable materials to understand forces and motion. Students will be given various materials to apply force and motion in a learning experience while exploring measurement concepts. We will also intertwine subjects of weather and seasons in order to further enrich their concepts and ideas regarding force and motion with various materials, on different surfaces with student-made, seasonal variables.

The main focus of the unit, scientifically, will deal with travel lengths on a ramp in order to teach forces and motion while focusing on elements of weather. Literacy-wise, the students will be exposed to fluency passages and new vocabulary to help them become better and more knowledgeable readers.

At the end of this unit, students will have had exposure to scientific experiments dealing with measurement and weather. They will also have improved reading skills by being exposed to new vocabulary, fluency practice and comprehension.

Background Information and Classroom Application

According to G. E. Tompkins in the 2006 edition of *Excerpt from Language Arts Essentials* (1), there are five factors for reading instruction that promote reading skills. Those factors include: phonemic awareness, phonics, vocabulary, fluency and comprehension. Equally important are skills of word identification as well as motivation. Students need to be well versed in each of these topics in order to succeed as a reader.

By directly teaching reading skills and strategies in these areas, along with modeled reading skills and thinking aloud with books read aloud (read alouds) in the classroom dealing with forces and motion, students will increase his or her reading abilities in and out of the classroom setting.

Decoding/Word Recognition

According to LaBerge & Samuels (2), "capable readers have a large bank of words that they recognize instantly and automatically because they can't stop and analyze every word as they read. Through a combination of instruction and reading practice, students' knowledge of words continues to grow."

In the classroom:

In this unit, I will incorporate word identification and fluency in order to increase word knowledge to help promote quick recognition of words and increased scientific vocabulary.

Vocabulary

J. Pikulski and S. Templeton describe the power of vocabulary in their 2004 article, *Teaching and Developing Vocabulary: Key to Long-Term Reading Success* (3). They quote that the "greatest tools we can give our students for succeeding, not only in their education but in life, is a large, rich vocabulary."

In the classroom:

In this literacy-based science unit based on forces and motion, I plan to use read aloud books and various forms of literature to expose and broaden the vocabulary of my students. By increasing their vocabulary, I am ultimately increasing their reading skills because I am presenting new information that will increase their background knowledge and schema for future reading experiences.

Fluency

The National Reading Panel report (4) defines reading fluency as "...the ability to read text quickly, accurately and with proper expression." Capable readers have learned to read fluently—quickly and with expression. Three components of fluency are reading speed, word recognition, and prosody (Rasinski, 2004).

According to the National Reading Panel, a recent study sponsored by the U.S. Department of Education found that "fourth grade students' oral reading fluency is a strong predictor of silent reading comprehension. Moreover, the same study found that nearly half of the fourth graders studied had not achieved even a minimally acceptable level of reading fluency. Fortunately, a solid body of evidence suggests that fluency can be taught and that effective instruction in fluency leads to overall improvements in reading."

In the classroom:

In this unit, students will be exposed to teacher-made fluency and comprehension passages based on the topics of forces and motion. By practicing fluency, students will have capabilities of reading "quickly and with expression." This reading strategy will promote the next level of learning, comprehension.

Comprehension

Comprehension is the main goal of reading instruction. It is the top of the "reading mountain" so to speak. Comprehension is not only important in the present when a student is reading and responding to text, but it is important for future instances of recalling information.

In the classroom:

By incorporating experiments and teachers-made fluency passages in the classroom, students will have practice reading fluently with peers and working towards becoming more proficient with new vocabulary and word recognition.

Strategies

Some strategies I plan to use include read alouds and journaling. Read alouds will be used throughout the unit in order to model proper reading skills, increase vocabulary as well as promote class discussion.

Journaling in the form of a composition or spiral notebook will be used on a daily basis to integrate writing across the curriculum. Students will have opportunities to write, ask questions, record experiment results, illustrate, etc. in their own journals regarding forces and motion. It will be a place of reflection for opinions on nonfiction read-alouds, forces and motion subject matter and classroom activities.

The unit will begin with a prereading strategy, **Turn and Talk**, to discuss prior knowledge of forces and motion. This allows students to orally discuss thoughts and information based on this scientific topic in a non-threatening way before the unit begins.

Throughout the unit, students will keep a vocabulary section in their journals to further their vocabulary knowledge by learning unknown words. I will also work in small groups in a guided reading format in order to incorporate vocabulary tasks to improve word knowledge and word meaning.

Graphic Organizers will be completed on material learned about forces and motion. These visual learning tools help students organize information in order to formulate opinions and thoughts on selected material.

Discovery Education.com is an excellent technology resource for videos and information regarding mass, gravity and height for our science experiments.

Another very useful site for forces and motion is Learning Science.org. This site has several videos and tutorials to better help students understand the concepts of force and motion. The website can be found at:

<http://www.learningscience.org/psc1bpositionmotionobjects.htm>

This unit will be a beneficial way to promote cooperative learning, engaging students in scientific opportunities as well as integrating vocabulary and comprehension for an ultimate goal of *increasing reading abilities, promoting literacy development and scientific concepts* in the classroom with peers in order to create a collaborative and respectful learning environment for all involved.

Classroom Activities

Activity # 1-What is the Weather?

Objective:

Students will create a foldable book after learning about the four seasons and various weather types that correlate with those seasons. This activity will expose students to scientific material and give them prior knowledge when incorporating various weather variables later in the unit for testing force and motion.

Materials:

- foldable materials (construction paper, colored paper, writing/coloring supplies)
- Weather foldable book inspired by Dinah Zike's foldables (See Figure 1)
- read alouds regarding weather (see Annotated Teacher Bibliography)
- Discovery Education-weather videos
- vocabulary cards

Teacher Input:

The teacher will discuss the four seasons and the weather that correlated with each season. Teacher and student will study winter, spring, summer and fall and learn about different types of weather, specifically (cold weather, rainy weather, warm weather and windy weather). Visual learning tools, such as videos and songs about the four seasons and weather, can be found at discoveryeducation.com.

Guided Practice:

After direct instruction including read alouds (See Annotated Bibliography for Teachers) regarding seasons and weather, teacher will instruct students on how to create a foldable book in order to showcase their knowledge of the four seasons and various weather types. Teacher will scaffold the instruction and allow students to turn and talk, use a graphic organizers and notes from their journals about weather and seasons in order to accurately explain and showcase their learned concepts in their foldable books.

Independent Practice:

Students will work with a partner and or in small groups to complete a *What's the Weather* foldable book. Students will engage in collaboration and creativity, 21st century skills, as they work together to create a weather artifact (See Figure 1).

Students will be instructed to specifically mention and discuss different types of weather from the various seasons. Students will also be exposed and encouraged to use vocabulary weather cards as examples in their foldable books. The weather cards will aid in verbal communication and overall knowledge of the subject matter.

When complete, students will showcase their foldable weather books with their peers in order to explain their learning and also learn from other students.

Activity # 2-What Moves You? Learning about Force and Motion.

Objective: Students will complete a KWL chart in order to discuss and learn about force and motion.

Materials:

- KWL chart entitled Force and Motion (See Figure 2)
- science journals
- various writing supplies (crayons, colored pencils, pencils, erasers, etc)

Teacher Input:

Explain to the students that they will be learning about a new topic, Forces and Motion. Let them create a mini KWL chart in their science journals. This helps them stay accountable during the whole group discussion and provides writing and rereading writing practice to further their reading abilities in regard to word recognition, fluency and comprehension.

Guided Practice:

The teacher will help complete the KWL class chart with comments and information provided from the students. The teacher will discuss how a force is a push or a pull and knowledge that forces are everywhere after the K is completed on the KWL charts. The teacher will also discuss how forces have different sizes and directions and make nonfiction references to birds and planes flying as examples of forces to promote questions and learning topics for students as they complete their charts.

Independent Practice:

Students will create their own KWL chart in their science journals for future reference (See Figure 2). Students will share their KWL charts with classmates in a *Turn and Talk* situation. Students will have access and use their individualized KWL charts throughout the unit as they continue to learn more about forces and motion.

Activity # 3-Fluency Passage Regarding Force and Motion

Objective:

Students will use a teacher created fluency passage (See Figure 3) to promote fluency and ultimately comprehension of the newly discussed science topics of force and motion.

Materials:

- teacher created fluency passage
- pencils
- timers
- journals for note-taking on concepts and or new vocabulary
- read aloud, And Everyone Shouted Pull
- fluency rubric (See Figure 4)

Teacher Input:

The teacher will model fluent reading by reading aloud the story, And Everyone Shouted Pull by Claire Llewlynn. Teacher will further discuss forces and motion using material from the book and questions students may have.

Guided Practice:

The teacher will discuss the importance of reading fluently. Fluent readers understand what they are reading because they spend less time sounding out words and decoding text. Teacher will model with students the correct and incorrect ways of reading fluently.

Teacher will discuss new vocabulary and the procedure for testing their oral reading fluency, ORF with a partner.

Independent Practice:

Students will work with a partner to practice reading scientific information regarding forces and motion, fluently. Students will engage in fluently reading passages to promote fluency and further their comprehension. Students will use the passage provided (See Figure 3). Students will also be encouraged to document any new vocabulary they come across in their science journals.

After ORF practice and mastery with this scientific reading passage, students will be assessed using a fluency rubric by Tim Rasinski (See Figure 4) found at: http://www.timrasinski.com/presentations/multidimensional_fluency_rubric_4_factors.pdf.

Students will showcase their learning by writing a reflection about forces and motion in their science journals. They will use the Turn and Talk sharing method in order to positively collaborate with their peers about their learning.

Activity # 4-Forces and Motions...Hot Wheels Style

Objective: Students will use hot wheel cars and a ramp to explore scientific topics of force and motion.

Materials:

- hot wheels
- science journals
- hand-made ramp (See Figure 5)
- yarn and expo markers for measuring nonstandard lengths
- open space and a smooth surface for experimenting with forces and motion

Teacher Input:

The teacher will review concepts of forces and motion by focusing on first grade language of a force being a push or pull and an object staying in motion unless something happens to change that.

Guided Practice:

Teacher will discuss the function of a ramp and demonstrate the proper way to use it to test force and motion in a open and smooth surface area. Teacher will review how to measure results using an expo marker for a marking dot and a piece of string to measure length.

Independent Practice:

Students will participate in testing force and motion using Hot Wheels cars and releasing them from the top of a hand-made ramp. Students will measure the length, in nonstandard units, the toy cars traveled after being released from the ramp at the same time. They will compare and contrast the string lengths as data discussion and record that information in their science journals.

Students will have opportunities of testing different car types on the ramps but not changing the ramp variables at this time (See Activity # 5). Students can record learned information in the L section of their KWL chart from the future activity.

Activity # 5-Forces and Motion. Changing Weather Variables

Objective:

Students will use hot wheel cars and a ramp to explore scientific topics of force and motion while altering the ramp surface to create weather and seasonal variables.

Materials:

- hot wheels
- science journals
- hand-made ramp
- yarn and expo markers for measuring nonstandard lengths
- open space and a smooth surface for experimenting with forces and motion

- weather/seasonal variables for cold weather, rainy weather, warm weather and windy weather
- cold weather variable-crushed ice
- rainy weather variable-water
- warm weather variable-heat from a space heater
- windy weather-cool air from a hair dryer

Teacher Input:

The teacher will review concepts of forces and motion by focusing on first grade language of a force being a push or pull and an object staying in motion unless something happens to change that. Students will reference their notes about forces and motion in their journals if needed.

Guided Practice:

Teacher will review the function of a ramp and demonstrate the proper way to use it to test force and motion in an open and smooth surface area (See Figure 5 for ramp diagram). Teacher will review how to measure results using an expo marker for a marking dot and a piece of string to measure length. Teacher will introduce weather variables for students to test using the ramp and the Hot Wheels on different man-made weather inspired surfaces.

Independent Practice:

Students will participate in testing force and motion using Hot Wheels cars and releasing them from the top of a hand-made ramp. Students will measure the length, in nonstandard units, the toy cars traveled after being released from the ramp at the same time. They will compare and contrast the string lengths as data discussion and record that information in their science journals for each weather variable tested on the ramp.

Students will have opportunities of testing different car types on the ramps but not changing the ramp variables at this time (See Activity # 5). Students can record learned information in the L section of their KWL chart from the future activity. Students will determine if weather variables have any effect on the distance the Hot Wheels car traveled when using a ramp at the same height and in the same physical space. Students will take notes, record data and determine if weather variables have any effects on distance when the same forces and motions are applied.

Notes

(1) Tompkins, Gail E. *Language arts essentials*. Upper Saddle River, NJ: Pearson/Merrill Prentice Hall, 2006. Print.

(2) LaBerge, David, and S. Jay Samuels. *Basic processes in reading: perception and comprehension*. Hillsdale, N.J.: Erlbaum Associates; 1977. Print.

(3) Pikulski, John and Shane Templeton. "Teaching and Developing Vocabulary: Key to Long-Term Reading Success" *Current Research in Reading/Language Arts* (2004).

(4) Bonnie B. Armbruster, "Put Reading First: the Research Building Blocks for Teaching Children to Read : Kindergarten Through Grade 3" (*Jessup, MD: National Institute For Literacy, National Institute Of Child Health And Human Development, U.S. Dept. of Education, 2001*).

Resources

Annotated Bibliography for Teachers

Armbruster, Bonnie. "Put Reading First: the Research Building Blocks for Teaching Children to Read : Kindergarten Through Grade 3" (*Jessup, MD: National Institute For Literacy, National Institute Of Child Health And Human Development, U.S. Dept. of Education, 2001*).

*This is a great resource for learning how to teach children to read. There is a great amount of research based information as well as strategies and how to help in and out of the classroom.

Bug, Amy. *Forces and motion*. New York: Chelsea House, 2008. Print.

*This is a resource for background information with forces and motion.

Cooper, Christopher. *Forces & motion*. Oxford: Heinemann Library, 2003. Print.

*This is a resource for background information with forces and motion.

Farndon, John. *Motion*. New York: Benchmark Books, 2003. Print.

*This is a resource for background information with forces and motion.

Graham, John, and David Jars. *Forces and motion*. New York: Kingfisher, 2001. Print.

*This is a resource for background information with forces and motion. Can be used for Classroom Activities #2, #4 and #5.

Kirkland, Kyle. *Force and motion*. New York: Facts on File, 2007. Print.

*This is a resource for background information with forces and motion.

LaBerge, David, and S. Jay Samuels. *Basic processes in reading: perception and comprehension*. Hillsdale, N.J.: Erlbaum Associates; 1977. Print.

*This is an informative resource for learning about comprehension and how to help struggling readers.

Llewellyn, Claire, and Simone Abel. *And everyone shouted, "Pull!": a first look at forces and motion*. Minneapolis, Minn.: Picture Window Books, 2005. Print.

*This read aloud is used for Classroom Activity #3.

Pelecky, Diandra L. *The Physics of NASCAR: the science behind the speed*. New York: Plume, 2009. Print.

*This resource was the main reading material for my seminar with Peter Tkacik.

Pikulski, John and Shane Templeton. "Teaching and Developing Vocabulary: Key to Long-Term Reading Success" *Current Research in Reading/Language Arts* (2004).

*This article gives noteworthy information about why vocabulary instruction is so important in the classroom.

Ross, Kathy, and Jan Barger. *Crafts for kids who are learning about weather*. Minneapolis, Minn.: Millbrook Press, 2006. Print.

*This can be used for Classroom Activity #1 and #5.

Tompkins, Gail E. *Language arts essentials*. Upper Saddle River, NJ: Pearson/Merrill Prentice Hall, 2006. Print.

*This book is a resource used for understanding the tools needed for success in reading.

MLA formatting by BibMe.org.

Reading List for Students

Barrett, Judi, and Ron Barrett. *Cloudy with a chance of meatballs*. New York: Atheneum, 1978.

Llewellyn, Claire, and Simone Abel. *And everyone shouted, "Pull!": a first look at forces*

and motion. Minneapolis, Minn.: Picture Window Books, 2005.

Mason, Adrienne, and Claudia Davila. *Move it!: motion, forces and you*. Toronto: Kids Can Press, 2005.

McKee, David. *Elmer's weather*. New York: Lothrop, Lee & Shepard Books, 1994.

Ross, Kathy, and Jan Barger. *Crafts for kids who are learning about weather*. Minneapolis, Minn.: Millbrook Press, 2006.

Chicago formatting by BibMe.org.

List of Materials for Classroom Use

- art supplies (crayons, pencils, colored pencils, paints, markers, etc.)
- Discoveryeducation.com
- expo markers
- foldable materials (art supplies and paper)
- fluency passage
- fluency rubric
- graphic organizers
- KWL chart
- Hot Wheels or small toy race cars
- internet access
- open space for calculating measurements
- ramp
- read alouds on weather/forces and motion
- student journals
- teacher made weather materials: ice, water, heat, cool air-hair dryer)
- timers
- writing supplies (pencils, paper, erasers, etc.)
- yarn

Appendix

Implementing District Standards

My unit would implement various Common Core Reading Standards for Informational Text in a significant way. The science-infused unit would incorporate Reading standards as well as the North Carolina Essential Standards for science to produce an overall educational and informative unit to improve fluency and comprehension for first grade students. Students would have the opportunity to increase their reading skills in order to develop and apply strategies and skills to read and write. Students would also develop and apply strategies to comprehend text that is read, heard and viewed in various forms of literature and informational text. Students will be exposed to the Essential Standard, Forces and Motion, to prepare them for upcoming school years.

Reading Standards for Informational Text first grade: With prompting and support, read informational texts appropriately complex for grade 1.

North Carolina Essential Standards Forces and Motion: Understand how forces (pushes or pulls) affect the motion of an object.

Figure 1

What's the Weather Foldable



Various foldable books and directions can be found at:

<http://teacherweb.com/FL/BelleviewMiddleSchool/MrsVNormand/foldables.pdf>

Different ways to fold paper for your book can be found at:

<http://www.education.ucsb.edu/webda>

Figure 2

KWL Forces and Motion

What do we know about forces and motion?	What do we want to know about forces and motion?	What have we learned about forces and motion?

Figure 3

Fluency Passage Sample for Forces and Motion

Fluency generator can be found at:

<http://www.interventioncentral.org/tools/reading-fluency-passage-generator>

Forces and Motion Fluency Passage

Assessment Date: ____/____/____ Student: _____
Examiner: _____
Words Read Correctly (WRC): _____ Errors: _____
A force is a push or pull. A force can move objects. You can see, or observe, a force 19 when something flies, falls, or spins. When you push something, you are moving it 33 away from you. When you pull something, you are moving it closer to you. 47 When an object is in motion, it will stay in motion until something stops it. Motion is 64 when an object is in movement. There are forces all around us in the world. 79
Notes: _____ _____ _____ _____

Figure 4

Fluency Rubric

Rubric can be found at:

http://www.timrasinski.com/presentations/multidimensional_fluency_rubric_4_factors.pdf

	1	2	3	4
Expression and Volume	Reads in a quiet voice as if to get words out. The reading does not sound natural like talking to a friend.	Reads in a quiet voice. The reading sounds natural in part of the text, but the reader does not always sound like they are talking to a friend.	Reads with volume and expression. However, sometimes the reader slips into expressionless reading & does not sound like they are talking to a friend.	Reads with varied volume and expression. The reader sounds like they are talking to a friend with their voice matching the interpretation of the passage
Phrasing	Reads word-by-word in a monotone voice.	Reads in two or three word phrases, not adhering to punctuation, stress and intonation	Reads with a mixture of run-ons, mid sentence pauses for breath, and some choppiness. There is reasonable stress and intonation	Reads with good phrasing; adhering to punctuation, stress and intonation.
Smoothness	Frequently hesitates while reading, sounds out words, and repeats words or phrases. The reader makes multiple attempts to read the same passage.	Reads with extended pauses or hesitations. The reader has many "rough spots."	Reads with occasional breaks in rhythm. The reader has difficulty with specific words and/or sentence structures.	Reads smoothly with some breaks, but self corrects with difficult words and/ or sentence structures
Pace	Reads slowly and laboriously.	Reads moderately slowly.	Reads fast and slow throughout reading	Reads at a conversational pace throughout the reading.

Figure 5

Ramp for Teaching Forces and Motion

