The Effects of Schema on Reading Comprehension at Coleman Elementary

Celeste Mills
The Effects of Schema on Reading Comprehension at Coleman Elementary

Submitted on December 15, 2019
in fulfillment of final requirements for the MAED degree

Celeste Mills
Saint Catherine University
St. Paul, Minnesota
Schema is a framework that helps us organize and interpret information. Developing schema is essential in the comprehension of text. Strong readers can make sense of what they read by seeing how it fits with what they already know. Teachers must help students make connections before, during, and after reading.

Without schema students are unable to infer because making inferences involves creating meaning that is not explicitly stated by the author. Readers use clues in the text plus their personal insights and experiences to make meaning of the text (Roit, 2014). My school is a Title I school with a high level of poverty. Typically impoverished have limited background knowledge due to limited vocabulary and life experiences (Payne, 2015). Students must be taught to activate schema to help make meaning from text. Explicitly teaching students both the term schema to facilitate metacognition and helping them focus on specific stimulus will help students in poverty to be ready to proceed to the elaboration stage, also known as inferencing (Payne, 2015).

There has been limited research on schema in isolation to reading comprehension. Although a lack of background knowledge affects reading success, many teachers have little support or understanding of lessons that focus on building schema. Teacher instruction does little to help students learn how or when to use the skills, nor was it ever established that this specific set of skills enabled comprehension (Appel, 2009). By exploring lessons in isolation to the schema framework teachers will be able to help students with a limited vocabulary interpret a text in a more meaningful way.
**Problem Statement**

Little is known how schema affects reading comprehension for children of various learning levels/needs. Reading comprehension is a broad topic, and studies have looked at strategies to help with comprehension. However, little research has studied schema in isolation and how to assess student comprehension after building background knowledge (Appel, 2009). Assessments should be given to determine student’s schema prior, during, and after a lesson. Hands-on lessons are an excellent tool for building background knowledge. Unfortunately, research suggests schools are not spending enough time to assess student schema and fail to give hands-on experiences to help build schema their students lack (An, 2013). Therefore, the purpose of this research project is to explore if hands-on lessons help build schema, which in turn may help deepen student comprehension of text.

**Review of Literature**

Schema theory states that written language does not carry meaning by itself. Students are unable to make inferences without building schema. Instead, a text-only provides directions for readers as to how they should retrieve or construct meaning from their own previously acquired knowledge (An, 2013.) Typically students who come from high poverty have limited background knowledge due to limited vocabulary and life experiences (Payne, 2015). Students must be taught to activate schema. Teaching students both the term schema (to give the students the
correct labels to facilitate metacognition) and helping them focus on specific stimuli will help students in poverty to be ready to proceed to the elaboration stage (Payne, 2015). As educators, we must provide sensorial lessons rich in language to help build schema. A way to build background knowledge is to provide rich learning experiences, particularly for students whose home environments do not. Literature refers to such efforts as “direct approaches” to background knowledge (Marzano, 2019, p.1). The literature reviewed for this project explores the connection between schema and reading comprehension.

Montessori education is based on sensorial experiences. Maria Montessori believed that all learning comes through our senses. “Our apparatus for educating the senses offers the child a key to guide his explorations of the world; they cast a light upon it which makes visible to him more things in greater detail than he could see in the dark, or uneducated state” (Montessori, 1886, p.167). As educators, we must provide those sensorial experiences to help our students build background knowledge so they can connect in a more meaningful way.

Organizing schema is another crucial factor in comprehension. Using graphic organizers such as KWL (What I Know, What I Want to Know, and What I Learned) helps students organize their thoughts prior, during, and after a text is read. When preparing for instruction, teachers focus on the content we will teach. Less planning and instructional time is dedicated to accessing preexisting knowledge. “If preconceptions are not engaged, children may fail to correctly grasp new concepts or give up on a subject altogether” (Campbell, 2, p.2). As educators, this should guide our instruction. By assessing prior knowledge, “What I Know,”
inform what lessons may need to be taught to help create background knowledge. After exploring background knowledge, we will ask our students about “What I Want to Know.” Asking students about what they want to know can build curiosity. Lastly, students record “What I Learned” after they have read the text. By recording what the students have learned, the teacher will be able to assess if the students took away the key ideas of the text. If the student did not take away key ideas, the teacher could re-evaluate and plan their lesson accordingly. The use of graphic organizers is an effective strategy (Ellis, 2008). Students demonstrated higher levels of comprehension and ability to recall information when they had used a graphic organizer in content-area instruction (Ellis, 2008).

Text connections are another way to help organize background knowledge. Struggling readers often move directly through a text without stopping to consider whether the text makes sense based on their own background knowledge, or whether their knowledge can be used to help them understand confusing or challenging materials (Zygouris-Coe, V. & Glass, C., 2004). By teaching students how to connect to the text, they can have a better understanding of what they are reading (Harvey & Goudvis, 2000). When students have a personal connection to the text, they are more likely to connect to the book. Text to Text is where readers connect big ideas and themes across a text. Readers gain insight during reading by thinking about how the information they are reading relates to other familiar texts (Draper, 2010). Text to World is exploring the relationship between the text and the world around them. Text to World connections is the broader connections a reader brings to a reading situation. We all have ideas about how the world works that go far beyond our personal experiences (Draper, 2010).
Conducting reading interest surveys is another way to explore student schema. Students are more likely to have strong background knowledge when related to a topic of interest. Interest has a strong positive influence on readers’ comprehension and recall (Hidi, 1990). Providing students with texts of interest builds confident readers and helps the student recognize the importance of their schema.

In 1953, Wilson L. Taylor researched closure tasks to assess reading comprehension skills. He developed the Cloze Test. In a Cloze test, the teacher removes a certain number of words that the student then needs to fill in as they read through the passage (Kelly, 2018). The Cloze test is a teacher-created assessment and can be used to focus on various subjects/topics. The Cloze test helps students find and make connections between key vocabulary within the story and how their meaning enhances the story (Meador, 2019). Over time, researchers have tested the Cloze method and found that it does indeed indicate reading comprehension levels (Kelly, 2018).

Methodology

Schema guides the students from sensory thinking to imaginative thinking, which encourages students to be active in the process of reading, guessing, and interpreting the text (An & Suying, 2013). In the schema framework, students activate prior knowledge to connect/comprehend a text. Questions that will guide my research are: To what extent do hands-on lessons using the schema framework affect reading comprehension? To what degree do hands-on experiences build schema in children with various reading needs? Do children across multiple ability groups benefit equally, or do specific groups benefit more than another?
Multiple data collection strategies to answer these questions. Teacher-created artifacts, such as text connections that use text to self, text to text, and text to world, KWL (what I know, what I want to know, and what I learned) graphic organizers, cloze readings, Montessori shelf work (nomenclature cards designed to cover each topic that students can layout together with a partner,) and a variety of hands-on lessons (teacher provided real-world experiences through field trips, manipulatives, and experiments). Each of these artifacts is considered independent variables in my action research. Observational data includes field notes I record throughout my study. My field notes will consist of dependent variables, such as student attitudes, responses, and outcomes.

My research will begin with inquiry data, a reading interest survey (see Appendix A) that is an independent variable. Each student will fill out a survey that asks them about what type of literary genres they enjoy. Their responses to this survey will be a dependent variable. After the survey, they will fill out the text connections questionnaire to make a note of my students' ability to connect with text based on their reading interest. I will make a note to see if my students' schema/background knowledge is stronger when it based on their interests. I will bring in books based on student interests and make a note of student engagement. Their engagement will be determined by on task and off-task time spent reading.

I will provide articles and picture books on various topics. Each student will read the text, and I will monitor comprehension. After they read the text, I will give a 20-30 minute hands-on lesson that will build schema on specific topics/subjects. The lessons may range from science experiences/experiments to any hands-on Montessori lesson (see Appendix B & C). The goal is
to develop my students’ background knowledge and assess my students' reading comprehension in a related text before and after the lesson has been given. I will make anecdotal notes on whether or not those lessons help my students make inferences on the topic/subject read. By providing these lessons, I hope that readers will be able to make sense of new experiences and enable them to make predictions about what they might expect to experience in a given context.

I will teach one 20-30 minute hands-on lesson a week as a whole class to 20 students. However, I will collect data on 6 of my 3rd-grade students. Classroom assessments and state testing determine which students participate in the study. The goal is to pick students who are below grade level, at grade level, and above grade level in reading comprehension. I will choose two students from each level. The selection process based on ability would be considered an independent variable. By selecting students at different comprehension levels, I hope to get a clearer idea of how the interventions help children from various comprehension levels.

To monitor schema before, during, and after the text and lesson, I will have them fill out a KWL graphic organizer (see Appendix D & E). They will fill out “What I Know” and “What I Want to Know” before reading the text, and “What I Learned” after the reading and hands-on lessons have been given. I will also look at their ability to make connections with Text to Text, Text to Self, and Text to World. I will do this by having my students fill out the Text Connections questionnaire (see Appendix F & G) after they read the text. They will fill out the questionnaire again after both the reading and hands-on lessons. I will compare their ability to make text connections after the hands-on experiences compared to readings that did not offer a lesson. A Cloze Reading (see Appendix H) is an instructional strategy where students are
required to fill in the blanks within a passage with correct words from a word bank. I will give a cloze reading assessment after they read the text. I will provide a posttest cloze reading after both the hands-lesson and text. With all of my data, I will be looking to see whether or not my students had a stronger schema with a lesson that accompanied a text compared to a text that did not. I will share the results of my data with each student. They will graph the results of their pre and post cloze reading assessment. We will discuss what reading comprehension strategy worked best for them. They will choose from the list of strategies we used to create a reading comprehension WIG (wildly important goal) in their data binders.

**Analysis of Data**

Two female students and four male students were part of my research. One female student and one male student were in a high ability group and above grade level in reading. One female and one male were in an average ability group and at grade level for reading. Two male students were in my low ability group, below grade level in reading, and receive special education services in reading.

Student Engagement Based on Student Interest:

At the beginning of my study, students were given a reading interest survey. Based on student responses, I provided each of my six students several books of their interest to read during their DEAR time (Drop Everything and Read time, a time they read silently on their own.) I tallied on task and off-task behavior according to books of interest and books not based on student interest for twenty minutes each day for one week. Regardless of ability groups or reading levels, the findings from this data show that students are more likely to stay on task when
given a book based on interest compared to books that are not. Percentages divided by above GL (Above Grade Level,) At GL (At Grade Level,) and Below (Below Grade Level.)

Figure 1

Books Not Based On Interest

20 minutes each day for 7 days: Above Grade Level students on task (reading text) for 70% of the time. At Grade Level students on task (reading text) for 60% of the time. Below Grade Level students on task (reading text) for 40% of the time.
20 minutes each day for 7 days: Above Grade Level students on task (reading text) 90% of the time. Grade Level students on task (reading text) 80% of the time. Below grade Level Students on task 70% of the time.

Building Shema with Hands-On Lessons:

Hands-on lessons were given for each topic for two weeks. The lessons were given after the first initial reading of each subject. Topics for each lesson included weather instruments, plant vocabulary, and landforms.

Our first reading topic was weather instruments. Students were introduced to weather instruments while sitting outdoors and discussing current weather. They made a list of what they should be looking for when studying weather patterns. After the weather instrument vocabulary was given, students were asked to build their own rain gauges and anemometers. Students used these instruments to collect weather data.
The plant vocabulary was introduced in a book about fall weather. We followed up this text with a leaf walk. Students collected leaves, sorted, and classified them in any way they chose. Students were asked to make note of the leaves that had more or less chlorophyll (green pigment.) Students discuss the needs of plants, the reasoning behind the loss of chlorophyll, and the process of photosynthesis.

After reading about landforms, students used playdough to build various landforms (see Appendix C.) Eventually, each student created each landform mentioned in the text. Anecdotal notes were collected for this portion of research. I made a note of student engagement. All 6 students participated in each lesson and expressed the most interest and excitement in the hands-on lessons compared to work that was not hands-on.

Comprehension with Text Connections and Graphic Organizers:

Text to self, text to text, and text to world is a graphic organizer intended to help students organize their thoughts. Students filled out this organizer after each reading and tried to connect the text to themselves, other books they have read, and to the real world. Students filled this out as a pre and post-assessment after lessons and shelf work. Two students with lower reading levels and receive special education had fewer text connections than my students who were at grade level and students who are above grade level. The text connection organizer is a writing exercise. The same students who made fewer connections, also struggle with writing. However, all of the students, in general, had more text to self connections on the post-assessment compared to the pre-assessment (see Appendix F & G).
KWL (What I know, what I want to know, and what I learned) is a graphic organizer that students use prior to reading by writing what they know and what they want to know. Typically students fill out the what I learned section after they read the text. However, for research purposes, I had students fill out the what I learned section after they had two weeks of hands-on lessons, Montessori shelf work, and re-read the text. I compared prior knowledge/what I know and what I learned. According to the data, every student had written down more on what I learned compared to what I know. Again, like the other graphic organizer, my two students who are below grade level in reading and receive special education did not have as many answers as my at grade level and above grade level for the “what I learned” section (see Appendix D & E). It is important to note they also receive special education services for handwriting and have expressed frustration with handwriting in general. Although, they had more answers for the post-test, compared to the pre-test, for “what I know” (see Appendix E).

Building Vocabulary with Cloze Reading:

Cloze reading is a strategy where students are required to fill in the blanks within a passage with correct words from a word bank. Cloze reading is used to assess a student's understanding of vocabulary and text. Students were given a cloze reading passage after the first reading. A total of six cloze readings were given after the text was read, and six cloze readings were given after the two weeks of lessons and shelf work. Every student, regardless of reading levels and abilities, answered more correctly on the post-assessment (see Figure 1). Although cloze readings require writing, it does not involve as much
handwriting as the graphic organizers. Percentages divided by Above GL (Above Grade Level,) At GL (At Grade Level,) and Below (Below Grade Level.) The series is divided by topics. Series 1 is Plant Vocabulary Cloze Reading, Series 2 is Weather Instruments Cloze Reading, and Series 3 is Landform Cloze Reading.

Figure 3

Cloze Readings have 10 questions each. Series 1 is Plant Vocabulary. Series 1 Above Grade Level students scored 100% and 80%. Series 1 At Grade Level students scored 50% and 20%. Series 1 Below Grade Level students scored 30% and 20%. Series 2 is Weather Instruments. Series 2 Above Grade Level students scored 60% and 50%. At Grade Level students 30% and 10%. Below Grade Level students 30% and 20%. Series 3 is Landforms. Above Grade Level students scored 70% and 80%. At Grade Level students both scored 0%. Below Grade Level scored 20% and 30%.
Cloze Readings have 10 questions each. Series 1 is Plant Vocabulary. Series 1 Above Grade Level students scored 100% and 100%. Series 1 At Grade Level students scored 80% and 100%. Series 1 Below Grade Level students scored 80% and 50%. Series 2 is Weather Instruments. Series 2 Above Grade Level students scored 100% and 100%. At Grade Level students 80% and 80%. Below Grade Level students 100% and 80%. Series 3 is Landforms. Above Grade Level students scored 100% and 100%. At Grade Level students 70% and 80%. Below Grade Level scored 70% and 70%.

Montessori Shelf Work:

Montessori shelf work was created to cover each reading topic. After the reading, students were asked to lay out the shelf work on their own. After two weeks of hands-on lessons, each student was asked to layout shelf work once again as a post-assessment. Nomenclature cards were made to cover landforms, weather instruments, and plant vocabulary. The landform nomenclature cards include pictures of various landforms with the correlating definitions and asked to match them accordingly. Overall, students scored higher in the landform shelf work compared to other shelf work. The weather instruments and plant vocabulary nomenclature cards did not include
pictures. Names of instruments and plants were given, and students had to match the name with
the appropriate definition. Although each student was able to match more correctly on their post-
assessment compared to their pre-assessment, they did not get as many correct with the landform
nomenclature work. Overall, data shows students were more likely to layout shelf work correctly
compared to exercises that required writing. Percentages are divided by Above GL (Above
Grade Level,) At GL (At Grade Level,) and Below (Below Grade Level.) The series are divided
by topics. Series 1 is Plant Vocabulary Cloze Reading, Series 2 is Weather Instruments Cloze
Reading, and Series 3 is Landform Cloze Reading.

Figure 5

Montessori Shelf Work Pre-Test

Montessori Shelf-Work has 10 questions each. Series 1 is Plant Vocabulary. Series 1 Above Grade Level students scored 80% and 80%. Series 1 Above Grade Level students scored 60% and 70%. Series 1 Below Grade Level students scored 50% and 40%. Series 2 is Weather Instruments. Series 2 Above Grade Level students scored 60% and 50%. Series 2 At Grade Level students scored 50% and 40%. Series 2 Below Grade Level students scored 40% and 50%. Series 3 is Landforms. Series 3 Above Grade Level students scored 80% and 80%. Series 3 At Grade Level students scored 80% and 70%. Series 3 Below Grade Level students scored 50% and 50%.

Figure 6
Montessori Shelf Work has 10 questions each. Series 1 is Plant Vocabulary. Series 1 Above Grade Level students scored 100% and 100%. Series 1 At Grade Level students scored 100% and 100%. Series 1 Below Grade Level students scored 80% and 80%. Series 2 is Weather Instruments. Series 2 Above Grade Level students scored 100% and 100%. At Grade Level students 100% and 100%. Below Grade Level 80% and 80%. Series 3 is Landforms. Above Grade Level students scored 100% and 100%. At Grade Level students 100% and 100%. Below Grade Level scored 80% and 80%.

**Action Plan**

As mentioned previously, schema is a framework that helps us organize and interpret information. The research provided suggested schema framework has a positive effect on the comprehension of text and emphasizes the critical role of the teacher in providing ways to build schema. One of the most effective ways to build schema is by providing multiple hands-on lessons. By doing so, children are more likely to connect meaning to the text. Students learned to make sense of what they read by seeing how it fits with what they already knew. Teachers not only can provide ways to build schema, but must help students make connections before, during, and after reading.

- Students are more likely to exhibit on-task behavior when reading a book based on interest compared to a book that is not.
Text Connections (text to self, text to text, and text to world) and KWL (what I know, what I want to know, and what I learned) are helpful graphic organizers to assess prior, during, and knowledge after a lesson. Both graphic organizers help organize and evaluate student schema. Students are more likely to make more connections when lessons are given to build background knowledge.

Cloze Readings assess vocabulary and comprehension of a text. Student vocabulary and comprehension skills proved to be stronger in Cloze readings accompanied by a hands-on lesson than readings that did not.

Montessori Shelf Work post-assessments revealed more growth than any other post-assessment.

Overall, students demonstrated growth in each post-assessment, proving that building schema increases comprehension. More text connections were made on post-assessments. However, my students who are reading below grade level, receiving special education services, and struggle with handwriting did not show as much growth on text connection graphic organizers compared to other assessments. Since this involves more writing than any other assessment I would not use this as a reading comprehension assessment, I would use it as a direct instructional strategy to organize student thoughts, access/assess schema, and a way to teach students to make connections to the text.

Post assessment Cloze Readings revealed a significant amount of growth compared to pre-assessments. Although Cloze Readings did not show as much post-assessment growth compared to Montessori Shelf Work, they are the closest assessment to the comprehension skills required for state testing assessments. However, when assessing comprehension, Montessori Shelf Work showed the most overall student growth. It is interesting to note that Montessori
Shelf Work is a hands-on work that can be used as a post-assessment but also a practice that students can use to build knowledge. Several factors could contribute to the significant growth and would be worth further study: One, students learn from the repetitive nature of Montessori Shelf Work. Two, it is a sensorial work that appeals to all ability groups. Lastly, it does not require as much reading and writing compared to other assessments.

Montessori Shelf Work may give educators the most accurate evaluation of comprehension of a specific topic, but it may not be the most accurate assessment when assessing those concepts that are put into a text. Since this research study is based on the improvement of reading comprehension, and shelf work does not require as much reading as a cloze assessment, Cloze readings are the most accurate assessment for assessing reading comprehension vs. general comprehension of a topic. Montessori shelf work is a vital tool to build schema and overall understanding, but may not be the best assessment to gauge reading comprehension.

By providing text connections strategies, cloze readings, hands-on lessons accompanied by Montessori shelf work, students were able to improve their over-all schema and in return, demonstrate overall improvement with their reading comprehension regardless of ability and reading levels. The combination of all of these tools, strategies, and assessments revealed an overall improvement in reading comprehension but, most importantly, prove that teacher provided hands-on lessons/opportunities build schema and increase reading comprehension in all students regardless of abilities or reading levels.
References


Appendix A

Student Reading Interest Survey

1. What type of books do you like to read? Tell me all about it.
   I like to read about football, farming, and hunting. I like to read different kinds of topics.

2) What is your favorite book? Why?
   It is called Grizzly Bears and it tells me about bears and what they do in the wild.

3) Where is your favorite place to read?
   Describe your special reading place.
   I like to read in bed because it is cozy.

4) Do you have a favorite series? What is it and why do you like it?
   I like fierce animal books because I think they are really cool.

5) Do you prefer fiction (stories) or non-fiction (real info)? How come?
   I prefer non-fiction because they tell us true facts.
Appendix B

Landforms Montessori Shelf Work

- A river: a narrow strip of land that connects two large areas of land.
- A canyon: a large crack in the earth formed by a river or earth's crust.
- A plain: a large area of flat land.
- A mountain: a high, tall, rocky area of land.
- A hill: a mound of raised land that is smaller than a mountain.
- A delta: low water land that is formed at the mouth of a river.
- A valley: an area of low land between two mountains or hills.
Appendix C

Landforms Hands-on Lesson

mountain

isthmus
Appendix D

KWL Chart

<table>
<thead>
<tr>
<th>What I Know</th>
<th>What I Want to Know</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>landforms are things that are formed in the ground</td>
<td>I want to know how they are formed</td>
<td>The landforms I know are hills, deltas, islands, valleys, canyons, plateaus, peninsulas, and mountains</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

KWL Graphic Organizer from a student who is Above Grade Level
Appendix E

<table>
<thead>
<tr>
<th>What I Know</th>
<th>What I Want to Know</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>grades</td>
<td>every</td>
<td>think</td>
</tr>
<tr>
<td>than</td>
<td>thing</td>
<td>recorded</td>
</tr>
<tr>
<td>aha</td>
<td>about</td>
<td>马丁林</td>
</tr>
<tr>
<td>part</td>
<td>she</td>
<td>海滩</td>
</tr>
<tr>
<td>of</td>
<td>loa</td>
<td>volleyball</td>
</tr>
<tr>
<td>ho</td>
<td>m</td>
<td>no</td>
</tr>
</tbody>
</table>

KWL Graphic Organizer from a student who is Below Grade Level
Appendix F

Text Connection Graphic Organizer from a student who is Below Grade Level
Appendix G

Text Connection Graphic Organizer from a student who is Above Grade Level

Text to Self

reminds me of a time when I...
went to Mackinac Island where it is surrounded by water

Text to Text

reminds me of a book I have read before because...
The guy runs on a plain at the start of the book

Text to World

reminds me of a real-life world event like when I saw a tornado on tv in Florida
Appendix H

Land Forms

mountain valley canyon plain delta island

isthmus plateau peninsula hill

There are many types of different land forms. A ______________ is a narrow strip of land that connects two larger areas of land. A ________________ is an area of land that is completely surrounded by water. Mackinac Island is the most famous island in Michigan. A ______________ is a large area of flat land. A large rocky area of land that comes up out of the earth’s surface is called a _________________. A ______________ is a mound of raised land that is smaller than a mountain. An area of low land between two mountains is called a _______________.

A strip of land that extends out into a body of water is called a _________________. The Leelanau Peninsula is a famous peninsula in Michigan. A ______________ is a large crack in the earth formed by a river or earthquake. The Grand Canyon located is located in the Western United States, and is the most famous canyon in the world. A low water land that is formed at the mouth of a river is a _________________. A ________________ is a large area of flat land that is raised higher than the land around it.

Landforms Cloze Reading