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**Literacy Strategies in Secondary Content Areas and the Effectiveness of Their
Implementation: A Review of the Literature**

by

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A Starred Paper

Submitted to the Graduate Faculty of

St. Cloud State University

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Table of Contents

	Page
List of Figures.....	4
Chapter	
1. Introduction.....	5
Focus of Paper.....	6
Importance of the Topic	7
Adolescent Literacy	8
Research Questions.....	9
Terminology	10
2. Review of the Literature and Strategies.....	12
Generic Literacy Strategies.....	15
The Frayer Model	18
Interactive Word Walls (IWW)	22
Question Answer Relationships	24
K-W-L and KNWS.....	26
Functional Language Analysis	28
Fast Reading (FT).....	31
Professional Development	33
3. Findings, Conclusions, and Recommendations	35
Findings.....	35
Conclusions.....	36

Chapter

Page

Recommendations.....	38
Summary.....	40
References.....	41

List of Figures

Figure	Page
1. Frayer Model Template.....	19
2. Frayer Model Example for Language Arts	20
3. Frayer Model Example for History.....	20
4. Frayer Model Example for Math	21
5. Frayer Model for Mathematics	21
6. Examples of Completed IWW	23
7. Example of A Completed Physical Property IWW.....	24
8. One Example of a Poster Explaining QAR Concepts to Students.....	25
9. An Example of a K-W-L Used for Solving a Problem in Math or Science	26
10. Pythagorean Theorem K-W-L Example.....	27
11. K-N-W-S Example of a Template for Use on a Mathematics Word Problem	28

Chapter I: Introduction

According to the Minnesota Academic Standards for English language arts for grades 8 through 12, “Reading is critical to building knowledge in history/social studies as well as in science and technical subjects” (Minnesota Department of Education, [MDOE], 2010, p. 81). The actual reading benchmark standards for grades 11-12 students for literacy in science and technical subjects is even more specific, “By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently” (MDOE, 2010, p. 85).

This is a benchmark, but most 12th-grade students do not achieve this marker, based on national testing results. The 2015 National Assessment of Educational Progress (NAEP) reported that only 37% of 12th-grade students performed at or above the “proficient” level in reading and this percentage has only varied about 4 percentage points since 1998 (National Center for Education Statistics, 2016). More specifically, according to the American College Testing (ACT; 2019) system report and using the state of Minnesota as an example, of the 99% of graduating students who tested for the ACT, only 48% of Minnesota students met the ACT reading benchmark. This percentage has not seen a meaningful change over the last 5 years (ACT, 2018). While this score is better than that for most states and above the national average of 46%, this means a greater number of Minnesota’s students enter college and careers not completely ready for the technical and scientific content comprehension challenges they will face in their future.

Focus of Paper

As a retired post-secondary teacher of developmental reading, my concern is for the success of the student past high school. In personal conversations with my adult students they

would lament the extra time and money needed as they struggled to balance their schooling with work and family commitments. Being required to take developmental reading courses increases the time, sometimes by a year, a student must spend in college to complete their degree. And it means additional cost financed through educational funding or spent by students to pay for these courses. Both create an extra burden on students in time and money. These conversations with my students made me wonder what I might recommend as a reading volunteer that would increase reading proficiency and reduce this cost in time and money for future students.

The focus of this paper was on increasing reading proficiency by increasing literacy instruction, specifically the incorporation of literacy strategies into adolescent content areas, or grades 4 through 12, as stated by Marchard-Martella's (2013) definition of adolescent literacy, with an emphasis on the secondary level, or grades 9 through 12 as defined by the National Center for Education Statistics (NCES; 2018). According to my review of the research and data, lack of literacy skills creates an economic drain on individuals and our society, thus creating an additional impetus for incorporating more reading strategies in all content areas.

Chapter 1 includes the Minnesota State Curriculum Standards and United States Census Bureau data. Chapter 2 reviews current research literature examining the effectiveness of adolescent reading strategies, their implementation, and support for teachers through professional development. Chapter 3 discusses the findings, recommendations, and conclusions of research reviewed in Chapter 2. The quantitative and qualitative research studies reviewed in Chapter 2 were published in the United States between 2007 and 2019. Additional studies and reports from 2000 on were also cited in Chapter 1 for definitions of literacy strategies.

Importance of the Topic

I feel that strong literacy skills developed during adolescence are a deciding factor in a student's future success, not only at the secondary school level, but also at the college level and throughout their careers. In contrast, lack of literacy skills translates into monetary costs for individuals, government entities, and employers.

For an individual, low literacy skills equal low income for the individual. The Program for International Assessment of Adult Competencies (PIAAC) conducts an international survey known as the Survey of Adult Skills. The purpose of this survey is to measure the key cognitive and workplace skills needed by individuals to participate in society and for economies to prosper. According to the PIAACC's 2012 survey, as reported in the National Center for Education Statistics (NCES, 2019), 21% or approximately 43 million U.S. adults possess low English literacy skills, and of these, 66% were U.S. born.

The PIAACC 2012 survey also determined that those with poor literacy skills were more than twice as likely to be unemployed (NCES, 2019). Of the 206 million working age adults in the United States 43% of those with the lowest literacy levels live in poverty (NCES, 2019). According to Kutner, Greenberg, Jin, Boyle, Hsu, and Dunleavy (2007), there is a clear correlation between more education and higher earnings, and between higher educational scores and higher earnings.

For society, there is a correlation between low literacy and higher incarceration rates. Seventy-five percent of state prison inmates did not complete high school or could be classified as low literate (Goodman, Finnegan, Mohadjer, Krenzke, & Hogan, 2013). In addition, recidivism rates can be decreased by increasing literacy rates among the incarcerated. Inmates

who participate in correctional education programs had 43% lower odds of recidivating (Davis et al., 2013).

These extra individual and societal costs emphasize the importance of helping adolescents develop good literacy skills and for all teachers to include reading literacy as a component of their teaching.

Adolescent Literacy

What is adolescent literacy? Adolescent literacy is focused reading instruction for students in grades 4 through 12, according to Marchard-Martella, Martella, Modderman, Petersen, and Pan (2013). Additionally, because of the wider range of texts they are required to read for their content courses, adolescent literacy strategies are more complex than those taught in the lower elementary grades. Adolescent literacy “entails reading to learn in subjects that present their ideas and content in different ways. Students need to be able to build knowledge by comprehending different kinds of texts, mastering new vocabulary, and sharing ideas with others” (Kamil, Borman, Dole, Kral, Salinger & Torgesen, 2008, p. 6).

Secondary content area texts are constructed in language patterns that are different from our everyday use of language, which may be unfamiliar to adolescents (Fang & Schleppegrell, 2010). Teachers not recognizing this complexity in content area texts (Hodgkinson & Small, 2018) gives us a starting point to understand why adolescent literacy strategies are not more incorporated into the secondary level classroom. Having spoken to many of my adult college students, a number of high school students, and even some of my reading professors, they cited the lack of content area literacy instruction in the secondary grades as a major factor in their own struggle to gain reading proficiency. Students stated that many of their secondary teachers were

well-versed in their respective content areas of literature, history, math or the sciences, but no actual literacy strategies were taught on how to comprehend the more complex texts. Related research confirms this. Ness (2009) found that, “In 2,400 minutes of direct classroom observation, a total of 82 minutes (3%) of reading comprehension instruction was observed” (p. 143).

But is this scarcity of reading comprehension instruction because of a lack of class time to teach reading strategies or is it because of a lack of teacher preparation time to learn and create implementation plans for these strategies?

After reviewing the literature several questions surfaced that have motivated me in writing this starred paper. Throughout the following section I will discuss the questions raised by my review in more detail.

Research Questions

The question that has been raised in my mind because of my literature review is as follows: How or why are teacher implementation and administrative support of literacy instruction strategies missing in the secondary educational level? This is the overriding question of this paper, and it will be separated into its two elements for a deeper analysis, teacher implementation, and administrative support through professional development. Specifically:

1. What literacy instruction practices were most successful for secondary teachers, and what was their experience in the ease or difficulty of implementing these strategies?
Based on this, do secondary teachers continue to use the strategies or not?
2. How does the school administration fit into this picture? Besides including professional development, what administrative practices have best supported

secondary faculty in the implementation and continued use of literacy practices?

This leads me to the focus of this starred paper. While no one person can hope to make changes to the whole system, nor should this paper be seen as a meta-analysis of all reading strategies for the secondary level, my plan with this paper is to present one viewpoint on how to increase reading proficiency by suggesting increased use of researched-based best practices in adolescent literacy strategies that are easily understood, quickly implemented and totally adaptable to any secondary content area.

Terminology

American College Testing (ACT)

Common Core State Standards (CCSS)

Individuals with Disability Education Act (IDEA)

International Literacy Association (ILA)

Literacy Information and Communication System (LINCS)

Minnesota Department of Education (MDOE)

National Assessment of Educational Progress (NAEP)

National Behaviour Support Service (NBSS) National Council for Special Education of Ireland

National Center for Education Statistics (NCES)

National Institute of Child Health and Human Development (NICHD)

National Institute of Health (NIH)

National Institute for Literacy (NIL)

National Reading Panel (NRP)

Program for International Assessment of Adult Competencies (PIAAC)

Response to Intervention (RTI)

Chapter 2: Review of the Literature and Strategies

As stated in Chapter 1, reading proficiency needs to be increased in adolescent content areas by increasing literacy instruction using reading strategies. To be effective, teachers should use research proven reading strategies based on literacy theories. But what are the current recognized theories for teaching adolescent literacy? Based on conclusions by the National Reading Panel (NRP; 2000, as cited by Cassidy, Valadez, & Garnet, 2010), the five pillars of reading literacy are: (1) phonemic awareness, or recognizing the smallest sounds in words; (2) phonics, or the making of connections between letters and sounds; (3) fluency, or the ability to read with expression, accuracy and speed; (4) vocabulary, or the meaning of words within context or in isolation; and (5) comprehension, or the ability to understand and make meaning from what is read.

The first two, phonemic awareness and phonics are generally explicitly taught and well understood by students by the end of the elementary grades. Adolescents with these types of decoding difficulties need more individualized and intense practice, which means this instruction would be, in general, most appropriately delivered by a reading specialist, according to the National Institute for Literacy (NIL; 2007).

The third pillar, fluency consists of two components, these components are: automaticity in word recognition and prosody, or expression in oral reading, to reflect the meaning of the text (Rasinski, 2014). Reading this sentence without needing to break each word into its parts or look up the definitions is an example of automaticity in word recognition. Likewise, reading a sentence like “She did what!” either out loud or in one’s head with feeling is an example of prosody or expression being used to understand the meaning of the text. Rasinski (2014) likened

teacher modeling of oral reading for comprehension to parental modeling of how to drive correctly, with individual practice by students helping them achieve mastery. “Repeated practice on the same text (or car when learning to drive) allows students to achieve this form of fluency or mastery that can easily transfer to new, never-before-read texts” (p. 9). Through his research, Rasinski demonstrated that fluency is positively affected by improved reading rate due to increased vocabulary recognition and by an increased level of comprehension. So, let us look first at vocabulary and comprehension as the pillars of literacy most affected by the classroom literacy strategies to be reviewed.

Vocabulary, the fourth pillar, are the words used to communicate in speech and in print. According to the NIL (2007), there are three types of vocabulary in our daily lives: oral vocabulary, or using spoken words; aural vocabulary, or understanding words spoken by others; and print vocabulary, words used in reading and writing. Of these, print vocabulary is the most difficult because it relies on fluency. Vocabulary decoding is not just one, but multiple skills performed together. According to Curtis (2004), Medo and Ryder (1993), Moats (2004), Snow and Biancarosa (2003):

Two important skills that are associated with vocabulary development are *word identification* and *word analysis*. *Word identification* or *decoding* refers to the ability to correctly decipher a particular word out of a group of letters. *Word analysis* is defined as the process involved in understanding the letters, sounds, and roots, prefixes, and suffixes that make up words, to enable a student to understand and use those words. Word knowledge also includes *syntactic awareness* or awareness of the grammatical use of a word, such as the part of

speech represented by a word. Once words are recognized, students use *pragmatic awareness*, or sensitivity to how words are used to communicate, to understand the purposes of their use. All of these processes together constitute students' vocabulary knowledge. (as cited by the NIL, 2007, pp. 14-15)

So now to comprehension, the fifth pillar of reading literacy. Durkin (1993, as cited by Cassidy et al., 2010) identified reading comprehension as the essence of reading. However, according to Gill (2008), reading comprehension is complex with multiple processes that occur simultaneously. Gill further stated that a teacher's definition of literacy can affect how they teach comprehension. According to the Glossary of Reading Terms of LINCS, the definition of "Text Comprehension" is "understanding what is read, with readers reading actively (engaging in the complex process of making sense from text) and with purpose (for learning, understanding, or enjoyment)" (Literacy and Information Communication System [LINCS], n.d., p. 108).

Duke and Pearson's (2008) definition of comprehension gives a clearer picture of how complicated the process is, especially in the content areas at the secondary level. "It may also be difficult to convince many that comprehension is more than just listening to the words you decode to see if they make sense, and that it involves many different processes, that it entails a multiplicity of different strategies, and that it means different things in different contexts" (p. 117). The emphasis on the strategies and skills that are the focus of elementary reading instruction fails to recognize the significant differences in reading demands that emerge in secondary schooling (Fang & Schleppegrell, 2010). Secondary level reading comprehension difficulties "are not solely the product of reading decoding skills" (Watson, Gable, Gear, & Hughes, 2012, p. 85), but are also the result of the use of more complicated texts.

Secondary texts are more complicated because secondary content areas are more complex. Based on the Common Core State Standards (CCSS), the content areas that are identified as the four core disciplines are English language arts (ELA), history and social studies, science and mathematics (Spires, Kerkhoff, Graham, Thompson, & Lee, 2018). “In the context of secondary schools, the subject area of ELA is comprised of subdisciplines, such as literature, creative writing, and linguistics; science is comprised of subdisciplines, such as biology, physics, and chemistry; social studies is comprised of subdisciplines, such as history, economics, and psychology; and mathematics is comprised of subdisciplines, such as calculus, logic, and statistics” (pp. 1406-1407).

With this myriad of disciplines, Moje (2008) recommended building “disciplinary literacy” rather than merely encouraging content teachers to employ literacy teaching practices and strategies. But before we switch to disciplinary literacies, we must first examine what are the generic literacy strategies currently recommended to increase fluency, incorporate new vocabulary, and create comprehension in secondary content areas.

Generic Literacy Strategies

The literacy strategies presented here will all be focused on the Tier 1 level of support of the Response to Intervention (RTI) initiative. RTI is part of the 2004 reauthorization of the Individuals with Disability Education Act (IDEA) and includes three levels of support: Tier 1 is classroom reading instruction for all students. Tier 2 is small group interventions. Tier 3 is individualized intensive one-on-one instruction (Lenski, 2011). Because this paper is focused on the classroom teacher, the strategies reviewed will be mainly for Tier 1 support.

According to Kamil et al. (2008), effective adolescent literacy strategies for classroom intervention should include the following practices:

1. Provide explicit vocabulary
2. Provide direct and explicit comprehension strategy instructions.
3. Provide opportunities for extended discussion of text meaning and interpretation.
4. Increase student motivation and engagement in literacy learning.
5. Make available intensive and individualized interventions for struggling readers provided by trained specialists.

Obviously, the first four fall under the purview of the classroom teacher with number five being dependent on district resources. It should be noted that providing individualized intervention can be a hindrance to a secondary student because, unlike in the elementary classroom, secondary classrooms are not self-contained so scheduling can be difficult (Brozo, 2009). Referred students may end up missing lectures and coursework which must be made up later.

Comprehension instruction also “should be balanced. It should include both explicit instruction in specific comprehension strategies and a large chunk of time for actual reading, writing and discussion of texts” (Duke & Pearson, 2008, p. 107). What is explicit instruction? It involves gradual release of reading instruction from the teacher to the student. Explicit instruction includes teacher modeling, then guided student practice with feedback, and finally independent student practice (Marchand-Martella et al., 2013).

Because skilled reading occurs pre-reading, during reading and post reading (Gill, 2008), generic literacy strategies should include not only comprehension and vocabulary learning but

need to activate the background experiences or prior knowledge and learning of the student.

When choosing a generic strategy, the teacher should be mindful of the following factors which are essential to reading comprehension (Watson et al., 2012):

- i. working memory capacity—holding a mental model of the situation being described while reading it.
- ii. prior knowledge or background experiences
- iii. motivation
- iv. vocabulary—including abstract symbols
- v. text coherence—text density and complexity and concept explanations
- vi. text structure—organization of the text (pp. 80-82)

According to Lee and Spratley (2010), generic literacy strategies include, but are not limited to:

- Double entry journals where students identify key questions and vocabulary in the text and explain their meaning to make connections
- K-W-L—a graphic where students identify what they already know (K), what they want to know (W) and after reading what they have learned (L)
- Graphic organizers like the Frayer Model or Word Walls to help understand vocabulary and organize concepts
- Anticipation guides that help students activate prior knowledge.
- Annotation of texts to pose questions, mark main ideas, make predictions, mark reactions.
- Analyzing question types like Question Answer Relationships (QAR), or like the SQ3R (Survey, Question, Read, Recite, Review) Study System
- Think alouds where teachers model how to think about the text.
- Mnemonic strategies
- Recognizing text features and structures including text organization and author's purpose
- Summarizations (pp. 17-18)

These are the most often cited types of strategies. Additionally, some of these specific strategies have been shown to be adaptable across the content areas including in mathematics.

Of these, the most prolific are the graphic organizers (GOs) and they can be quite effective. Post test results from a study by Dexter and Hughes (2011) show the use of GOs was associated with an increase in vocabulary knowledge, comprehension and inferential knowledge.

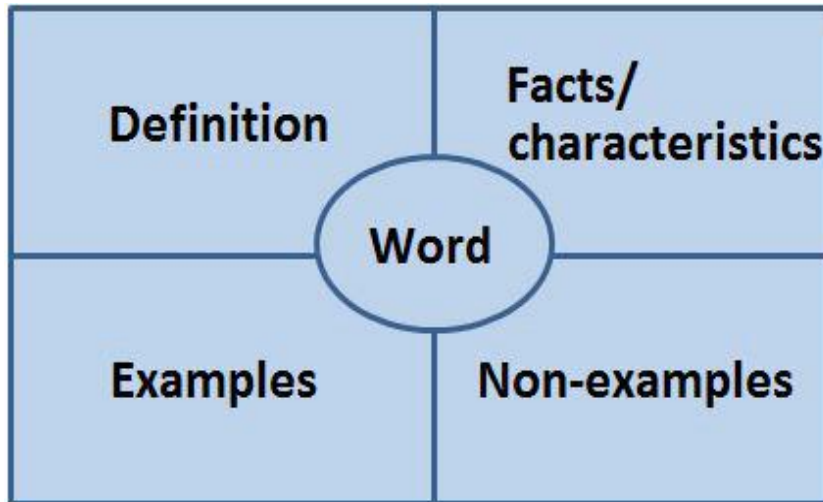
They found that based on many older studies, GOs are better for students with little or no prior knowledge of the new concepts. GOs help students to see the textual inferences and help students “identify the juicy segments in the text that are critical for your student’s conceptual understanding” (Roman, Jones, Basaraba, & Hironaka, 2016, p. 128). GOs work well for vocabulary across the disciplines, whether in the sciences, or for mathematics, where they are especially useful in learning new concepts (Armstrong, Ming, & Helf, 2018).

Two GO strategies for vocabulary that can be adapted across all four core disciplines are the Frayer Model, and the Interactive Word Wall. Both strategies follow Marzano’s (2009) recommendations for teaching new vocabulary:

1. Provide a description, explanation, or example of the new term.
2. Ask students to restate the description, explanation, or example in their own words.
3. Ask students to construct a picture, pictograph, or symbolic representation of the term.
4. Engage students periodically in activities that help them add to their knowledge of the terms in their vocabulary notebooks.
5. Periodically ask students to discuss the terms with one another.
6. Involve students periodically in games that enable them to play with terms (pp. 83-84)

The Frayer Model

The Frayer Model developed by Frayer, Fredrick, and Klausmeier (1969) and her colleagues at the University of Wisconsin, is a highly adaptable graphic organizer for learning vocabulary. As shown by the cited examples, the Frayer models created by the National Council for Special Education of the Department of Education and Skills of Ireland (Figures 1, 2, 3, and 4) can be used to identify and define not only unfamiliar vocabulary, but also present new concepts in all four of the core disciplines of ELA, history and social sciences, science and mathematics.

Figure 1*Fruyer Model Template*

As the initial template shows (Figure 1), the ELA lesson begins with direct instruction of the new vocabulary word and its definition. Then students are asked to work in pairs or individually to determine examples (synonyms) or non-examples (antonyms) for the completed new word “sonnet” (Figure 2). For history (Figure 3), science and math lessons (Figure 4), it changes only slightly in that the “facts/characteristics” quadrant becomes more important. In the example for math (Figure 4), the Fruyer model is used to actually solve problems like finding the perimeter, and explaining the concept of the new word. Figure 5 shows a generic template for problem solving in either mathematics or the sciences.

Figure 2

Frayer Model Example for Language Arts

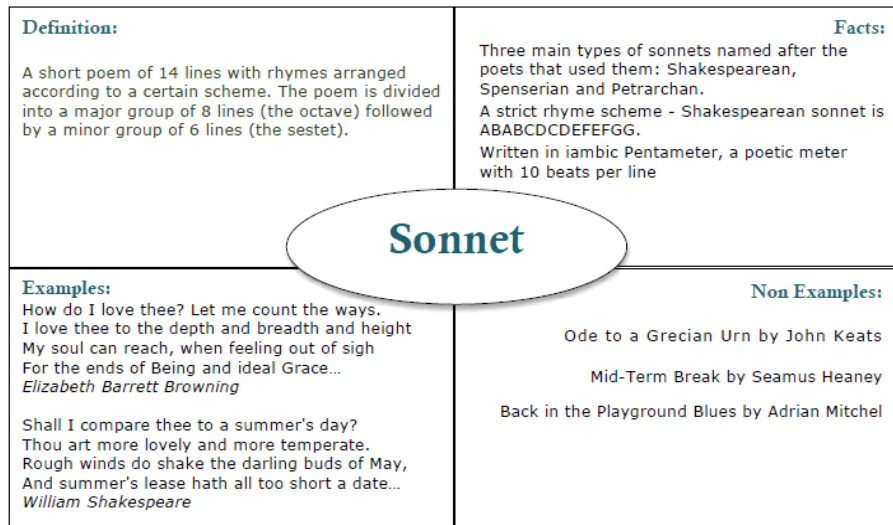


Figure 3

Frayer Model Example for History

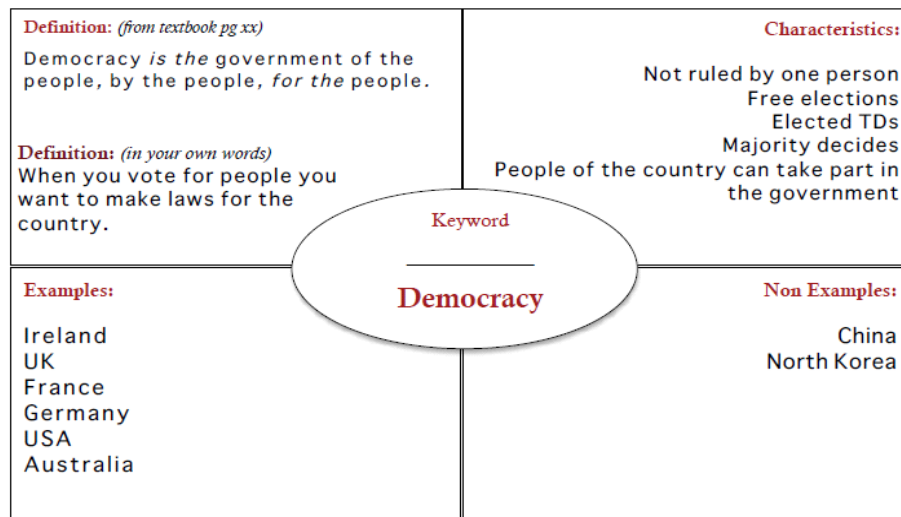
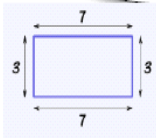




Figure 4

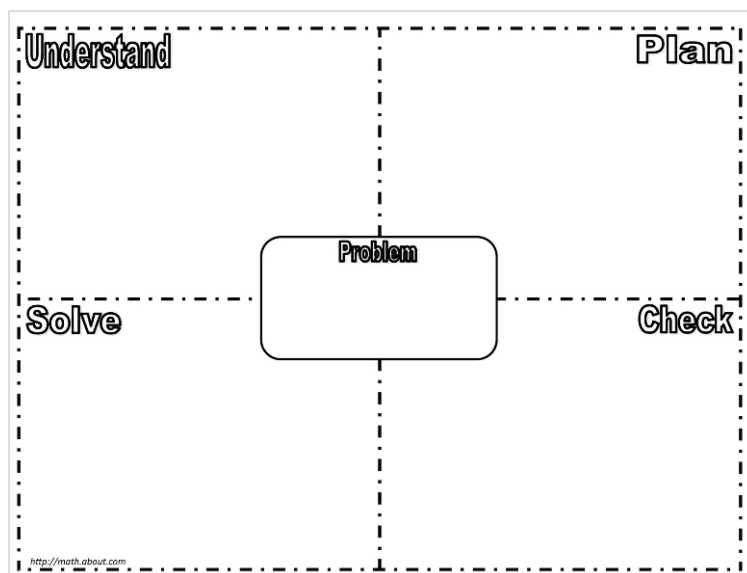
Frayer Model for Mathematics

<p>Definition:</p> <ul style="list-style-type: none"> - The perimeter of a shape is the distance around the edge of the object. - The perimeter of a circle is called the circumference. - Common units: cm, m, km, 	<p>Facts/Characteristics:</p> <p>Add only the numbers on the outside of the shape. All the length outside an object added together</p> <p>square = $4a$ </p> <p>rectangle = $2a + 2b$ </p> <p>triangle = $a + b + c$ </p>
<p>Examples:</p> <p>The perimeter of this rectangle is $3+7+3+7 = 20$ Rectangle perimeter = $2(l+b)$</p>  <p>An example of a perimeter is the line where your wall goes on the border of your garden.</p>	<p>Non Examples:</p> <p>Can't find the perimeter because it's not a closed figure.</p>  <p> $2\text{cm} \times 4\text{cm} = 8\text{cm}^2$. This is area, not perimeter. If it was perimeter you would add all of the side lengths together.</p>

These are just four examples, but there are many other examples and templates available for free from many reputable educational support groups, as any internet search reveals.

Figure 5

Frayer Model for Mathematics



Interactive Word Walls (IWW)

Another vocabulary teaching strategy that is a bit more time consuming to initially learn but is just as easily added to all content areas is the Interactive Word Wall (IWW). IWWs are an adaptation of a vocabulary Word Wall. Rather than being a static reference created by the teacher at the beginning of the school year, IWWs are student generated, strategically target academic vocabulary, and help students connect academic vocabulary to scientific concepts by using real objects (Jackson & Narvaez, 2013). It can be completed in five steps (paras. 4-19):

- Step 1 Planning the Word Wall. Distinguish between familiar words and new vocabulary. Pair selected words with pictures or real objects, if available.
Sketch a concept map based on the best way to represent the organization of the material; hierarchical, cyclical, compare and contrast, flowchart, etc.
- Step 2 Create a student worksheet that mirrors the sketch.
- Step 3 Place the word wall based on wall space so all students have access.
- Step 4 Build the wall in class. Teacher creates the structure based on lesson needs or student collaboration. (Figure 6)
- Step 5 Complete student record sheet and word wall together. This usually takes many days and are finished as the unit nears completion. (Figure 7)

Figure 6

Examples of Completed IWW

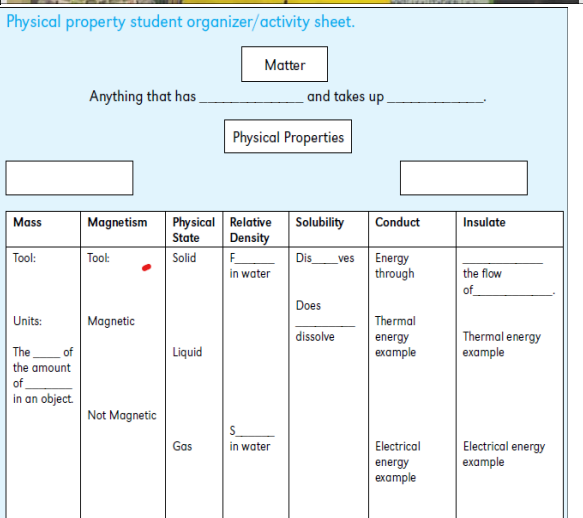
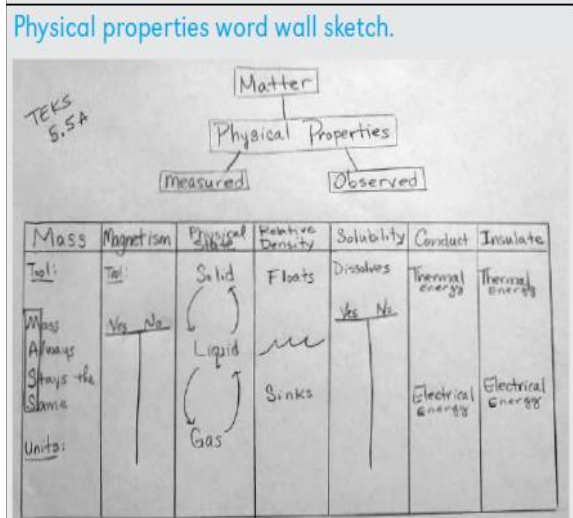


Figure 7

Example of a Completed Physical Property IWW



IWWs are best if left in view for the complete school year. Wall space may be a challenge, but if built on poster board, or trifold science fair boards, they can be moved into the hallway for continual reference once the unit is completed.

Question Answer Relationships (QAR)

Some of the above strategies, though listed separately, are really GOs, as are QARs. A QAR shows how the text information is organized and prompts for inferences. Students determine whether the answer can be found “In the Text” or “In My Head.” If it is “In the Text” it is recorded as either being “Right There,” meaning in one specific place, or by “Think and Search” meaning in the text but from multiple items. This draws on higher order thinking skills (Fenty, McDuffie-Landrum, & Fisher, 2012, p. 34), like the question “What are the character

traits?” If the answer is “In My Head,” the student must choose “Author and You” meaning the student makes an inference by drawing on prior knowledge and what the author has stated in the text; or chooses “On Your Own,” meaning the student makes an inference based on their own prior knowledge (Figure 8). This strategy includes anticipation skills when presented prereading; it includes modeling by the teachers when they show students their own thinking processes as they verbally go through the questions, it includes guided practice as students practice with teacher and peer support, and it includes independent practice when students who have learned the strategy begin to design their own QAR questions (p. 37).

Figure 8

One Example of a Poster Explaining QAR Concepts to Students



K-W-L and KNWS

Know-Want-Learn (K-W-L) also uses a graphic organizer (Figure 9) to provide a structure to activate prior knowledge, establish a purpose for reading and to help summarize what was learned (National Behavior Support Service [NBSS], n.d.; Armstrong et al., 2018; Lupo, Tortorelli, Invernizzi, Ryoo, & Strong, 2019; Ogle, 1986). This prereading activity begins by exploring what students (K) know about a subject, what they (W) want to know, and what they need to (L) learn about a text.

Figure 9

An Example of a K-W-L Used for Solving a Problem in Math or Science

K-W-L strategy sheet		
1. K—What we know	W—What we want to find out	L—What we learned and still need to learn
2. Categories of information we expect to use		
A.		E.
B.		F.
C.		G.
D.		

Figure 10*Pythagorean Theorem K-W-L Example*

K-W-L in Maths											
K				Pythagorean Theorem				L			
<ul style="list-style-type: none"> - It is about triangles. - It 's called Pythagorean Theorem 				<ul style="list-style-type: none"> - Can we apply it to any triangle? - What are you supposed to do? - How do you use it to solve what you are trying to solve? - Why is it important? - What does this theorem say? - When was it created? - What 's a hypotenuse? - How do you use it in real life? 				<ul style="list-style-type: none"> - No we can only apply it to the right triangles. - You need it to find a hypotenuse or to find the length of a missing side on a triangle. - You replace variables with numbers and then find the third side. - It is important because it is a way to find side C - $a^2+b^2=c^2$ 			

Based on a current research study by Lupo et al. (2019) consisting of 293 ninth-grade students in 17 English classes taught by four teachers, all students benefited when taught using K-W-L. Since being designed in 1986, there has been “a lack of empirical research examining the efficacy of K-W-L with adolescents” (Lupo et al., 2019, p. 461) even though K-W-L has been mentioned frequently in educational literature. This current study shows that when compared to the Listen-Read-Discuss (LRD; 2019) method, all students, regardless of text difficulty or prior reading ability, benefited from activating knowledge using the K-W-L approach, even though on average, K-W-L lessons were 8 minutes shorter than LRD. This is very hopeful, especially since K-W-L is easily adaptable to mathematics courses (Figure 10).

Related to K-W-L is the KNWS strategy which is also useful for mathematics (Figure 11). Similar to K-W-L, students list what they (K) know, what information is (N) not relevant to

the problem, what the problem (W) wants them to find, and what (S) strategy can be used to solve the problem (Barton, Heidema, & Jordan, 2002). I found no studies of KNWS at the secondary level, but in a recent study of elementary students in Thailand, it was found that students could better distinguish what a problem asks and what information it provides using KNWS (Phonapichat & Wongwanich, 2014).

Figure 11

K-N-W-S Example of a Template for Use on a Mathematics Word Problem

Examples of Visual Representations: **K-N-W-S Worksheet.**

K What facts do I KNOW from the information in the problem?	N Which information do I NOT need?	W WHAT does the problem ask me to find?	S What STRATEGY/ operation/tools will I use to solve the problem?

Functional Language Analysis (FLA)

There have been, of course, other strategies proposed, like Functional Language Analysis (FLA). FLA draws on the language of talking about language, or meta language, which includes analyzing the language of the text to identify word types, such as participants (nouns), process types (verbs), circumstances (adverbs or prepositional phrases) and textual meaning (organization) (Fang & Schleppegrell, 2010, p. 592). Either these strategies, like FLA, are difficult to implement, or have been rolled into more formal projects. Some of these programs

are free, and some are only available commercially. This paper focuses on those projects and programs where the curriculum is free, because that aligns with the purpose of this research review.

Review of Literacy Project Research Concept Orientated Reading Instruction (CORI).

CORI is a collaborative project started between the University of Maryland and Frederick County Public Schools to more fully integrate reading instruction in the upper elementary school science curriculum (Guthrie & Klauda, 2014). CORI is primarily orientated to concepts in the program. While the curriculum itself is free, it generally takes a year of planning and purchasing of trade books to make it work. This is in addition to a 10-day workshop requirement, with monthly full days of professional development, thereafter. There is measurable improvement of reading comprehension over traditional instruction, when CORI was taught, according to recent research (Guthrie & Klauda, 2014). While CORI shows promise, it is currently not available outside of Maryland. Also, the time and costs of this program seem prohibitive for many smaller school districts.

Reading Evidence and Argumentation in Disciplinary Instruction (READI). Reading for Understanding Across Grades 6 through 12: Evidence-Based Argumentation for Disciplinary Learning known as Project READI is a multi-institution, multi-discipline project to design interventions for adolescent learners that focuses on the content areas of literary analysis, history, and the sciences (Goldman et al., 2016). Modules created for use by teachers do not concentrate on teaching standards, but rather on instructional design and evidence finding. “Attempting to turn the core constructs and learning objectives into enactable instructional interventions through iterative design-based research deepened the unpacking process for all members of the design

teams “(Goldman et al., 2016, p. 57). What the design teams created, which is available free from the Project READI website are Evidence-based Argument Instructional Modules.

Professional development required is not sage advice from professionals, but rather collaborative learning by teachers using Professional Learning Communities (PLC), where a specific group of teachers come together to review how to implement the modules and review the assessment data. Instruction is then adjusted to support struggling learners, based on this assessment data.

As explained by Goldman et al. (2016), READI takes approximately 3 years to fully implement. In the first year of collaborations (Strand 1) teachers build on their understanding of argumentation and evidence, while reviewing different representations in texts like graphs and charts, etc. Year 2 (Strand 2) begins implementation while teachers continue to design, reflect upon and revise lesson plans. This implementation continues over the next 2 years with teachers becoming active contributors to the Strand 2 design team. This process is time intensive, “repositioning the teacher’s role is a gradual process. It took several iterations of implementation and reflection before the teachers’ adaptations reflected the deep structure of the approach” (Goldman et al., 2019, p. 1160). While the implementation process is lengthy, the opportunities for collaboration, feedback and reflection proved the most crucial to the improvement of the lessons (Goldman et al., 2019). An added advantage over some commercial programs is that because the teachers create the final lessons themselves, there is no worry about teacher fidelity to the program, with adaptations to individual classrooms being the norm. “Curriculum designers assume teachers implement curriculum as written, yet research shows that all teachers adapt curricula” (Troyer, 2019, p. 352).

Several research studies have shown the positive effect READI has on student

comprehension in the sciences. In one of the most recent studies completed by Goldman et al. (2019) the improvements were significant. The study was completed in the fall of 2014 through the first 2 months of Spring semester 2015. It involved 981 students from 35 schools with 48 secondary biology teachers. Students were recruited from two classes of each teacher for a total of 96 classrooms. The classrooms were divided equally between the control group and intervention group. The results were very encouraging for student comprehension in that, “the effect sizes suggest that the intervention students were about 1.5 years ahead of the control students after participating in the intervention” (Goldman et al., 2019, p. 1201).

The ability to use current texts, the lack of costs for project instruction modules, the support for teacher collaboration through the creation of the PLCs, and the comprehension improvements backed by multiple quantitative research studies, recommend READI for implementation in secondary science classrooms. However, the long implementation time required leaving current students lacking support, along with the additional district costs required in time and salary for teacher collaborations would be a challenge to smaller school districts. But long-term benefits highly recommend this project for consideration.

Fast Reading (FT)

One project that needs to be included in this review is from England and results of recent research give it high potential, especially for poorer readers, even though there is virtually no lead time for implementation and no additional costs required. It is called Fast Reading (FT). In this study, conducted by Westbrook, Sutherland, Oakhill, and Sullivan (2019), in spring 2015 with 20 teachers and 365 students in Year 8 (12–13 years) from 10 schools in the South of England, 20 classes read two whole challenging novels consecutively over 12 weeks as part of

their formal English class. Ten teachers, one from each school, were given an additional 1.5 days of training. “Strategies including reading the text aloud in class at a fast pace, inference-making, guided group reading and the use of graphic organisers (sic)” (p. 3). For this small cost, little additional training, and short implementation time, the results were surprising, especially for the poorer readers. “(P)oorer readers in both groups (students whose reading age was 12 months or more behind their chronological age) made an average of 16 months progress in the standardised (sic) tests compared to the average readers in both groups who progressed at the average of 9 months” (p. 3). Westbrook et al. reported this as “statistically significant” (p. 5).

The faster reading pace allowed students to see the whole picture of the story more quickly, and this study creates doubt for the idea that slower readers need texts that are less demanding (leveled readers) to comprehend. By reading aloud, grouping students in social groups for collaboration, remediating “sticking points” immediately so all understood the concept of the text, reading became enjoyable for not only the students, but the teachers. Teachers’ ideas of student abilities were also challenged. “With ability setting too often conflated with socio-economic background and hence social class in England, a faster read forced teachers in our study to reconstruct their expectations for whole groups of students” (Westbrook et al., 2019, p. 8).

Although not adaptable for use with denser texts or those with abstract symbols and visual organizers like graphs, this strategy shows promise and appears well suited for ELA classrooms, or any narrative texts used as supplements for the other disciplines. Additionally, its low cost and low professional development time make implementation suitable even for smaller or less affluent districts.

Professional Development

All the above-named projects and literacy strategies need some amount of time for background learning and planning before implementation. This time commitment, if more than 1 or 2 hours, usually must come from administration in the form professional development (PD). While no research studies comparing the effectiveness of specific administrative practices at the secondary level could be found, there are studies and surveys that confirm the effectiveness of PD paired with administrative support in the success of implementing literacy strategies. In an extensive search of articles from the 1990s by Fletcher (2014) for her qualitative review of research literature concerning the “effectiveness” of literacy practices, one of the major themes found was that, “when teachers are supported by effective whole-school sustained professional development, which comprises of research-based evidence of effective practices, that sound practices to support literacy learning” can be implemented” (p. 297) with the most significant being the continued support of PD by the principal.

One of the most effective forms of PD, as shown by the READI research above, are Professional Learning Communities (PLCs). Fletcher (2014) also confirmed this in her study as one of the common features of effective literacy practices. “Monitoring students’ progress and then using this data in collaboration to plan further teaching” (p. 306), is the exact description of the purpose of a PLC.

Teachers working in collaboration can also help to reduce the variations in teacher knowledge and effectiveness. In the International Literacy Association (ILA) Report for 2020, 67% of teachers and 79% of literacy consultants believe that this variability in knowledge effectiveness is one of the barriers to equity in literacy for all students. As not all schools,

especially small and less affluent districts can afford to follow Ness's (2007) recommendation to use literacy coaches and curriculum specialists, support for PLCs seems more cost effective at least as an initial plan of support for teachers and especially for smaller districts and schools.

Chapter 3: Findings, Conclusions, and Recommendations

Chapter 1 provides the background information on the history and theories of literacy in the secondary content areas and Chapter 2 presents a review of the specific strategies along with a review of the research literature. In Chapter 2, the findings, conclusions and recommendations of this research are discussed, especially as it applies to smaller and less affluent school districts.

Findings

My research question looked at teacher implementation and administrative support as possible limiting factors for why literacy instruction practices were not more incorporated into secondary level content area teaching.

Based on a review of the research as it relates to teacher implementation, it was found that content-area teachers may not incorporate literacy and comprehension strategies: first, because they perceive reading as a generic skill instead of a set of abilities students should develop in their courses (Wineburg 2001, as cited by Roman et al., 2016); second, because they lack the time to learn and implement these strategies (Armstrong et al., 2018); and third, because there is a lack of support for teacher fidelity to a strategy to ensure its successful implementation and therefore see the need for its continued use (Troyer, 2019).

The review of the literature shows that not all strategies are effective in all content areas because of the nature and language of a discipline (Spires et al., 2018). Each content area has its own needs for fluency, academic vocabulary and comprehension (Fang & Schleppergrell, 2010) and specialized ways of using language (Armstrong et al, 2018; Draper, 2010 as cited by Adams & Pegg, 2012; Goldman, 2012). While research has been conducted on the effectiveness of different strategies, the studies have been based in one subject or content area with no cross

disciplinary research provided (Spires et al., 2018). Also, the definition of “effectiveness” is elusive when it comes to student success in reading (Fletcher, 2014). Therefore, while finding research that supports the effectiveness of one strategy for all content areas does not exist, there are some strategies that research shows are very adaptable to different content needs, with graphic organizers being the most adaptable, easily available and quickly implemented (Roman et al., 2016).

The research review regarding administrative support shows that time is the biggest factor because it affects budgets through additional costs of materials and personnel, even though administrative support is the most significant factor to implementation success (Fletcher, 2014). Additional support for teachers usually comes in the form of professional development which may involve additional personnel or current teacher time to present the PD, and additional time for teachers to learn and practice a strategy before implementation (Armstrong et al., 2018). For a district-wide literacy program, the costs are again in new materials, and personnel time to plan the implementation, which sometimes can take a year or longer, like the READI project (Goldman et al., 2016).

Conclusions

My cousin Steve is a teacher in a small parochial school in a small rural town. By chance, I happened to discuss the topic of this paper with him when I first began doing research, and I offered my assistance in his class as a volunteer. Since my background had been teaching college level adults in developmental reading, I was looking for an opportunity in the K-12 levels to broaden my background knowledge and experience for when I began writing this paper. My

offer to volunteer was met with enthusiasm as Steve was looking for additional support, especially for his students most needing individualized attention.

Steve is an awesome teacher. His ninth-grade class was reading “The Odyssey” while I was there, and it was so much fun watching his class sit around the table reading aloud, with Steve sometimes acting out a concept for further clarification. Because of his enthusiasm, the students were always eager to begin the lesson.

Steve is the only teacher of English for grades 7 through 12. Even though his classes are small, five to 13 students, each class is one grade so he must complete six separate preparations per day. Within each class the students are at multiple reading levels, including those whose first language is not English. “In the classroom I have students with so many reading levels that sometimes you hit the middle and miss the top level and the bottom level. Kind of that balancing act” (S. Ness, personal communication, April 23, 2020).

Steve understands the need to teach literacy strategies to enhance comprehension but states his biggest obstacle to be time. “The biggest drawback is the time factor. There are only about 45 minutes per day for each class and we just run out of time” (S. Ness, personal communication, April 23, 2020). As he explained, it can be daunting just to find the time to make certain everyone is learning. “You might get something started and then have to change it up because the students aren’t getting it. And sometimes I’ve had to go back and reteach the whole thing (S. Ness, personal communication, April 23, 2020).” But sometimes there is not the time to reteach. “Like annotation. Most students got it, but a couple completely missed it. I wanted to go back and do more with it, but we lost the time” because the end of the semester was fast approaching (S. Ness, personal communication, April 23, 2020).

Just like Steve, time is the main issue for most teachers, whether it is the time to learn a strategy, the time to plan its implementation, or just the time to use it in the classroom. That is why having one or two literacy strategies that can be easily understood and adapted to the material, as well as being implemented quickly is the kind of tool teachers need to be able to include literacy teaching in their content areas, at least as a starting point. This is especially true for those small districts that may not have the monetary means available to pay for the additional materials or personnel needed to implement a project or commercial product.

Recommendations

When choosing a literacy strategy or project to implement, deciders must take into consideration the overall additional cost in materials and salary, the lead times required for implementation, plus the amount of administrative support needed to make each strategy or project successful.

Based on the research reviewed, and keeping in mind the time constraints, costs and administrative support needed, my recommendation is that secondary level teachers consider incorporating a graphic organizer as an initial addition to support comprehension and vocabulary learning. These GOs, especially the Frayer model, are easily understood and very adaptable. In addition, there are additional free examples and lesson plans available from numerous reliable education websites. In smaller districts, if a literacy specialist or consultant is unavailable, even a short collaboration with an elementary teacher could be all the support needed for an effective implementation.

The research shows that READI is the best evidence-based project and should be considered as a district wide approach. This is a long-term commitment that may have additional

costs, but the research proves it is highly effective in increasing comprehension, especially in the sciences.

Lack of teacher fidelity to a strategy or project can mean it is used incorrectly and learning goals may not be reached. “Presenting strategies as simple tools, without discussion and the recognition of teacher adaptation, means they may not be used in ways that enhance student understanding” (Adams & Pegg, 2012, p. 159). This means that for best results, some form of PD is necessary to support teachers, no matter which strategy is chosen.

The takeaway for administrations to consider is the idea of creating Professional Learning Communities (PLCs). The collaboration between teachers with feedback and review of assessments to improve teaching are the main benefit of PLC support. Research has also shown that PLCs have a noticeable positive impact on learning and the improved reading levels of students. All school districts, even small private or parochial schools should consider implementing PLCs at all grade levels as an integral part of teacher professional development.

Literacy instruction can be incorporated into any secondary discipline, but it is best done along with support to help the teacher learn the goals and theories behind the strategies to ensure fidelity and success. It can be jump-started in an individual classroom but is best done across a district with buy-in from teachers and support from administration. No matter which strategy is chosen, implementing PLCs will increase the chance of a successful implementation and encourage the continued use of these strategies because of the additional support for teachers from their colleagues.

Summary

The classroom experience with my cousin Steve made me adjust the focus of this research. As a recently retired teacher looking for a way to use my skills to give back to my community, I had started looking for strategies I might suggest if allowed to volunteer in my local school district. But my local district is not small and has a budget that allows for a literacy para-professional on staff. This made me wonder if I could even be a useful volunteer there. Based on volunteering in Steve's classes, I instead considered how my knowledge might be put to use by volunteering in other small, private, or sometimes very rural school districts that may only have volunteers available when needing additional assistance.

This gave me concrete questions to use to look for concrete answers. I looked for what was available for little or no cost that secondary teachers could use to increase reading comprehension in their disciplines. Suitable reading strategies had to be easily understandable, able to be quickly implemented and adaptable to meet the needs of a small school or district. That is what I have presented here; a starting point for any teacher looking to add literacy instruction to their content area.

All secondary level teachers want to help their students with comprehension. It is just that many of them do not have the literacy background knowledge or the time and administrative support needed to accomplish this goal. Finding one beginning strategy that could work for most content areas was the goal of this research review. Having one beginning strategy gives teachers a starting point. Teachers know that helping students do better in school eventually helps a student fulfill their dreams. And all a dream needs to begin is a starting point.

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