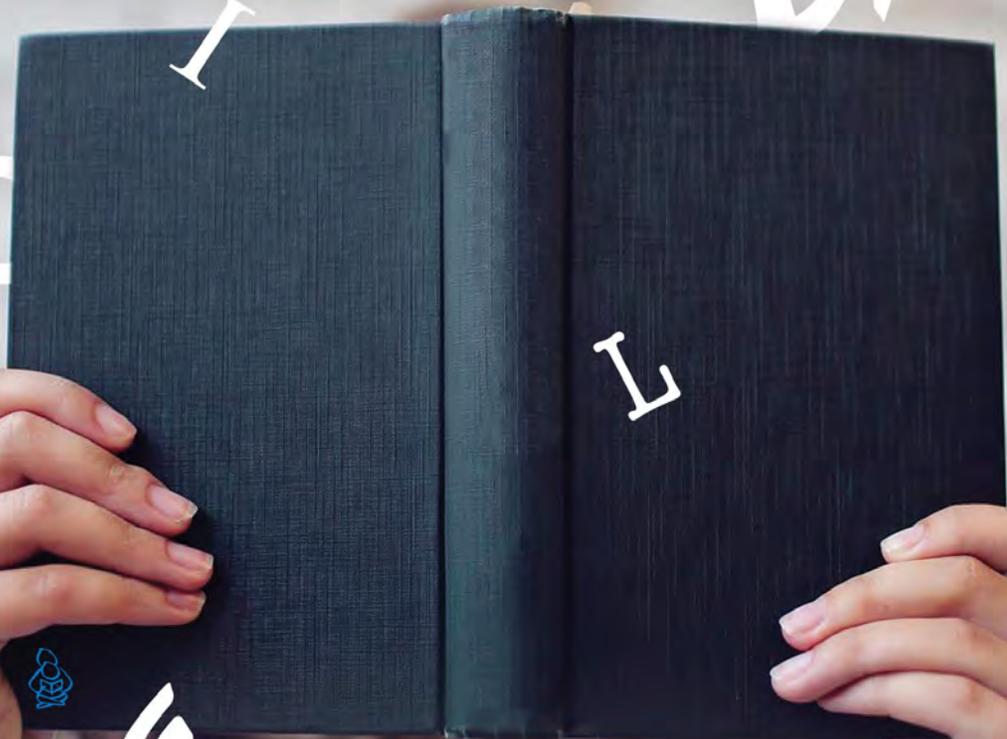


OPENING

the world for literacy



KENTUCKY READING JOURNAL
FALL 2017 EDITION

KRA is a nonprofit affiliate of the International Reading Association, a professional organization aimed at promoting reading for all. KRA is one of the largest state professional organizations. Members of the KRA represent a dedicated body of educators interested in moving reading/literacy forward in the Commonwealth.

Becoming a member of KRA affords educators with opportunities to network and learn about the most current research and instructional practices in reading/literacy. KRA has local councils in all areas of the state. Participating in local council activity is one way to tap into the multiple advantages of being a KRA member.



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2017–2018

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KRA Newsletter

Literacy Leaders, the KRA newsletter is now “green” and *available online in PDF format from the KRA website: <http://kyreading.org>*. Members are encouraged to submit their news and information for the newsletter to Roxanne Spencer at roxanne.spencer@wku.edu.

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A Word from Your Editors

The Fall 2017 issue of the *Kentucky Reading Journal* is titled **Opening the World for Literacy**. The articles in the journal highlight different ways of thinking about literacy, both traditional and non-traditional. The overall journal is organized into three main sections: *Feature Articles*, *Teaching Tips*, and *Professional Book Reviews*. The feature articles are longer works, which synthesize research, present new research, or take a theoretical look at issues that provides valuable knowledge and practical applications for literacy teachers. The *Teaching Tips* are shorter pieces which share information about specific practices and implementation ideas. The *Professional Book Reviews* are reviews of current professional literature to help teachers decide which resources will meet their needs. Regardless of the type of submission, each article focuses on expanding the views of literacy to open literacy to students, at all levels of education.

For example, Dr. Sherry Stultz's article, entitled "**Multi-sensory Strategy Instruction for Vocabulary Acquisition and Maintenance**," explores an instructional intervention designed to improve vocabulary knowledge. The quantitative study examined the interventions' impact on students with and without disabilities. This study will help teachers develop instructional techniques and at-home support that encourage the acquisition and maintenance of vocabulary knowledge by enhancing their instruction with visual and auditory supports.

In "**Mathematical Literacy in the Elementary Classroom**," author Dr. Richard Kilburn problematize the phrase "mathematical literacy" through a theoretical discussion of the intersection of the two content areas. He challenges us to think critically about the terms we use and how we use children's literature in mathematics instruction. Dr. Kilburn also offers some considerations for how educators might engage in a classroom dialogue about literacy in mathematics.

Teaching Tips are next, Ms. Donya Baker reminds us that while teaching writing is challenging, the Writing Workshop method shifts much of the responsibility to the students. She synthesizes the research about the instructional method and the value of each component of the method.

This journal concludes with a **Professional Book Review** by Lisa King, literacy consultant from the Central Kentucky Educational Cooperative. Mrs. King reviews the professional resource, *The Writing Strategies Book*. Check it out for input on the strengths of this resource for classroom instruction.

Finally, take note of the Call for Manuscripts at the conclusion of the journal. Feel free to submit manuscripts as feature articles or teaching tips to the journal. We are also accepting book reviews for current professional books. I hope you particularly

will consider the “Kids’ Korner” portion as an opportunity for your students (or children!) to share illustrations, stories, narratives, poems, informational writing, etc., with our literacy community. Please be aware, too, that you are invited to submit to the KRJ newsletter. See the journal’s contents page to find more information about how to do just that.

The contributors to this *Kentucky Reading Journal* have demonstrated an eclectic range of topics for consideration. We hope that you learn a little something by reading the articles herein and that you are motivated to implement a new idea, consider a new approach or program, or question the way you have traditionally taught something, or even read a new professional book.

Enjoy!

Stacey Korson, Ph.D. and Tammie Sherry, Ed.D.
Co-Editors

Multi-sensory Strategy Instruction for Vocabulary Acquisition and Maintenance

**Sherry L. Stultz, Ed.D.
Morehead State University**

Educators employ a variety of teaching techniques to assist their students with learning and retaining new material. Some of those techniques are successful and others are not. The goal of a classroom teacher should be finding and using the most efficacious teaching methods while rejecting those that do not work (Cook & Cook, 2011; Kavale & Mostert, 2003).

Fisher and Frey (2014) reported that vocabulary acquisition and retention can be a significant predictor of reading comprehension as well as academic performance. If a student understands a greater number of words and can apply them in various settings, then he or she will be able to read and understand material on a greater variety of topics (Cervetti, Tilson, Castek, Bravo, & Trainin, 2012). However, many students struggle with vocabulary acquisition (Dalton & Grisham, 2011). Therefore, it is important for classroom teachers to find and use teaching techniques that are appropriate and effective for improving student vocabulary acquisition.

In addition, current educational laws address the use of effective teaching techniques in the classroom. For example, the No Child Left Behind Act of 2001 requires schools to identify and employ the most effective teaching methods (Browder & Cooper-Duffy, 2003; Fusarelli, 2004). Also, one-eighth of the Common Core State Standards for English/Language Arts focus specifically on vocabulary acquisition and development (Fisher & Frey, 2014). Finding effective teaching practices is not only the hallmark of an effective teacher, but they are also required by educational policy makers.

A final consideration when choosing a teaching technique is the classroom composition. Students with disabilities are increasingly being educated with their non-disabled peers in inclusive classrooms (Kavale & Forness, 2000; Palloway, Miller, & Smith, 2012). This will sometimes require adjustments to the methods employed by those teachers in the regular education environment so that the needs of all students are being met.

The intervention that will be discussed here was developed for use in an inclusive English/Language Arts middle school classroom located in Central Appalachia. The intervention used multi-sensory (i.e., visual and auditory) instruction to assist with vocabulary development and retention. The author's intent in publishing this information was to assist classroom teachers and to inform educational researchers. This is a promising practice for a universally-designed classroom where all students can show improvement in vocabulary acquisition.

Importance and Effectiveness of Visual Learning

According to Collins, Goforth, and Ambrose (2016), students in rural settings "are at risk for vocabulary underdevelopment and often have less access to educational resources" (p. 20). Vocabulary development and reading comprehension have been found to be positively correlated

(Biemiller & Boote, 2006; Nitzkin, Katzir, & Shulkind, 2014). Therefore, helping students develop their vocabulary can assist them with literacy and academic performance.

Several studies in the current body of research have examined ways to develop and retain vocabulary. One of the recommended methods has been to combine audio and visual techniques into a single intervention. For example, Penrose, Rasberry, and Meyers (2008) asserted that learning including audio and visual components is statistically more effective than audio-only and visual-only methods. To support their assertion, those authors provided results of a study of communication in audio-only, visual-only, and audio-visual mixed modes of training. The researchers found that the three-day recall rate of information for the three methods was 10% for audio-only, 35% for visual-only, and 65% for the audio-visual combination (Penrose et al., 2008). These findings were interesting, but they were not directed specifically to K-12 students.

Massaro (2015) added that visual learning, such as that found in picture books designed for younger children, was more likely to introduce new words to the learner than in spoken language. This emphasized the potential importance of adding a visual component to teaching vocabulary to students. However, the study did not examine the effectiveness of visual techniques for students beyond the preschool or early-elementary level.

Other researchers have studied the use of these types of learning for students in classroom settings and found them to be very effective. Much of the current body of research has addressed students learning a second language (Ajayl, 2008; Akbulut, 2007; Dubois & Vial, 2005). However, the research in this area has not been limited to foreign language instruction. For example, Cope and Kalantzis (2000) found that the combination of text, audio, and video presentations maximized student learning of social factors. In addition, Moreno and Valdez (2005) determined that using multimedia instruction increased student learning of complex scientific processes. Finally, Jones (2009) and Mary (2008) examined the efficacy of multi-method instruction for vocabulary development among students in the middle grades and found it to be quite effective. These studies provide support on which this current study was designed and conducted.

This study used a multi-sensory teaching strategy to help middle school students in an inclusive classroom learn vocabulary words. It was designed to augment the current research in the field to include students in an inclusive classroom setting. In addition, this study addressed a need that the author had noted during her 17 years as a classroom teacher: students with and without disabilities in the inclusive environment were struggling with vocabulary acquisition.

Methodology and Results

The setting, methods, and results of the intervention will be presented here. The results for all students as well as the results for students with disabilities will be presented. In addition, a discussion of practical applications for classroom teachers will be provided. Finally, recommendations for future research studies regarding the efficacy of this teaching technique will be discussed.

Setting

The setting for this study was an inclusive seventh grade, English/Language Arts classroom at a public middle school located in a rural town in Central Appalachia. Total school enrollment was approximately 250 students in grades 6 through 8. A total of 26 students (n=26) were in the classroom where the intervention was implemented. Eighteen of the students were males, and eight were females. The students' ages ranged from 12 to 14 years. Finally, the classroom was inclusive (i.e., both regular education and special education students in the same classroom). Eight of the students in the group, six male and two female, were receiving special education services. The remaining students did not have a disability diagnosis.

Methods

Ten vocabulary words were introduced at the beginning of each week in a literature-based unit. Participants were individually given a pre-test to determine their knowledge of the ten vocabulary words at the beginning of each week. They were then presented with PowerPoint slides where pictures were paired with the vocabulary words. In addition, the definition and part of speech were listed on another slide along with a sentence using the word as it would appear in the literature-based unit. The researcher read the word, definition, part of speech and sentence while the students viewed and discussed the pictures. After modeling, the teacher engaged the students in guided practice where the power point slides only had the picture and the students were required to say the correct word, the correct definition, and use the word in a sentence when given a prompt. Students responded individually. However, they were permitted to collaborate with their classmates when answering.

This intervention of direct instruction, guided practice, and group discussion lasted for approximately five to ten minutes each day. The research was conducted for thirty consecutive school days (i.e., six weeks). Students were tested individually using paper-pencil quizzes at the end of each week. Finally, a comprehensive paper-pencil quiz was administered six weeks after the final week of the intervention to individually assess each student's retention of the information.

The pictures used to create the PowerPoint slides were located through Google searches by either typing the vocabulary word plus "picture" or something to illustrate the word's meaning plus the "picture." This method of picture selection was chosen over using commercially-available sources with photos because it was easy to assemble and it was free of cost. In addition, the definition and part of speech were taken from the Meriam-Webster dictionary. Finally, the sentence was taken from the literature-based unit of study.

Results

The results of each of the pre-tests and post-tests for each of the six-week periods for all students are shown in Table 1.

Table 1: Results for All Students

Week	Average Pre-Test Score	Average Post-Test Score	<i>t</i> Value	<i>Degrees of Freedom</i>	<i>p</i> Value
1	5.96	8.50	7.4013	25	<.001
2	6.00	8.69	8.3523	25	<.001
3	5.81	9.08	9.4914	25	<.001
4	5.54	8.92	10.4525	25	<.001
5	5.96	8.65	7.5099	25	<.001
6	6.08	9.15	11.1111	25	<.001

The mean accuracy rate for the weekly tests for all students for all six weeks was 88.33%. In addition, the results were statistically significant for each of the six-week periods at the $\alpha = .05$ level. Students demonstrated a higher rate of recall on each of the weekly assessments. Finally, the mean accuracy rate for the cumulative tests, given six weeks after the end of the final week of the intervention, was 77.31%. This indicated that the students could recall over three-fourths of a selected group of 10 words from the 60 words taught during the study six weeks after the intervention had ended. When compared to the mean accuracy of the pre-test scores for the six weeks of the study of 58.91%, this demonstrated that the students retained nearly 20% more of the words taught during the intervention than they possessed before it was employed. The author attributed this improvement to the intervention.

In addition, information regarding the performance of the students receiving special education services is shown in Table 2.

Table 2: Results for Special Education Students

Week	Average Pre-Test Score	Average Post-Test Score	<i>t</i> Value	<i>Degrees of Freedom</i>	<i>p</i> Value
1	3.50	7.12	6.4162	7	<.001
2	3.38	7.25	6.6746	7	<.001
3	3.38	8.12	7.6659	7	<.001
4	3.75	8.25	8.4187	7	<.001
5	3.50	7.50	7.4833	7	<.001
6	3.75	8.12	23.9096	7	<.001

The mean accuracy rate for the weekly tests for students with disabilities for all six weeks was 77.27%. In addition, the results were statistically significant for each of the six-week periods at the $\alpha = .05$ level. Students demonstrated a higher rate of recall on each of the weekly assessments. Finally, the mean accuracy rate for the cumulative tests, given six weeks after the end of the final week of the intervention, was 65.00%. This indicated that the students with disabilities could recall nearly two-thirds of a selected group of 10 words from the 60 words taught during the study six weeks after the intervention had ended. When compared to the mean accuracy of the pre-test scores of those students for the six weeks of the study of 35.42%, this demonstrated that the students retained nearly 30% more of the words taught during the intervention than they possessed before it was employed.

The improvement in scores and retention rates for students with disabilities were much higher than for those of the whole group. This indicated that students with disabilities might benefit even more from the intervention than their non-disabled peers. The small number of participants with disabilities in this study (i.e., eight) would require further testing before drawing this conclusion. However, it is clear to the researcher that the students with disabilities who participated in this study benefitted from the intervention.

To add to these quantitative results, the students were asked for feedback on the new intervention. The students reported that they enjoyed having the pictures to accompany the definitions of the words as well as the use of technology in the classroom. One of the benefits cited by the students was that the pictures helped to reinforce their understanding of the definitions, especially when the word was not a word that they had heard before.

Another benefit noted during the exercises was that the pictures allowed for additional vocabulary development. Since the pictures used might also have synonymous meaning, the author could discuss synonyms for the vocabulary words in addition to their definitions. For example, the picture that accompanied the vocabulary word “queasy” showed a woman who

appeared ill. Some of the students stated that the woman appeared “sick” when the slide was reviewed in class. This allowed the researcher the opportunity to discuss how those words were similar. This was not the original design of the exercise, but it was an additional benefit that manifested itself in a teachable moment.

Discussion

The intervention described here can be used in classroom instruction or as part of a class website to provide remediation or review at home. The applications may also go beyond those mentioned here. They would be bound only by the limits of technology and time of the classroom teacher.

This intervention did not have control and experimental groups. Instead, all students were included in the study group. The use of a single-group design with a pre-test and post-test is an acceptable form of academic research when the group is already formed (e.g., students in an existing classroom) and when creating two different groups and administering two different interventions was not practical (Creswell, 2008; Johnson, 2014). That is why the single-group research design was selected.

Recommendations

The results of this study have implications for those teaching students in English/Language Arts classrooms as well as educational researchers examining the efficacy of this type of teaching method for teaching vocabulary words to students. Some of the implications for classroom teachers and recommendations for researchers will be provided in this section. Clearly, the specific environment in which the teacher and researcher work will affect the implementation of these items.

Recommendations for Teachers

For classroom teachers, the overall findings of the current research study support the use of this method of instruction in the English/Language Arts classroom. Students with and without disabilities experienced success using the method. In fact, students with disabilities demonstrated a larger rate of learning than their peers without a disability diagnosis. Students in rural academic settings are often at a disadvantage regarding vocabulary development and awareness (Collins et al., 2016). Therefore, the use of the teaching methods discussed in this study show promise for helping those students to improve their academic performance and chances for success.

Recommendations for Researchers

The author recommends that this study be used to reinforce existing research on the effectiveness of this vocabulary teaching method. Future research would be informative and would add to the current body of research. The author makes the following recommendations for future research on the efficacy of methods to improve the acquisition of vocabulary skills in a universally-designed classroom:

1. Adding a control group that uses audio-only (i.e., no pictures) instruction. This could assist in determining the comparative effectiveness of this method of instruction.

2. Developing studies to examine any differences in learning and retention related to different student characteristics such as gender, age, disability, and so on. The small sample size ($n=26$) of this study did not lend itself to this type of analysis/generalization. However, conducting a similar study with a larger number of participants might help to determine if those other factors had an interaction with the teaching methods described here.
3. Conducting another study with the same design in a different geographical area. The students in the current research study were all from a rural setting in Central Appalachia. It is possible that students in urban school districts, either inside or outside of Appalachia, might yield different results.

Summary

Educators employ a variety of teaching techniques to assist their students with learning and retaining new material. Some of those techniques are successful and others are not. The intervention described in this paper was designed specifically for an inclusive seventh-grade, English/Language Arts class at a rural middle school located in Central Appalachia. The use of multi-sensory instruction to teach the vocabulary words yielded positive results that were statistically significant at the $\alpha = .05$ level for all students. Additional statistical analysis demonstrated that students with disabilities showed a greater benefit from the intervention than the mixed group. These findings support the use of this type of instruction for teaching vocabulary words at this and other grade levels. In addition, recommendations for future research are provided here. Future research would provide greater clarification regarding the efficacy of this teaching method.

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Mathematical Literacy in the Elementary Classroom

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Abstract

There exists much confusion in mathematics instruction surrounding the integration of mathematics and literacy. The primary reasons behind this are the lack of clearly defined terms and the adherence traditional instructional methods in mathematics. When we begin to understand that mathematics is a language, we realize we can teach it using a balanced literacy approach. However, the lack of quality texts that combine literary elements with authentic mathematical experiences for the reader hinders educators' ability to employ this teaching style. Three recommendations are made to address this shortcoming: greater communication, teacher produced texts, and student produced texts.

Mathematical Literacy in the Elementary Classroom

I am frequently bombarded with questions from teachers who seek to clarify the meanings of words surrounding mathematics instruction: How does one integrate mathematics and literacy? Does this just mean word problems? Is this the same as mathematical literacy? What role does mathematical fiction have in the instruction of these concepts? Where does the notion of numeracy fit?

In this article, I hope to provide clarification to the current state of pedagogy by explaining some of the nuances between these different phrases, encourage educators by positing a different approach to teaching elementary mathematics that utilizes the knowledge and skills they already possess, and then discuss how educators might implement this strategy in light of limited resources that support it. My experience as a former K-12 teacher, and in my work with teachers at multiple levels, it is obvious that teachers are not afraid of hard work and possess a desire to teach effectively. Often, they simply do not have clear instructions as to what that teaching should be.

Definition of Terms

In an attempt to find curricular designs and practices that assist more students to reach mathematical proficiency, scholars and policy makers have created an environment of ever-changing vernacular and standards. This shifting environment is one of constant confusion for practitioners who seek to provide quality instruction in the hope of earnestly helping their students. Exacerbating the issue is that at times words are often changed while the meaning is left intact and in other instances the vocabulary is left static while the definition is altered. No place is this more evident than in the area of integrating mathematics and literacy.

The first step in learning any material is to understand the language. Much of the vocabulary surrounding mathematics instruction has been in a state of flux for the last several years. To clarify any ambiguities, I begin with a definition of terms currently tossed about haphazardly and discuss the commonalities and differences between them. One of the terms frequently used and rarely defined is *numeracy*. Askew, Brown, Rhodes, William, and Johnson (1997) define numeracy to be "...the ability to process, communicate, and interpret numerical information in a variety of contexts." Teachers, curricular scholars, and mathematicians agree that processing, communicating, and interpreting information are critical components of *any* education. The application of these events to numerical information is an obvious fit for mathematics education. At the risk of stating the obvious, I must point out that this definition involves more than simple numerical fluency in the same way that authentic reading involves more than the ability to recognize the words on a page.

Often used synonymously with numeracy is the term *mathematical literacy*. The Organization for Economic Co-operation and Development (OECD) is the organization that runs the Program for International Student Assessment (PISA). According to the OECD (2006):

Mathematical literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen (p. 72)

Despite the shared ideas in their definitions, numeracy and mathematical literacy are not equivalent concepts. While both terms require an individual to have mathematical knowledge, neither are synonymous with *mathematical knowledge*. Numeracy focuses on the ability to perform and communicate mathematics while mathematical literacy places the emphasis on recognizing the need for and appropriateness of mathematics in different life-like situations. For instance, a carpenter needs to have the skill to use every tool in his shop, but that carpenter also needs to know *when* to use each tool. Numeracy is the development of skill *to do* a mathematical process. Mathematical literacy is knowing *when* each process is necessary. We must acknowledge that in order for an individual to be educated in mathematics, both numeracy and mathematical literacy are built upon a foundation of mathematical knowledge, and all three components ought to be taught together.

We therefore find that we have a climate in which two slightly different terms (numeracy and mathematical literacy) that incorporate a third (mathematical knowledge) are, often mistakenly, used interchangeably. Is that really a big deal? It is if curriculum developers and policy makers intend to communicate to educators precise learning outcomes. Where the proverbial waters begin to muddy further, and the topic that is of most interest to classroom teachers, is in the dialogue surrounding *how* we develop these proficiencies.

Mathematics is a Language

Despite the cultural belief that the subjects of mathematics and English/language arts are complete opposites, mathematicians understand that nothing could be further from the truth. Galileo Galilei, as quoted in Drake (1957), wrote:

Philosophy is written in that great book, the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the

language and read the letters in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures without which it is humanly impossible to understand a single word of it; without these, one wanders in a dark labyrinth. (p. 237-238)

This quotation from almost 400 years ago perfectly illustrates many “modern” ideas in mathematics education:

- mathematics relates to the world as it is
- mathematics needs to be understood
- mathematics itself is composed of multiple facets.

However, at the foundation of Galileo’s thought is that mathematics is a language! Bullock (1994), agrees with Galileo by stating, “Mathematics can be ... regarded as a form of language, developed by humankind in order to converse about the abstract concepts of numbers and space” (p. 735)

Viewing mathematics as a language instead of a collection of algorithms for finding solutions is not something everyone desires to do, yet that is precisely the image that mathematicians see. If we can wrap our minds around the notion that mathematics is a language, then the integration of mathematics and literacy can be achieved in exactly the same way one would integrate literacy with Spanish, history, or any other field that contains its own vocabulary and grammatical structure. Taking this language approach to mathematics positions us in the (usually) more comfortable space of learning language as we investigate how to simultaneously teach mathematical knowledge, numeracy, and mathematical literacy.

Integrating Mathematics and Literacy

Where We Are

The very heading of this section regarding the integration of math and literacy will cause frustration, and perhaps anger, to rise within many math teachers. As a former high school math teacher, I understand. As I was required to sit through professional development and adapt to ever changing standards that included references to literacy, I often found myself resistant to these changes precisely because I was not a reading teacher. In fact, the notion that every teacher ought to teach reading is absurd. Metsisto (2005) states quite clearly that math teachers only possess the skills to teach literacy if they have been trained as a generalist. Fortunately, generalist educators are *exactly* what we find in most elementary schools. These teachers have been trained in the teaching of all subjects, so the combination of mathematics and literacy ought to be easily accomplished. If anything, my experiences with both current and future elementary teachers have demonstrated that the subject with which they are least comfortable is often math. All the more reason to treat math as a language and use the techniques of literacy instruction with which a majority of elementary educators are comfortable!

The primary obstacle to this endeavor is that math specialists, those the elementary teachers look to for content and pedagogy development, are frequently the same educators to who Metsisto is referring. These educators, unprepared to teach reading and writing in general, have maintained that literacy instruction should stay within their discipline. This singular

stipulation has led to the notion of content literacy (Draper, 2002; Metsito, 2005; Shanahan & Shanahan, 2012). Content literacy, or disciplinary literacy, is “an emphasis on the knowledge and abilities possessed by those who create, communicate, and use knowledge within the disciplines (Shanahan & Shanahan, 2012, 8). Mathematics instruction that only allows for content literacy, while appropriate in the middle and secondary classroom, creates an environment in which the advantage of having teachers trained in all disciplines is minimized, the subject areas become segregated, and the vision of mathematics as a language is lost.

The proper setting for the integration of mathematics and literacy exists in elementary schools, but the curricular texts are not provided. This has led many teachers to search for texts that will provide the proper integration themselves. A simple internet search will reveal the experiences of many teachers who use texts in their classrooms along with the suggestions of reputable organizations such as Scholastic, Education World, and the National Council of Teachers of English. Unfortunately, the texts suggested by these educators and organizations, for reasons discussed below, are generally insufficient for the goals of a classroom.

Types of Mathematical Fiction

In the English/language arts classroom, balanced literacy is often accomplished through the use, in various ways, of texts. Because elementary educators are familiar with and trained in this approach, the answer to quality mathematics instruction then appears obvious: implement this strategy in mathematics with quality texts. At this point the term mathematical fiction enters the pedagogical lexicon. However, finding an academic definition of the term is nearly impossible. Is it any work containing math or referencing mathematicians? This definition is extremely vague. Does a biography of a Srinivasa Ramanujan, a brilliant Indian mathematician, qualify as mathematical *fiction*? Is mathematical fiction, as Kashman (n.d.) suggests, only works of fiction that significantly reference mathematics? What about a story in which the character performs some trivial addition that ultimately has no bearing on the plot? Such a work would hardly be relevant in an upper-elementary classroom.

Because there is no consensus of a definition, many works that would not be useful for classroom instruction have been classified as mathematical fiction. With all of the demands already asked of teachers, it is not feasible that they read every available book in order to select the appropriate texts. This problem is particularly daunting in elementary classrooms. Many texts exist that combine fiction and mathematical concepts. Each of these books may have a small role in mathematics education, but they are not substitutes for texts that provide the authentic integration of math and literacy. I have found that books fall into three general categories: concept books, story books, or logic books.

Concept books are those that are appropriate to introduce a topic. They often include a cute, although often fictitious, story surrounding the idea. Most texts which fall under the heading of mathematical fiction and which are recommended for classroom use fall into this category. An example might be Neuschwander’s (2013) *Sir Cumference and the Off-the-Charts Dessert*. This book demonstrates how circle and bar graphs may be used, but it does not assist students in learning how to decide which graph is most appropriate. In fact, it may leave students with the false impression that either chart could be used for any given situation. Teachers may read these texts to their classes, or have their classes read them, at the beginning of a lesson, but they hold little value during instruction. The largest pitfall of these texts is that the

student rarely has to do any mathematical processing. Most often, the character in the book analyzes the situation and makes all decisions. The student is part of the audience instead of a participant.

Story books are usually more advanced than concept books. These texts tell stories, which include a more developed plot and usually have more than a single mathematical concept addressed. Abbott's (1886) *Flatland: A romance of many dimensions* falls into this category. The book is a satire of Victorian culture that uses the mathematical concept of dimensionality. Texts in this category allow teachers to address several areas during the course of instruction. However, they ultimately have the same major shortcoming as concept books: the reader is but a bystander to the mathematical process. If we recall that the definition of mathematical literacy requires students to recognize the need for mathematics, then it becomes clear that these books, which never require them to decide what practices and methods are valid, are insufficient on their own.

Logic books are the only one of these general categories that address this shortcoming. Logic books are usually collections of challenging puzzles or problems, which students must solve. These texts are fantastic at challenging the thinking of students. However, they rarely include any type of story to unify the separate problems. An example would be Lee's (2010) *Challenging word problems for primary mathematics, Level 1*. These books frequently look like the word problem section of traditional math books. While they are great resources for educators looking for ways to challenge students or present problems in a non-traditional format, calling these texts *fiction* is a stretch by any definition. There is also little literacy instruction that can be done from such a text. Rarely can a literacy lesson (beyond perhaps the introduction of a new vocabulary word) happen from a mathematical word problem.

Where We Should Be

Once we accept what every mathematician inherently knows, that mathematics is a language, it becomes a less daunting task for educators to envision what effective instruction of mathematics might be. Instruction in mathematics ought to mirror the balanced literacy approach, which is so frequently used to teach vocabulary, reading, and reading comprehension. Balanced literacy, as advocated by Tompkins (2014), calls for the literacy instruction to simultaneously incorporate the learning of vocabulary and grammatical structure and then slowly increase the complexity of the two in order to maintain comprehension. Because mathematics is a language, it should be learned the same way!

Mathematics instruction needs to begin with vocabulary. Once basic vocabulary is learned, simple grammar can be taught. For example, once students understand the relationships between numbers (the vocabulary of more, less, greater than, etc.) and the grammatical structures ($+$, $-$, $=$), lessons dealing with addition and subtraction are approachable. This balance of vocabulary and grammar must be maintained while the complexity of the problems increases. But these lessons cannot take place in a vacuum. If the concepts are devoid of application to the lived experiences of students, then they have little meaning or relevance to the student. This paragraph may seem dangerously close to what is already being proclaimed in educational circles. However, where I deviate is in the assertion that this application and explanation should take place through literature and not through lecture or sterilized problems.

In order to accomplish this, it is imperative that quality literature be used. Such literature would need to address several content and pedagogical issues simultaneously: use appropriate language (including both vocabulary and grammatical structures), provide relevance to the mathematical concept, and require the learner be actively involved in the problem-solving process.

Difficulty of Integrating Mathematics and Literacy

The reason integrating mathematics and literacy is so difficult becomes clear when considering everything presented above. Because mathematics is a language that needs to be taught using a balanced language approach at the elementary level, then educators need appropriate texts. But texts that include fiction, from which reading and comprehension skills can be taught as well as require authentic mathematical processing from students, are rare. If high quality books integrating elements of literacy instruction with authentic mathematical experiences play such a vital role in teaching the language of mathematics, why are so few of them available?

The answer to this question is two-fold. Primarily, while the notion that mathematics is a language is not new (recall that Galileo made this assertion 400 years ago), the concept of teaching it that way is. Traditionally, mathematics has been taught as a collection of problem solving algorithms. Only those who were able to discern the language behind the processes were privileged enough to gaze upon the majesty of the subject. That is, only the vocabulary of mathematics (the symbols and algorithms) were taught. It has always been left to the student to understand the poetry. The repeated calls for change in mathematical pedagogy highlights the need for such texts. However, one must expect a delay between recognizing the need for curricular materials and those materials being produced.

Secondarily, the qualifications of a professional author of such a work are immense. An author must understand both the literary needs and mathematical needs of a student. It is a rare individual who is qualified to accomplish both. Further complicating the matter is that these two areas must be balanced. The author of such a work must use vocabulary, sentence structure, plot, and a theme of student interest while requiring mathematical concepts and problem-solving skills all from not only the same grade level, but concepts which are sequenced together within the curricular standards. Creating a text that addresses the needs of one subject is challenging enough. Quite frankly, there are not many people qualified to incorporate everything in the same piece of literature. This second difficulty in producing texts exacerbates the first. That fewer individuals are qualified to write texts indicates that these texts will take even longer to produce.

Recommendations for Practice

The lack of an abundance of quality literature does not mean all hope is lost. Educators cannot wait around until the texts become available to start teaching mathematics as a language using a balanced literacy approach. How, then, do we do it? I have three suggestions that may help tide us until professionally developed material is available.

Teachers must communicate with each other about available literature they have found and/or used in their classrooms. Every teacher cannot look through every piece of literature available. When we find literature that fits the needs of our students, we need to communicate this in our schools, districts, on-line forums, and social media. We cannot afford to be grateful

we have it without sharing the information. It is important to note that this is what many blogs and websites have attempted to do. However, that so many of the resources being recommended are concept books, story books, or logic books highlights the problem that quality texts are scarce.

Another avenue is that educators can write the literature themselves. I know this appears to be a daunting task, particularly given all of the other demands placed upon teachers. I get it. I do not anticipate a classroom teacher will write this type of fiction for every lesson for the next school year. However, teachers know their students best. It is easiest for teachers to find topics of interest to their students, understand the grammar and vocabulary with which their students are familiar, and incorporate the mathematical goals they have for their students in a single work. It does not need to be published. It does not need to be perfect. It just has to be. Besides, students will often be interested in a story simply *because* it was written by their teacher.

Any teacher willing to make such an attempt may want to follow a few simple guidelines: keep the story simple but interesting to the students, integrate the mathematics so that the *student* has to solve the problem, and integrate literary concepts that are relevant. For example, the text could be a choose your own adventure story of a pirate having to solve problems to find a treasure. This appeals to many elementary age children, requires the student to do the math appropriately (along with providing immediate feedback if they are incorrect), and allows the teacher to direct a literature lesson about sequencing (with the possibility that all answers are not the same).

The last, and perhaps best, approach is to allow the students to write the material themselves. After an example or two, the students would have a feel for what is required. Allowing them to write the story provides an authentic writing experience, gives students the challenge of applying their mathematical knowledge to a real-life situation, and permits them flexibility in mathematics (that traditionally is taboo).

This could be accomplished several ways. A teacher may begin by requiring only a comic strip instead of a full work of fiction. Another option is to provide students with the framework of a story that concludes in a math problem that must be solved to know the answer. For instance, give the students a story about a race between different characters. However, the students must modify the story so that the details needed to determine the length of time it took each character to complete the race (distance and speed, length of breaks, etc). The text of the story could end without informing the reader of who won. A concept such as this allows the integration of the math concepts of time, distance, and rate along with the literary topic of story resolution as the reader has to determine each participant's time in order to know how the story concludes.

Conclusion

Mathematics is not a subject to be feared. Contrary to popular belief, it is not a complex system of algorithms to be memorized. Mathematics has its own vocabulary, grammatical structure, and processes for accomplishing goals. It also has times when the meanings of those words, the design of those structures, and the order of the processes can be manipulated. This is exactly like the rules of reading, writing, and spelling. In short...mathematics is a language. Why then, are elementary educators not utilizing their skills and knowledge of language instruction in the math classroom? We must introduce our students to the vocabulary, grammar,

and processes of mathematics in a balanced and ever more difficult way. To accomplish this, we must have literature that incorporates these aspects. Until such time as that literature can become abundantly available, teachers must share what resources are available, can write their own as examples for their students, and provide students genuine writing opportunities by assigning the creation of such works.

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The Writing Workshop

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As a language arts teacher, I have always struggled with the question, “What is the best way to teach the writing process to my students?” Writing instruction can be taught in numerous ways, but what I want to review is how the writing workshop routine can be an effective way to teach students the true steps of the writing process. I will descriptively review many ideas from teachers and professionals alike about the structure and strategies behind the writing workshop.

We all know writing can be a challenge to many students, but what we don’t know is how to reach every student that is in need. As teachers, we must find the true way to teach the writing process during that short time of the educational journey that will help their future career and life paths. Writing is a valuable tool that children will take with them through life. We have the difficult job in front of us to determine the best way to teach the writing process that will benefit students. Hopefully, as teachers, we can find that one way to challenge the writing needs of each student and successfully support them for the future that is ahead. Writing workshop could be the one instructional routine to assist every student in the difficult task of learning the writing process.

Currently, I use writing workshop in my classroom and have for many years, but I want to know if my students are getting what they need from me as a teacher using this approach to writing. I want to look at the true outline of a writing workshop and the research behind it that shows how this writing approach could benefit our students in today’s classrooms.

We must first look at the true structure of a writing workshop in the classroom. According to a study by Jones, Reutzel, & Fargo (2010) writing workshops include mini lessons, writing and conferring, and sharing. During a writing workshop, the role of the teacher turns into more of the facilitator and less of the instructor. Teachers gear more of the responsibility on the student and less on the teacher. For example, as students are engaged in the writing process the teacher is more of the observer and confers with the students (Jasmine & Weiner, 2007). Here are some examples given by Richard Bullock (1998) of how the traditional philosophy of teaching may be different from that of the workshop approach.

Traditional	Workshop
Products are of primary importance. Avoiding mistakes is important. Learning is expected to be uniform.	Processes are valued as much as products. Taking risks is a valued sign of learning. Learning is expected to be individual.

Through writing workshop students are supported by others in their own writing endeavors. Teachers and peers will confer with one another, while asking questions about the writing that is at hand. Students also get the opportunity to share their work they complete during writing workshop. Many teachers provide this through the author's chair or in small group share time.

Overall the writing workshop gives students a feeling of independence. Higgins, Miller, & Wegmann (2006) found that writing workshop actually provides an environment in which students use cognitive processes and social interactions to become effective writers. Students are able to think about their writing and share their ideas with others. They think of themselves as writers and enjoy writing because they are given a choice of writing topics and time to write (Fu & Lamme, 2002).

As teachers, this is what we want for our students. We want them to feel a part of a community of writers. The concept of writing workshop gives the opportunity for students to learn the writing process, but more importantly engage in other areas of learning through mini lessons, conferring, and shared writing. The idea behind writing workshops reminds us that as children watch each other and talk together about their work, they provide important demonstrations for one another. The opportunity must therefore be provided for kids to read together, write together and simply learn things from each other (Harste, Short, & Burke, 1988). Teachers do play an important role in writing workshop, however the true responsibility falls to the student who is absorbed in the process.

Mini lessons

An important part of the writing workshop approach is the use of mini lessons during instruction. According to Angela Behymer (2003), mini lessons are based on the children's needs depending upon strengths and weaknesses they show in their daily writing. The writing workshop itself can focus on ideas such as phonics, conventions, and social interaction. An example of this could be used through the conferring that takes place with students on a daily basis. During this time, teachers can assess their students' strengths and weaknesses accordingly to develop mini lessons for later lessons. While reading the book *Why Workshop?* (1998) it was pointed out by Debra Grisso that mini lessons were not only necessary for students to get far, but for her to discover the element she needed most, dialogue. She would comment to her students about their writing and they would also respond. That way the lines of communication were open about their writing. Once students feel comfortable talking about their writing, they can improve in those areas of weakness with the assistance of a teacher.

Nancie Atwell (1987) points out, "opportunities to respond, to engage in literary talk with the teacher are crucial" (p. 164). Mini lessons open up conversation about the needs and wants of the student, but they can also provide beneficial information for the teacher in the area of what to concentrate on for teaching purposes. Angela Behymer (2003) tells us that you can tailor your mini lesson to each child's needs and abilities. The mini lesson focuses on the message rather than the conventions of the writing. The important thing to remember is that you must have spontaneity and be alert to what the children need. Overall, mini lessons can be a great asset to your writing workshop approach to teaching the writing process. It is imperative that you go in with an attitude that change may occur, and students could need extra assistance in specific

areas. No plan is final and all avenues of learning should be examined when using mini lessons through writing workshop.

Writing and Conferring

To me the most essential component to the writing workshop is the opportunity for students to be able to write and confer about their work. For example, Nathan Kasten (2010) explains to us that he sensed reluctance in his students to simply sit down and write using writing workshops. He thought they seemed more concerned with the grade and what would happen when they finished. In his attempt to put their minds at rest, he asked them to simply “just write.” He wanted his students to focus on the writing that took place in his classroom instead of the grades and results that usually followed a usual assignment. Teachers can talk to students through a one on one approach, small or whole group settings during this step of the writing workshop. Katie Wood Ray (2006) points out to us that conferring is powerful and comes with asking authentic questions to students. Some question examples could include, “What are you thinking?”, “Can you give me an example?” and “Why did you do that?” Since students are faced with questions like this during a conference, they are aware of changes they may need to make or additions for their own writing pieces. Ray (2006) also explains that if a teacher asks questions that she is familiar with or already knows, students usually respond with a kind of “worksheet” talk where they fill out blanks and wait for the next questions. As teachers that is why it is important to focus on thought provoking questions that center in on the individual student catered to each specific writing piece.

During conferring, teachers tend to lean more towards an open classroom environment. For example, teachers may allow students to move around the room freely at their will to share their writing with peers and ask for suggestions. According to Davenport and Eckberg (2001), teachers may set up a room with round tables and a gathering area consisting of a large carpet, rocker, and easel. Because of this, students are able to move about freely and have opportunities to collaborate with one another as a supportive community of writers. Other teachers may use an open approach of playing music while students are engaged in the writing process. For example, Wagner, Nott, & Agnew (2001) explain that sometime teachers put on a CD of classical background music while they circulate among students to confer and answer questions. All children are expected to write during this time and a community of writers is developed through the process. Through writing and conferring, students may work on the editing stage of their piece after receiving feedback from teachers or peers. The openness of the classroom makes the student feel like they are in charge and viable of what takes place while they are working in the classroom. During this stage of the writing process through writing workshop, they may also catch their own mistakes through rereading and revising which only makes children become more proficient writers.

Sharing

The sharing portion of the writing workshop comes as the final step in the process. Students are able to share their work with others and reveal their hard work as well as effort. Some students are more involved in the sharing process of writing workshop whereas others only want to discuss their writing one on one with a teacher. In my experience as a writing teacher, I have had students that will share their accomplishments on a daily basis. I often end my writing workshop time with a sharing session to see what students have accomplished during the allotted

writing time. Not only does the student writer benefit from this, but also the other students in the class that are also learning from the experience.

There are many ways teachers invite students to share in their completed writing from the day. For example many teachers use the Author's Chair approach. Eleanor Baker (1994) points out to us that during this time a student sits in the chair while the group celebrates the new piece of writing with applause or a sticker for the author. The writings often take a place in the classroom library, where they remain until the end of the year. The Author's Chair is very inviting for all age groups, but especially those in the elementary grades. They love the idea of the individual attention that is given to the person that is reading from the chair.

During the sharing process, students may involve other members such as principals and parent volunteers to listen to their work. While listening to Suzanne Roy (2004) explain the importance of her journey as a principal engaging in the writing workshop at her school, we see the positive outcome it has made in her life and the lives of students. She explains, "I walk through the door and down the familiar hallway. Now my heart beats fast and loud with anticipation of the excitement to come; as writing unfolds; as writers discover their voice" (p. 28). Even though she is not a true part of the classroom, this principal still engages with the students in the sharing aspect of the writing workshop. To me, she feels a part of the true learning experience that takes place in the classrooms of her school which, as a principal, is very important.

While sharing their work, teachers may invite students to display their writing for others to see in public. Rhodes and Dudley-Marling (1996) point out that publishing contributes to the writer's development by providing students to revise and edit their work which takes place during the writing workshop. Other teachers may invite parents and community members to see and experience what the students have been writing in class. This often gives students a feeling of ownership as well as accomplishment to see their finished pieces complete for others to see. The sharing component of the writing workshop can be used in many ways, but ultimately should benefit the students in their true writing experience.

Overall, it is clear to me that the writing workshop approach is the way to go for teachers when teaching the writing process to students. The research and literature assert that writing workshop approach gives students the individual freedom they need while writing for success. I have seen many new examples used in the writing workshop that will help me in the future. For example, I was introduced to many approaches for sharing student work as well as ideas to use when students are engaged in the writing component of writing workshop. In the future, I would like to see how the writing workshop is used in many levels from elementary to high school. I found that my research focused more on the elementary to middle age group. I hope to take the information I obtained and draw on the benefits for the common goal of teaching the writing process to students in my classroom. The writing workshop approach could be the answer to our problem.

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Professional Book Reviews

The Writing Strategies Book

By Jennifer Serravallo

(Heinemann Publishing, 2017)

Reviewed by Lisa King, CKEC Literacy Consultant

Is writing instruction your nemesis? If you run out of time during the day, is writing the first thing to get omitted? In her most recent book, Jennifer Seravallo, offers up 300 strategies to support students in all stages of the writing process. She says that her aim is to offer the most useful strategies in a teacher friendly format, so teachers can locate “just the right strategy at just the right moment.” And she does not disappoint with over four hundred pages of strategies.

A word of caution, however, don’t neglect the “Getting Started” section. This is critical for fast navigation of the text. Seravallo explains the foundational thinking of the book’s ideas and explores the ten crucial instructional goals around which the text is organized. She also explains how this book supports your writing instruction across the school year, how to set up your classroom for independence and how the strategies might fit into your classroom. So don’t flip straight to the strategies, this section is well worth the read.

As you dive in deeper, you will find each section color coded and organized by grade levels and an at-a-glance strategies list. The format is consistent throughout the text. Each strategy is listed, with teaching tips and prompts, as well as the levels, genre and writing processes listed in the sidebar.

The strategies don’t disappoint. She offers up the “oldies but goodies” like finding the heart of your narrative and using mentor text, as well as more new and inventive ones than there is room to mention. Her use of anchor charts is masterful and her prompting succinct and student friendly. Seravallo draws upon all the writing gurus and tips her hat to each of them throughout the book to create the yellow pages of writing strategies. This book is a must have for your collection of instructional resources.