

THE LUNA CURRICULUM: RESEARCH-BASED AND STUDENT-CENTERED LANGUAGE ARTS
AND MATH INSTRUCTION FOR GRADES 3-5

by

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Research-Based and Student-Centered Language Arts and Math Instruction for Grades 3-5

Abstract

The Luna Curriculum (Bonin, 2016) was designed for use as Tier I or Tier II instruction in grades 3-5 classrooms. The Luna Curriculum provides a framework for providing effective instruction through the integration of a variety of research-based and research-tested teaching methods including; the CRA method of math instruction, math literacy, word sorts, interactive notebooks, strategy instruction, scaffolding, and assessment. With diagnostic assessments included within the curriculum, educators can easily assess where their students are in the Luna continuum and begin instruction. The Luna Curriculum also has *The Extremely Complicated Universe* series, original short stories that integrate the math and language arts concepts learned throughout the curriculum in a story format. Students will practice their skills while reading about Garrett and Stefan, two middle school students that help solve environment problems in the Extremely Complicated Universe. The Luna Curriculum is an important instructional resource for upper elementary teachers who are looking to provide research-based intervention instruction to their students in an engaging manner.

Introduction

Teachers are constantly looking for ways to provide research-based instruction to their students in a way that they know will work for their students. With increasing demands in the classroom, it can be difficult for teachers to ensure that they are providing

the instruction their students need; due to diminished professional development training and shrinking planning time.

I have had experience, as an employee, intern, and teacher, in both general education and special education settings, grades K-8. It is apparent that there is an increased need for intervention instruction; instruction given to students when the normal classroom instruction is not enough. However, there is often little to no resources for teachers in terms of this intervention instruction. When there is a resource, it is often difficult to implement, requires expensive or many materials, and ends up being more of a hindrance than a help.

With this in mind, I decided that I wanted to create an easy to implement, usable intervention curriculum. I wanted to create a curriculum that was engaging for students and easy for teachers to implement and put in their classrooms. With these ideas in mind, the Luna Curriculum was born.

Background

In the fall of 2015, 50.1 million students attended public school, in grades K-12 (U.S. Department of Education, 2015). In the 21st century classroom, there are a multitude of learners, all with different learning needs. Inclusion, or educating students with disabilities in the general classroom, is becoming increasingly popular.

As of fall 2011, 95% of students with disabilities aged 6-21 were served in general education schools in some capacity (U.S. Department of Education, 2015). Of those students, 61.1% of them were educated in the general classroom for 80% or more of the time (U.S. Department of Education, 2015). Students with specific learning disabilities made up the largest category of students with disabilities spending at least 80% of their

time in the general classroom, with 66.2% of all students with a specific learning disability. It is clear that in today's classrooms teachers must be prepared to teach their variety of students in a way that works for the individual student's needs and abilities.

Response to intervention. To try to meet this need, the Individuals with Disabilities Education Improvement Act in 2004 introduced a process known as Response to Intervention, or RTI, in the regulatory notes as a method to help identify students with special needs. Bender and Shores define RTI in their book as a "process of implementing high-quality, scientifically validated instructional practices based on learner needs, monitoring student progress, and adjusting instruction based on the student's response" (2007, p 7).

Response to Intervention has three tiers. Tier I is general classroom instruction. In Tiers II and III interventions should be provided to ensure that the student is met with academic success. As Buffum defines, an intervention can be almost anything, as long as it is "above and beyond what all students receive, [and] helps a child succeed in school...can be a practice, method, strategy, and/or program" (Buffum & Mattos, 2011, p 129).

Although the definition for intervention is very broad, there are several characteristics that all effective interventions share. To be effective, an intervention should be research-based, directive, administered by trained professionals, targeted, and timely (Buffum & Mattos, 2011, p 131-140).

Furthermore, interventions should not be administered for every objective or skill. Interventions should focus on the essential skills. Essential skills must have endurance, meaning that the skill will be valuable beyond a single assessment, leverage, meaning the skill is valuable in many disciplines, and readiness, meaning that the skill provides the

student with something they will need in further education (Buffum & Mattos, 2011, p 48). Many teachers look to the curriculum to decide which skills are essential, and therefore require an intervention if necessary.

Curriculum development. There are many definitions for both curriculum and curriculum development. Focusing on the definitions creating by Wiles and Bondi, a curriculum is “a plan for learning” (p 31) and curriculum development is “a process whereby the choices of designing a learning experience for students are made and then activated through a set of coordinated activities” (2010, p 3).

Taba created a step-by-step procedure for curriculum development; as displayed in Figure 1.1 (Wiles & Bondi, 2010, p 15). Analyzing many different curriculums and noting the similarities in the processes of creating them generated these steps.

- Figure 1.1*
- 1) Diagnosis of needs
 - 2) Formulation of objectives
 - 3) Selection of content
 - 4) Organization of content
 - 5) Selection of learning experiences
 - 6) Organization of learning experiences

Figure 1.1 Taba's curriculum development process (Wiles & Bondi, 2010, p 15)

Instructional techniques. Within every curriculum are instructional techniques designed to maximize student learning. Newton and Winches have done research trying to figure out what types of instructional techniques truly maximize learning. They have found that there are six main components of a classroom and curriculum that help to maximize student learning. Clear learning targets, high expectation, and a culture of redemption not

only provide direction for the students but also an environment in which students know what is expected of them and that mistakes are acceptable as long as they are learned from. Teachers should plan constantly and tweak their teaching frequently to meet students' needs. Teachers need to also make sure that they are questioning their students effectively and that good relationships between teacher and students are maintained (Newton & Winches, 2013, pg 72-73).

As IDEA and RTI require research-based instruction, research has also been done regarding what teaching methods are effective. McEwan and Adkins identified sixteen teaching methods (Figure 1.2) that worked effectively with students, especially struggling learners (McEwan-Adkins, 2009, p 15).

Figure 1.2

- 1) Explaining
- 2) Giving directions
- 3) Modeling
- 4) Assessing
- 5) Reminding
- 6) Guiding Practice
- 7) Scaffolding
- 8) Facilitating
- 9) Coaching
- 10) Attributing
- 11) Constructing meaning
- 12) Redirecting
- 13) Motivating-Connecting
- 14) Recapping
- 15) Annotating
- 16) Affirming

Figure 1.2 Sixteen Research-based interventions for teaching students K-6 (McEwan-Adkins, 2009, p 15)

Learning goals are another researched-based way to maximize learning. It has been shown that when students' focus on learning goals they are more likely to "prefer and choose challenging tasks, persist at difficult tasks, seek forms of help that promote independent problem solving, use cognitive strategies that enhance conceptual understanding" (Swan, 2002, p 15). Self-regulated learners normally utilize learning goals more than students who do not self-regulate. Zimmerman, Bandura, and Martinex-Pons found that "self-regulated learners direct their learning processes and attainments by setting challenging goals for themselves [and] by applying appropriate strategies to achieve their goals" (1992, p 664). As such, it is important to try to teach learners to self-regulate in order for them to find more academic success.

As stated, self-regulated learners use both goals and strategies. There is an instructional technique called strategy instruction that focuses on teaching learners strategies in order to make them more self-dependent during their learning process. Reid, Lienemann, and Hagaman define a strategy as "a series of ordered steps that helps a student perform a task". It is important to note that not any series of ordered steps can be considered a strategy. Reid et al elaborate that strategies need to improve performance, be essential, willful and effortful (2013, p 17).

Strategies are not only helpful for completing or performing a task, but also have been shown to help with working memory. Many students with learning difficulties have trouble with their working memory, or where information is temporarily stored and managed (Reid et al, 2013, p 21). Information in the working memory is only held for a short time, and then it is gone unless it has been moved to long-term memory storage. When a student's working memory is overloaded, they run out of space for new

information (Reid et al, 2013, p 21). This can lead to apparent lapses in memory of directions, something just read, or numbers just recited.

Strategies are especially useful to students when they are allowed to choose which strategy they want to use. It has been found that when students have more choice in their deciding of strategies to use the students “can learn more content and make more connections” (Van De Walle, Karp, Lovin, & Bay-Williams, 2013, p 10). This is due to the fact that students can choose the strategy that works best for them, instead of the one that the teacher has decided the student should use. This is often called a student-centric or a learner-centered classroom. In learner-centered classrooms, teachers begin “where the students are” instead of where the curriculum tells them they should be (Van De Walle et al, 2013, p 6). Students should play an active role in these classrooms, with the teachers acting more as guides and teaching to each student’s needs and abilities (Saxena, 2013).

Even though teachers should act more as guides, this does not mean that they do not provide instruction. In fact, specific instruction, called explicit instruction, has been shown to be very helpful in teaching students of all abilities, but especially those with learning difficulties. Explicit instruction is defined as a “structured, systematic and effective methodology for teaching academic skills (Archer & Hughes, 2010, p 1). There are sixteen distinct elements of explicit instruction, outlined below in figure 1.3.

Figure 1.3

- 1) Focus instruction on critical content.
- 2) Sequence skills logically.
- 3) Break down complex skills and strategies into smaller instructional units.
- 4) Design organized and focused lessons.
- 5) Begin lessons with a clear statement of the lesson's goals and your expectations.
- 6) Review prior skills and knowledge before beginning instruction.
- 7) Provide step-by-step demonstrations.
- 8) Use clear and concise language.
- 9) Provide an adequate range of examples and non-examples.
- 10) Provide guided and supported practice.
- 11) Require frequent responses.
- 12) Monitor student performance closely.
- 13) Provide immediate affirmative and corrective feedback.
- 14) Deliver the lesson at a brisk pace.
- 15) Help students organize knowledge.
- 16) Provide distributed and cumulative practice.

Figure 1.3 The 16 elements of explicit instruction (Archer & Hughes, 2010, p 1)

While the above instructional techniques can be used across the different subjects, there are also instructional techniques that are to be used in specific subjects. For math, it has been shown that the most successful math curriculums and programs encourage student interaction (Slavin, Lake, & Groff, 2010, p 3). Also, using children's literature to elaborate students' understanding of mathematics has been shown to be beneficial (Nelson, 2012, p 419).

There has been extensive research on language arts instructional techniques as well, especially with the recent pushes in literacy achievement. Scammacca, Vaughn, and Roberts studied a wide range of language arts intervention and instructional techniques. They found that effective interventions shared the characteristics of a) training in

phonological awareness, b) decoding and word study, c) guided and independent reading of progressively harder texts, d) writing exercises, and e) engaging students in practicing comprehension strategies while reading (2007, p 30).

Teacher decisions. With all of this various research on best-practices, it can be difficult for teachers to choose what is best for their students. Even more so, teachers have trouble deciding how to best instruct their students with learning difficulties. Teachers also have to decide what to do for their students requiring Tier II and Tier III interventions under the RTI model. Many schools and teachers end up showing the “more of the same” and/or the “what program do we buy” syndrome when it comes to trying to effectively educate their students (Buffum & Matoos, 2011, p 129). However, it has been shown that more of the same instruction does not help the students who are already struggling, and many programs do not produce the results that the schools and teachers are searching for. This is true for computer assisted instruction as well, something that many schools are turning to as the push for technology in the school systems mounts. However, Slavin, Lake, and Groff have found that there is “limited evidence in elementary schools – and even less evidence in middle and high schools – that CAI math programs are effective” (2010, p 8).

With all of this information in mind, I set out to create the Luna Curriculum. I wanted to incorporate as many research-based elements as possible, while using my own classroom experience to make it a program that teachers would want to use.

Process

At the beginning, the idea of writing my own curriculum was overwhelming. However, I believed in the vision and I knew that it would end up helping not only my

future students, but also future students in general. I set out to create the Luna Curriculum in an organized fashion.

The standards. My first step in the curriculum planning process was deciding what I wanted the Luna Curriculum to teach. There are a multitude of math and language arts concepts that are covered in grades 3-5. I decided to use the Common Core Standards as a guiding document in deciding what I wanted the Luna Curriculum to teach. I looked over all math and language arts Common Core Standards for grades 3-5 and tried to find any patterns or similarities between the grades. In the math standards, I noticed that many of the standards had to do with place value, operations, and fractions, and that they built upon one another as the grades progressed. In the language arts standards, the central threads were reading comprehension, decoding, and identifying and using different types of words. Based on these central threads, I created the six manuals of the Luna Curriculum.

Instructional methods. Once I had decided what the Luna Curriculum was going to teach, my next step was deciding how it was going to teach it. To begin with, diagnostic assessments would be included with each manual. The diagnostic results would tell the teacher exactly what lesson to begin instruction in with that student. Also, the diagnostics would serve as a pre and post assessment, being able to show the teacher what growth the student has made throughout the instruction. I wanted to employ a mix of instructional techniques to ensure that the lessons would be effective for a variety of students. The method of “I do, we do, you do”, was a method that I had used and seen in my teaching experience extensively, and that became the base of how the Luna Curriculum would be taught. I decided I would also use interactive notebook pages as a way to engage students while also providing them with a way to go back and review the concept or skill. Lastly,

some form of independent practice, whether in the form of an assignment or a practice sheet, would be included with each lesson. This would allow the student to practice the skill or concept after the lesson.

Lesson plans. From there, I created the lesson plan template. Each lesson in the Luna Curriculum uses the unique Luna Lesson format. This format was created to help streamline lessons and ensure that teachers can clearly see what each lesson requires. A blank copy of a Luna Lesson can be seen in Figure 2.1.

Math/LA.Unit Letter.Lesson Number.Lesson Part

<i>Title</i>	
<u>Learning Goals:</u>	
<u>Students Need to Know:</u>	<u>Students Will Know:</u>
<u>Connection to Common Core:</u>	
<u>Materials Needed:</u>	
<u>Teacher Input:</u>	
<u>Guided Practice:</u>	<u>Independent Practice:</u>
<u>What To Look For:</u>	<u>Opportunity for Assessment:</u>

Figure 2.1

Each part is elaborated on below.

Heading: Each lesson will have a bolded heading across the top of the first page as seen above. These headings will serve to not only organize the various lessons but are also what the teacher will be directed to after the assessment. The header has 5 different parts:

1. Math/L.A. → the beginning of each header will indicate if the lesson is either math or language arts
2. Unit Letter → within each subject area, there are three units. Each unit has been given an identifying letter, which will be capitalized. Note that you do not have to teach the units in their alphabetical order; the units are simply grouped together for organizational purposes.
3. Lesson number → This number indicates where that particular lesson lies within its corresponding unit. With very few exceptions, lessons should be followed in order. This is due to the increasing difficulty of the lessons as the numbers grow larger.
4. Part → This lowercase letter indicates which part of the overarching lessons the plan is. Many lessons, especially in the math curriculum, teach the same concept but are broken down into different parts. It is important to follow the particular order in teaching these sets of lessons as each one builds on the other.

Lesson Title: This title gives a brief overview of what the lesson will teach and/or how that teaching will be accomplished.

Learning Goals: Learning goals help focus teaching and also student learning by directing attention to the “big idea” of the lesson. It is recommended that the teacher share the learning goal with the students at the beginning of each lesson to help focus student learning.

Students Need to Know: This lists the necessary background knowledge that students need to have in order to be successful with the lesson. Many times the background knowledge is taught in previous lessons.

Students Will Know: This lists what the students will know after successfully teaching the lesson. Often this knowledge is required in the next lesson.

Connection to Common Core: The Luna Curriculum is aligned to Common Core Standards. As such, the particular standards that each lesson is aligned with are highlighted in this section.

Materials Needed: Any materials that will need to be gathered ahead of time in order for the lesson to be taught are listed so that teachers can prepare effectively.

Teacher Input: This is the first “teaching” part of the lesson. The teacher input section involves the direct instruction and modeling aspect of the lesson. In this part, the teacher is doing the most work.

Guided Practice: Students will start to work with the skill or concept but under careful guidance and with support from the teacher. In this part, the students and the teacher are working together to practice the skill.

Independent Practice: Students will work on the skill or concept independently or with partners. Now that they have had the necessary instruction and guided practice, they are able to use the skill by themselves. In this part, the students are doing the most, if not all of, the work. The teacher is nearby to provide assistance as needed.

What to Look For: Highlighted in this section is what the teacher should be observing from his/her students throughout the lesson, specifically in the guided and independent practice. Teachers should review this section before teaching the lesson to ensure that

they know what to look for. If the teacher does not see these behaviors exhibited by his/her students, this is an indicator that the lesson may need to be re-taught with more teacher input.

Opportunity for Assessment: Assessment can be used as a valuable tool to guide instruction. It is important to know if the students are “getting” the information before it is too late, as the lessons build on one another. This section will list the type of assessment and grading criteria. The independent practice is almost always an opportunity for assessment.

Blacklines and Master Materials: Finally, below each lesson plan are the blacklines and masters that correspond to the lessons. These range from student copies to teacher answer keys, and are located close to the lesson for convenience.

The Extremely Complicated Universe series. I wanted to integrate both the language arts and math elements in an engaging way. I did not want to only use word problems, as is often the case when incorporating language into math. Instead, I came up with *The Extremely Complicated Universe* series. The series provides an opportunity for the students to practice the language arts and math skills and concepts they have learned in the lessons while reading a story. Students will read the story (either independently or through a read-aloud) and solve math and language arts problems that are integrated throughout the story. The problems correspond to the skills and concepts taught in the lessons and the interactive notebook pages. With two stories per grade and one introduction story, The Extremely Complicated Universe series chronicles the adventures of Stefan and Garrett; two middle school students that endeavor to solve the environmental problems of the Extremely Complicated Universe. I planned out what types of problems

would be within each story and what environmental problem would be featured. Some of the environmental problems include erosion, water pollution, and air pollution.

Once all the planning had been done, I could finally set to work on actually writing and creating the Luna Curriculum.

The Luna Curriculum

The manuals. In total, the Luna Curriculum is comprised of 98 lessons that make up the six manuals. There are three math manuals; place value (16 lessons), operations (14 lessons), and fractions (14 lessons). There are also three language arts manuals; comprehension strategies (14 lessons), decoding (23 lessons), and types of words (17 lessons). Almost every lesson involves an interactive notebook page and practice sheets. Every manual, except the comprehension strategies manual, comes with 12 diagnostic assessments, 4 per grade level. The diagnostics are designed to be given in a 20-30 minute block each, and the results tell the teacher the recommended starting point for that student's instruction within the manual.

The Extremely Complicated Universe series. Seven stories comprise *The Extremely Complicated Universe* series. There is one introduction story that sets up the series, and then two additional stories per grade level. Each story features math and language arts skills from the Luna Curriculum that are on that grade level. Figure 3.1 lists the stories and the skills and concepts that they cover.

Grade	Title	Concept
3 rd	<u>The Land of the Castle</u>	Place value, operations, simple verb tense
	<u>The Land of the Islands: Pirates</u>	Fractions, identifying types of words, conjunctions
4 th	<u>The Land of the Sweets</u>	Place value, operations, progressive verb tense
	<u>The Land of the Food</u>	Fractions, progressive verb tense, prepositional phrases
5 th	<u>The Land of the Trees</u>	Place value, operations, perfect verb tenses
	<u>The Land of the Islands: Underwater</u>	Fractions, conjunctions

Figure 3.1 The Extremely Complicated Universe Series

Looking Forward

The Luna Curriculum is ready to be implemented in grades 3-5 classrooms. Currently, it has been distributed to an elementary school for them to implement and try. The teachers are going to implement the Luna Curriculum during a half hour intervention block in the morning and use it to help their students review for the end of grade tests. In the future, I would like to conduct an action research study in my own classroom to research test the effectiveness of the curriculum. Based on the results of that study, I would look into publishing the Luna Curriculum professionally.

It was a very rewarding experience to be able to create a curriculum that will help teachers and students alike in the future. Although it is only a piece of the total interventions that a student in grades 3-5 may require, the Luna Curriculum is an excellent start to helping students succeed.

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