

## Memorandum

To: Read Charlotte Board  
From: Munro Richardson  
Subject: Unpacking the Science Behind the Reading Checkup  
Date: April 20, 2021

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In June 2020, Read Charlotte partnered with Learning Ovations, a California-based company, to bring the *Reading Checkup* to families in Mecklenburg County. With the *Reading Checkup*, parents and guardians can have their PreK-3 children take two 15-minute quizzes to find out their current reading and vocabulary levels, get recommendations about priorities for improving their reading and receive a customized list of family-friendly literacy activities they can do at home. Many of these activities have short tutorial videos for families. The quizzes can be taken as frequently as every six weeks and will update recommendations for targeted home literacy activities based upon student growth. The minimum needed technology is a smartphone.

This memo explains the science behind the *Reading Checkup*, which was developed by Dr. Carol Connor. Having reviewed dozens of interventions during my time at Read Charlotte, I believe it's one of the greatest developments over the past 20 years to improve early literacy outcomes.<sup>1</sup> Dr. Connor conducted at least eight large experimental studies on the impact of individualizing student instruction in early elementary classrooms. She published over 30 peer-reviewed journal articles on this single topic and developed innovative, evidence-based tools for educators.<sup>2</sup> Here's the Cliff's Notes summary:

- There are four types of reading instruction.
- Providing the right amounts of the right types of instruction at the right time from PreK-3<sup>rd</sup> grade creates proficient readers by third grade.
- There are algorithms to help adults accomplish this with existing curricula, interventions and supplemental literacy activities in the classroom, out-of-school and at home.
- There is a great deal of evidence that demonstrates this works.

This memo provides detail on these points and is organized into four parts:

- 1) The Science: The Four Types of Reading Instruction
- 2) The Application: The A2i System
- 3) The Impact: Evidence of Efficacy
- 4) The Implications: Improving PreK-3 Literacy Outcomes

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<sup>1</sup> Mark Schneider, the director of the Institute of Education Sciences (IES) at the U.S. Department of Education, in November 2020 told me Dr. Connor's work is one of the most successful examples of research-to-practice funded by the IES. Adam Gamoran, president of the William T. Grant Foundation, spoke about the respect for Dr. Connor in her field and the impact of her work when we talked in December 2020. The efficacy of Dr. Connor's work is also supported by education researchers such as Nell Duke at the University of Michigan; Louisa Moats, the author of LETRS professional development program for teachers; and Nicole Patton Terry, director of the Florida Center for Reading Research.

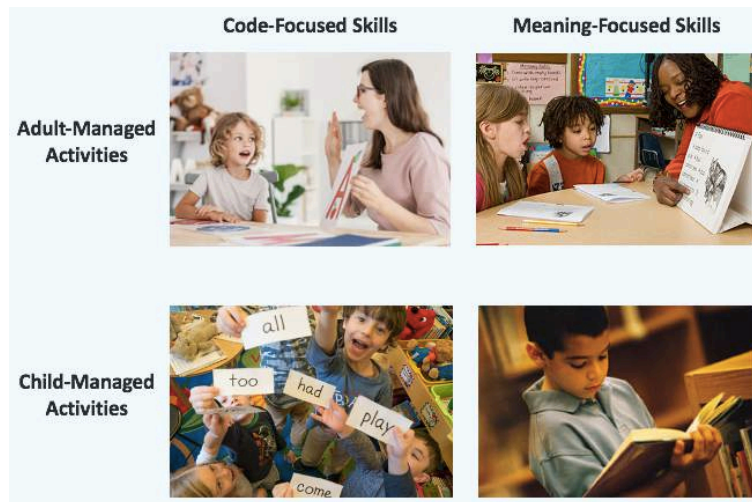
<sup>2</sup> I've followed this research with great interest since mid-2017 and finally met Dr. Connor in January 2020. Regrettably, she passed away of ovarian cancer at the age of 67 in May 2020.

## Part I. The Science: The Four Types of Reading Instruction

In the early 2000s, Dr. Carol Connor, at the time a professor at Florida State University and a research faculty member of the Florida Center for Reading Research, began nearly two decades of research into the relationship between PreK-3 children’s learning in the classroom and their language and literacy skill development. This work started with five years and 2,000 hours of close observation of PreK-3 classroom instruction. The objective was to understand the relationship between variation in classroom instruction and students’ end of year reading outcomes.

After careful study, Dr. Connor and her colleagues identified four basic types of reading instruction. Reading instruction either helps develop code-focused skills (word reading) or meaning-focused skills (vocabulary, comprehension and writing).<sup>3</sup> Further, this instruction is “managed” (who’s directing the learner’s attention) either by adults or by the child (individually or with peers). Put together these two types of instructional focus and two delivery modes of instruction constitute four potential types of reading instruction as indicated in Figure 1 below.

**Figure 1. Four Types of Reading Instruction**



Dr. Connor’s research uncovered that student’s reading development stems from *the interactions* between these four types of reading instruction and students’ reading, vocabulary and comprehension skills. She called these “child X instruction interactions.” Students need all four types of reading instruction, but the amount of needed time in each of them to become a proficient reader by the end of third grade varies by student. The specific amounts of needed daily instructional minutes depend upon the combination of students’ reading, vocabulary and comprehension skills and their proximity to the end of third grade. Moreover, the optimal level of instructional difficulty of literacy activities to help an individual student progress toward third grade reading proficiency changes over time based upon their current skills.

Figure 2 below shows an example from an article Dr. Connor published in 2014.<sup>4</sup> A first-grade student who starts the year on-level for vocabulary but a full year behind in word reading ability

<sup>3</sup> For Pre-K, play is considered a meaning-focused activity that builds language and oral comprehension skills.

<sup>4</sup> Connor C. (2014). Individualizing teaching in beginning reading. *Better: Evidence-based Education*. 6(3): 4-7

needs to start the year with 76 daily instructional minutes to be on a path to catch up in reading by the end of the school year.<sup>5</sup> This is significantly more than her peers who start the year on-level for vocabulary and reading (58 minutes per day) or on-level for vocabulary but a full year ahead for reading (52 minutes per day). For this struggling reader, this sums to 90 additional minutes needed each week and 6 more hours per month.

**Figure 2. Beginning First Grader Daily Instructional Minutes (On-Level for Vocabulary)**



This student needs 76 daily minutes -- about 30% more daily instructional time than her at- or above-level peers. Two-thirds of this time needs to be teacher-led and two-thirds needs to be spent on code-focused skills (phonemic awareness and phonics).

This student's 58 daily minutes are well-balanced between teacher-led (48%), student-led (52%), code-focused (52%) and meaning-focused (48%) instruction. Two-thirds of code-focused time should be student-led, but two-thirds of meaning-focused time should be teacher-led.

This student's 52 daily minutes are well-balanced between teacher-led (52%) and child-led (48%) instruction. Two-thirds of this time needs to be spent in meaning-focused instruction. About 40% of daily minutes should be teacher-led meaning-focused instruction.

How these daily instructional minutes are allocated is vitally important. As you can see in Figure 2, the first grader who starts one year behind in reading optimally needs to spend two-thirds of her time in teacher-managed instruction. But her peers who are at- or above-level need a fairly even balance of teacher- and child-managed (individual and peer work) instruction. Further, the optimal amount of time spent between code- and meaning-focused instruction varies as well. The first grader who starts a year behind in reading needs to spend two-thirds of her time in code-focused instruction. Her classmate who starts the year at-grade level, however, needs an even balance of time spent on code- and meaning-focused skills. But her peer who starts a year ahead in reading optimally needs to spend two-thirds of his time in meaning-focused instruction.

The optimal daily minutes and balance between the four types of reading instruction shift as students' reading skills develop. For example, as the student in this example who started one year behind in reading makes progress, the extra needed daily minutes (compared to her peers) will decrease, and the balance will shift to include proportionally more child-managed and meaning-focused minutes. Keep in mind that the optimal instructional difficulty (grade level) of literacy

<sup>5</sup> This is a simplified illustration of the A2i algorithms that assumes all students start on grade-level for vocabulary but differ in their starting reading levels. In reality, a classroom of students will vary in *both* vocabulary and reading levels, which makes the challenge of individualizing (differentiating) instruction even more difficult for teachers.

activities in each of the four types of reading instruction varies by student based upon the combination of their reading, vocabulary and comprehension skills.<sup>6</sup>

In the course of this research, Dr. Connor and her colleagues made six other important discoveries concerning effective classroom reading instruction:

1. **Teacher-managed small group instruction is four to ten times more effective than whole group instruction.** The largest effects (ten times the impact) are realized in Pre-K and Kindergarten classrooms.
2. **Too little or too much code-focused instruction can lead to weaker gains.** You can watch a video of Dr. Connor speaking on this topic starting at the three-minute mark: <http://bit.ly/CodeFocused>. Interestingly, Harvard Professor Jimmy Kim came to a similar conclusion in his 2017 study of CMS classroom literacy practices jointly funded by CMS and Read Charlotte.
3. **Conversely, it's never possible to provide too much meaning-focused instruction as long we're providing enough code-focused instruction.** Meaning-focused instruction does not have to be strictly limited to designated literacy blocks, but also can include subjects such as science and social studies.
4. **Students typically need increasingly more child-managed instruction (individual and peer group) to maximize their growth as the school year progresses.** Further, as illustrated above in Figure 2, advanced readers need more child-managed minutes overall. A deficit of many core curricula and interventions are that they are overwhelmingly awash with adult-managed activities, leaving teachers to fill independent rotations with little guidance and potentially ill-suited activities.
5. **It's not enough to get it right in the early grades.** One of Dr. Connor's research studies tracked teachers and students from first through third grade. She found there is no "inoculation effect" at first grade. It's not enough to get a child reading on-level by the end of first grade and then ease up on the focus on getting instructional minutes right. This work needs to persist K-3 (ideally, PreK-3) to help children reach their full potential.
6. **The quality of the learning environment matters.** Dr. Connor's research found an interaction between the quality of the classroom learning environment<sup>7</sup> and the literacy instructional minutes that students receive. Students' reading development is much greater, minute for minute, for students in classrooms with stronger learning environments than students who receive the same amount of instruction in classrooms with weaker learning

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<sup>6</sup> In this example, a struggling first grader will optimally benefit from code-focused literacy activities at an instructional level below first grade. However, a first grader who starts school one year ahead in reading will optimally benefit from meaning-focused literacy activities with instructional challenges above a first-grade level. This is not to suggest universal "leveling" or not providing access to standards-aligned grade-level content to all students. It does suggest, however, that content that is too challenging or not challenging enough can negatively impact skill development and lead to weaker gains.

<sup>7</sup> Classroom learning environment in this study had three components: 1) teacher warmth, responsiveness and discipline, 2) classroom organization, and 3) teacher support for classroom vocabulary and language development.

environments.<sup>8</sup> Getting instructional minutes right is key; ensuring a high-quality learning environment makes the gains even greater.

These research insights are incredibly compelling and reveal the complex characteristics of effective reading instruction. Dr. Connor’s research helps to explain why despite our best efforts locally, at the state level and nationally we have not yet systematically moved the needle on reading outcomes. While Dr. Connor and her colleagues helpfully describe the mechanics of effective reading instruction, on its own this is too complex and dynamic to be of immediate practical use. Fortunately, they developed a set of practical tools to help teachers (and, increasingly, other adults) leverage these insights to provide individualized reading instruction. I describe these tools in Part II, which I think of as a sort of “GPS” to help adults successfully navigate children toward third grade reading proficiency.

## **Part II. The Application: The A2i System**

Dr. Connor and her colleagues developed a software program called “A2i” (“Assessment-to-Instruction”) intended to help classroom teachers leverage the insights from their research findings.<sup>9</sup> The aim of A2i is to make sure all students achieve strong reading skills by the end of third grade. A2i fundamentally has five components:

- 1) **Three adaptive online assessments of children’s reading, vocabulary and comprehension skills: Word Match Game, Letters2Meaning, and Reading4Meaning.** Dr. Connor and her colleagues over many years developed and refined these assessments, which are normed to subsections of the Woodcock-Johnson III assessment (picture vocabulary, letter-word ID and passage comprehension) and the Gates-MacGinitie Reading Test. The Word Match Game and Letters2Meaning focus on early elementary skills like decoding single words and reading a sentence or two and cover grades K-3. Reading4Meaning is a passage comprehension assessment that includes more complex tasks like understanding genre and inferencing and is intended for students reading at a second or third grade reading level. The Word Match Game and Letters2Meaning can be given as frequently as every six weeks. The assessments collectively produce two key values: reading level (expressed as Grade Equivalent or “GE”) and vocabulary level (expressed as Age Equivalent or “AE”).
- 2) **Five grade-level algorithms (PreK-3) that make recommendations for the amounts of daily minutes needed in each of the four types of reading instruction.**<sup>10</sup> These recommendations can be used to either a) catch up a struggling reader to grade-level by the end of the current academic year or b) provide an on-level or advanced reader with at least nine months academic growth in reading.<sup>11</sup> The three adaptive assessments are connected

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<sup>8</sup> Connor, C. et al. (2014). Capturing the complexity: Content, type, and amount of instruction and quality of the classroom learning environment synergistically predict third graders’ vocabulary and reading comprehension outcomes. *Journal of Educational Psychology*. 106(3): 762-778.

<sup>9</sup> For a description of the development of the A2i system, see Connor C. (2019) Using Technology and Assessment to Personalize Instruction: Preventing Reading Problems. *Prevention Science*. 20(1): 89-99

<sup>10</sup> Dr. Connor provided details about the algorithms in a 2009 peer reviewed journal article. See Connor C. et al. (2009). Individualizing Student Instruction Precisely: Effects of Child by Instruction Interactions on First Graders’ Literacy Development. *Child Development*. 80(1): 77-100.

<sup>11</sup> Nine months is equivalent to a full academic year.

to the algorithms. The algorithms use a student's current grade, the time of the year, and current reading and vocabulary levels to make precise recommendations for needed daily minutes of the four types of reading instruction for each child. The algorithms are collectively engineered to move PreK-3 children up to a fifth-grade reading level.

- 3) **Indexing of algorithms against existing curricular materials.** The goal is to help teachers understand how to better use existing research/evidence-based core curricula, supplemental curricula and interventions to meet the individual needs of each student in their classroom. To date, nine core literacy curricula have been indexed against the A2i algorithms.<sup>12</sup> No core curriculum, however, fully meets the instructional minutes needed for all children in a classroom. This is particularly true for child-managed activities given that most curricula are overwhelming full of adult-led activities. Nationally, teachers reportedly spend upwards of 12 hours a week looking for supplementary activities.<sup>13</sup> A2i helps fill this gap by recommending high-quality, research-based literacy activities that matches students' instructional needs. In total, over 100,000 curricular activities (including supplemental curricula, Florida Center for Reading Research activities, etc.) are currently indexed to the A2i algorithms. Curricular activities include a mix of licensed and open-source materials.
- 4) **A flexible web-based software to support classroom instruction.** The A2i Professional Support System assists teachers with lesson planning, recommendation and selection of targeted curricular activities, student groupings based on instructional needs, and tracking of individual student and classroom progress. Teachers can see information for each student, groups of students or their entire classroom. When students take the A2i assessments (as frequently as every six weeks), the A2i system updates instructional recommendations based upon student progress. Not all curricular activities are available to all teachers. These are restricted based upon a school district's licensed curricula and the materials they want to make available to teachers in their classrooms.
- 5) **Training and coaching.** Initial training to use the A2i system takes about 90 minutes. Coaches are provided to implementing teachers, comprising up to 12 hours of support over the course of an academic year.

The design of the assessments embedded within A2i is unique. Rather than an assessment of student's learning they are assessments designed to inform instruction. Therefore, they will not, for example, compare a child's skills on first letter sound fluency with a national sample of children in the same grade. Further, it's not possible to substitute another assessment (e.g., MAP, iStation, i-Ready, mCLASS, etc.) for the A2i assessments. These other assessments can still be used, and their results can be imported into the A2i platform for teachers to use as necessary, however the A2i system does not require them to operate.

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<sup>12</sup> American Reading Company, Benchmark Advance, California National Geographic, Core Knowledge Language Arts, EL Education, Fountas & Pinnell, Journeys, StoryTown and Wonders.

<sup>13</sup> See <https://www.americanprogress.org/issues/education-k-12/reports/2018/08/29/454705/curriculum-reform-nations-largest-school-districts/>. A CMS teacher survey administered prior to the 2019 adoption of the EL Education literacy curriculum similarly found teachers were spending significant time each week looking for instructional materials. The adoption of a single literacy curriculum for the entire school district is intended in part to address this problem.



## The Reading Checkup

Dr. Connor co-founded a company called Learning Ovations to disseminate A2i. Although the A2i Professional Support System was originally designed for classroom teachers, over the past year Learning Ovations has begun to expand offerings to include out-of-school and home. Since Spring 2020, Read Charlotte has partnered with Learning Ovations on the home-based application called the *Reading Checkup*. The *Reading Checkup* uses many of the same components as the classroom version: Word Match Game and Letters2Meaning assessments (referred to as “quizzes” in the *Reading Checkup* ecosystem); PK-3 algorithms; and literacy activities indexed to the algorithms. We’ve made further adjustments, such as curating family-friendly literacy activities, providing literacy kits and books, executing a multi-channel marketing campaign and training “Checkup Champions” to provide support to families.

### **Part III. The Impact: Evidence of Efficacy**

In this section, I summarize two types of evidence regarding the efficacy of the A2i system. The first type of evidence comes from seven randomized controlled trial (RCT) studies that were published in peer-reviewed academic journals from 2007-2013. The second type of evidence is real-world results from use of A2i in classrooms in 17 school districts since 2018. These are results from the 2018-2019 school year for Kindergarten and First Grade students, since the 2019-2020 school year was interrupted by the pandemic. These real-world results are independently reviewed by a third-party evaluator, MDRC.

#### Evidence from Experimental Studies

In 2013, the Coalition for Evidence-Based Policy found that 88% of the 90 experimental studies commissioned between 2002-2012 by the Institute for Education Sciences at the U.S. Department of Education “produced weak or no positive effects compared to usual school practices.”<sup>14</sup> By contrast, Table 1 summarizes the results of seven randomized control trials (RCTs) across grade levels from 2005-2011 that demonstrate the efficacy of the A2i system on both word reading and comprehension.<sup>15</sup> Each of these RCT studies was published in a peer-reviewed academic journal. For experimental studies, the main result is what’s known as the “effect size,” a measure of the difference in outcomes between randomly assigned treatment (A2i classrooms) and control groups (classrooms using normal practices). The greater the difference in results, the larger the impact (or “effect size”) of the intervention.

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<sup>14</sup> <http://coalition4evidence.org/wp-content/uploads/2013/06/IES-Commissioned-RCTs-positive-vs-weak-or-null-findings-7-2013.pdf>

<sup>15</sup> The studies for grades 1-3 used subtests of the Woodcock-Johnson III and Gates-MacGinitie Reading Test to measure word reading and comprehension outcomes. The Kindergarten study used a composite measure of Word ID, Word Attack, Letter Sound Fluency, Phoneme Segmenting Fluency, & Nonsense Word Fluency. This composite measure was based upon subtests from Woodcock-Johnson III, AimsWeb and DIBELS.

**Table 1. Seven Randomized Controlled Trials of the A2i System**

<b>Study Year, Grade Level &amp; Sample Size</b>	<b>Eligible for Free &amp; Reduced Lunch</b>	<b>Percentage of Black Students</b>	<b>Core Curricula Used In Study</b>	<b>Outcomes &amp; Effect Size</b>
2005-06 First Grade 616 students	57%	A2i Group: 74%; Control Group: 38%	Reading Mastery, Open Court	Comprehension: 0.25
2006-07 First Grade 369 students	45%	A2i Group: 32%; Control Group: 26%	Open Court	Word reading: 0.50
2007-08 Kindergarten 556 students	60%	A2i Group: 57%; Control Group: 60%	Open Court	Word reading: 0.52
2008-09 Third Grade 448 students	47%	A2i Group: 51%; Control Group: 51%	Open Court	Comprehension: 0.20
2008-09 First Grade 468 students	39%-59%	All Students: 6%	Several curricula	Word reading: 0.32
				Comprehension: 0.36
2009-10 Second Grade 558 students	39%-59%	All Students: 6%	Several curricula	Word reading: 0.44
				Comprehension: 0.43
2010-2011 Third Grade 541 students	39%-59%	All Students: 6%	Several curricula	Word reading: 0.25
				Comprehension: 0.06
2008-2011 First-Third Grade	39%-59%	All Students: 6%	Several curricula	Word reading: 0.76

Note that while there is a PreK algorithm (which is used in the *Reading Checkup*) it was never rigorously tested in an experimental study. With the sole exception of the outcome for reading comprehension in the 2010-2011 third grade study, all of the results are quite robust—roughly two and a half to five times larger than the typical literacy intervention.<sup>16</sup> (Overall, outcomes for single-year third grade studies appear generally smaller than single-year K-2 studies.) Across these studies, Dr. Connor and her colleagues found no difference in student outcomes from teacher use of the A2i system based upon poverty levels (school- or individual-level), teacher experience, student special education status or parent education. The biggest predictor of outcomes was the degree to which teachers followed the A2i algorithms’ instructional time recommendations.

A key consideration in evaluating the relevance of these findings concerns the demographic makeup of the students in these studies. Research studies consistently found no difference in

<sup>16</sup> The median “effect size” for both broad outcomes like word reading and comprehension and for curriculum or broad instructional programs is 0.08. The single year effects in Table 1 generally are about 2.5 to 5 times larger than what we typically get from literacy interventions. See Tables 9 and 10 in Lipsey M. et al (2012). *Translating the Statistical Representation of the Effects of Education Interventions Into More Readily Interpretable Forms*. National Center for Special Education Research, Institute for Education Sciences, U.S. Department of Education.



student outcomes from teacher A2i use by students' race, ethnicity or income level. Further, Table 1 shows that several of the studies included significant numbers of African American students:

- First grade study from the 2005-2006 school year (616 students): 74% in the A2i experimental group and 38% in the control group.
- Kindergarten study from 2007-2008 school year (556 students): 57% in the A2i experimental group and 60% in the control group.
- Third grade study from 2008-2009 school year (448 students): 51% in both the A2i experimental group and the control group.

The percentage of students eligible for Free and Reduced Lunch across these three studies ranged from 47%-60%. By contrast, however, only about 6% of the students were African American in the three-year (2008-2011) RCT study. Further, across all of these experimental studies there were no significant numbers of Hispanic students or English language learners. Thus, these experimental results, while compelling, don't fully reflect the demographic and socioeconomic makeup of our most challenged schools in Mecklenburg County. For more insights on these subgroups, we turn to results from school districts that have used A2i in the classroom since 2018.

#### Evidence from Real-World Implementation

In December 2017, the Institute for Education Sciences (IES) awarded a five-year, \$14.65 million expansion grant to scale A2i to a consortium of researchers and developers, including researchers at UC Irvine, Learning Oventions, Digital Promise (qualitative evaluator) and MDRC (quantitative evaluator).<sup>17</sup> Under this grant, A2i has been used to date in 17 school districts in four states using 7 different core curricula. Implementation began with K-1 classrooms in Fall 2018, adding second grade in Fall 2019, and third grade in Fall 2020.<sup>18</sup>

Figure 3 below shows the average performance of the Fall 2018 First-Grade cohort.<sup>19</sup> The dotted line shows on-grade level reading performance. The yellow line shows the average reading level of the First-Grade cohort across the 17 A2i school districts. On average, this group of students started first grade in Fall 2018 three months below grade level in reading. However, they started third grade in Fall 2020 on average reading on grade level. In Spring 2021, this first cohort will take their state third grade reading assessments.

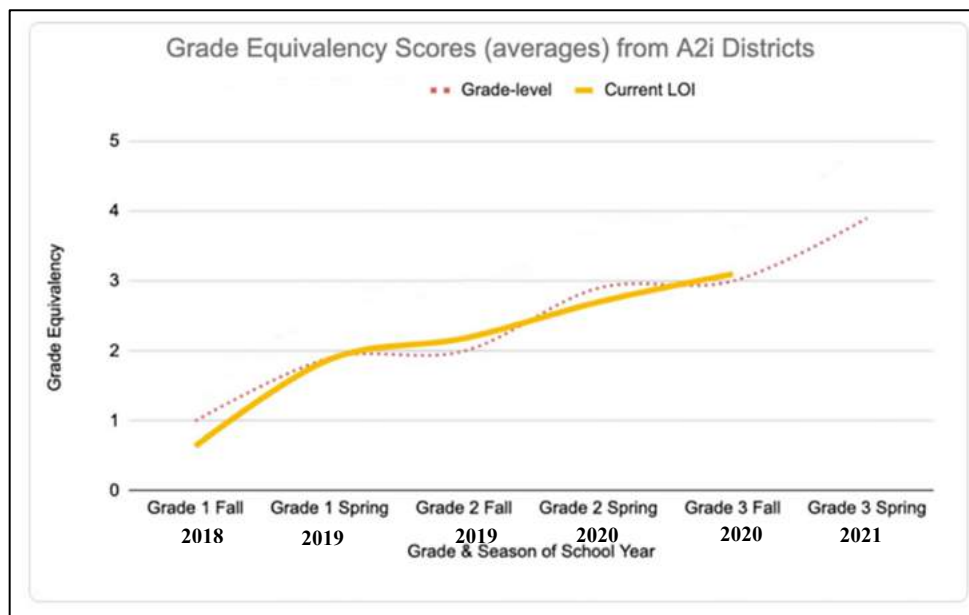
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<sup>17</sup> Over the past 15 years, A2i was developed, evaluated and scaled with a progression of awards from IES, as well as the National Institutes of Health/National Institute of Child Health and Human Development (NIH/NICHHD). For details, see <https://ies.ed.gov/blogs/research/post/ies-supported-technology-to-be-used-in-hundreds-of-schools>

<sup>18</sup> The cost to school districts is roughly \$25,000 per school each year. This includes initial planning and setup, as well as training and coaching of teachers and school building staff.

<sup>19</sup> These quantitative results are reviewed by MDRC, the third-party evaluator under the IES grant that is supporting the scale up of A2i into these school districts.

**Figure 3. Average Reading Level for A2i First Grade Cohort (Fall 2018-Fall 2020)**



The 83 schools in the 17 A2i districts represented in Figure 3 above have the following demographics:

- 79% are Title 1 schools
- 77% have majority minority student populations
- 70% have three-quarters or more students eligible for Free and Reduced Lunch
- 23% have half or more students with Limited English Proficiency

Ideally, we'd like to review results for specific school districts of similar size to Charlotte-Mecklenburg Schools (CMS) with comparable student demographics and socioeconomic makeup. However, there is no apple-to-apple comparison available. CMS is more than three times bigger than the largest current implementing A2i district.<sup>20</sup> Size matters when considering what it takes to implement anything successfully at scale. Further, while some of these districts overlap some aspects of the diverse socioeconomic demographic profile of CMS, none have our complete socioeconomic, racial and ethnic makeup.

With these caveats in mind, Table 2 provides the demographic summaries of four current A2i districts. Two are located in California, one is in New York and the other is in Pennsylvania. The two California districts (Fontana and Anaheim) are the most urban and largest in size among current A2i districts. The other two districts represented in Table 2 are quite small, approximately the size of one to three large CMS elementary schools. All four districts have significant numbers of economically disadvantaged students, ranging from 52% to 84%. All of the districts except Ambridge Area School District in suburban Pittsburgh have majority minority student populations. However, none have significantly large numbers of Black students.

<sup>20</sup> The largest A2i district, Fontana Unified School District in California, has just over 41,000 students but is only currently implementing A2i in half of its schools.

**Table 2. Demographic Data of Select A2i School Districts**

	Ambridge Area SD	Elmsford Union FSD	Fontana USD	Anaheim ESD
State	PA	NY	CA	CA
Total Enrollment	2,316	995	41,116	18,394
K-1 Students	511	189	5,268	5,028
2019 Gr 3 Proficiency	58%	42%	41%	34%
Black	18%	23%	5%	2%
Hispanic	3%	55%	87%	85%
Asian	1%	10%	1%	1%
White	73%	10%	4%	5%
English Lang. Learner	1%	15%	32%	51%
Econ. Disadvantaged	52%	57%	84%	84%

Each of these school districts began to implement A2i in Fall 2018 in grades K-1. Table 3 below shows the first-year implementation results in each of these districts broken down by grade level.<sup>21</sup> These results are from A2i assessments, which as we explained earlier in Part II produce a “Grade Equivalent” (GE) reading level result. The results in Table 3 show the average beginning and ending GE reading level for each grade cohort and the amount of growth that occurred during the school year. A student that enters Kindergarten reading on-level and ends the school year nine months later reading on-level begins with a GE reading level of 0.0 and finishes with a GE reading level of 0.9. Similarly, a student that enters and finishes First Grade on-level begins with a GE reading level of 1.0 and ends with a GE of 1.9.

To make these data easier to interpret, I color-coded the beginning and ending average reading levels for each cohort as follows:

- Figures in red plain text indicate averages below grade level
- Figures in blue italics type indicate averages approaching grade level<sup>22</sup>
- Figures in green bold type indicate averages at or above grade level

<sup>21</sup> While data are available for Year 2 and beginning of Year 3, the challenges posed by the pandemic make us cautious in interpretation of these results. Year 2 was abruptly interrupted by the pandemic, which complicates interpretation of Spring 2020 results. Year 3 began under abnormal at-home testing conditions, which similarly complicates the interpretation of Fall 2020 results.

<sup>22</sup> When reviewing these data, it’s important to keep in mind that a student’s last test date is rarely right at the end of the school year. To account for this disparity and the standard error on any test, we consider a final test that reaches achievement of “current grade plus 8 months” (but less than a full 9 months) as “approaching grade level.”

**Table 3. First Year A2i Implementation Results in Four School Districts**

District	Grade Level	Fall 2018 Avg Reading Level	Spring 2019 Avg Reading Level	Avg Reading Growth
Ambridge Area School District	Kindergarten	-0.023	0.835	8.6 months
	First Grade	0.608	2.156	14 months
Elmsford Union Free School District	Kindergarten	0.060	0.979	9 months
	First Grade	0.713	1.963	12.5 months
Fontana Unified School District	Kindergarten	-0.143	0.732	8.8 months
	First Grade	0.490	1.875	13.85 months
Anaheim Elementary School District	Kindergarten	-0.178	0.822	10 months
	First Grade	0.456	1.665	11 months

(Red plain: below-level; Blue italics: approaching level; Green bold: at- or above-level)

Given the school district demographics, it's not surprising that most cohorts on average started the year reading below grade level. Negative numbers in Fall 2018 indicate average reading performance at the Pre-Kindergarten level. In two instances, first grade classrooms made enough gains for students to catch up by the end of one year. In several other cohorts the average end of year reading level came close to being on grade-level. Evaluation of reading growth (the last column) shows that students on average made significant gains. In the first year of implementation, the lowest performing Kindergarten cohort (in Ambridge Area School District) made 95% of a full year's academic growth (nine months). First Grade cohorts in all four school districts exceeded one academic year of growth.

Note that there is no meaningful difference in first-year total reading growth by grade cohorts in the two smaller districts (Ambridge and Elmsford) with roughly 50%-60% poverty levels and the two much larger districts (Fontana and Anaheim) with over 80% poverty levels. What's also notable is that the larger districts also have higher percentages of English language learners (ELL). Anaheim had a 51% ELL student population but yet over a year's growth for both grade cohorts. It is rare to find strategies proven effective for ELL students. Additional data show even greater growth in vocabulary skills for these students after the first year of implementation.<sup>23</sup> A closer look at the data in Table 3 reveals that the students in the larger districts started the year at lower reading levels than the two smaller districts. Students in these districts had more ground to cover to get caught up by the end of the first year. My understanding is that two years later all of these cohorts on average are on track for reading proficiency by the end of third grade.

Since 2015, the Elmsford Union Free School District in Westchester County, New York has used the i-Ready assessment in reading and math for its students. These data can provide third-party confirmation of the impact of teacher use of A2i on student outcomes. Table 4 below shows the longitudinal results on i-Ready before and after the first year of use of A2i in the 2018-2019 school year. Prior to using A2i, between 36%-43% of K-2 students met English Language Arts

<sup>23</sup> For example, both the Kindergarten and First Grade cohorts at Ambridge and Elmsford grew between 13-18 months in vocabulary during the first year of implementation, outpacing their growth in reading. Improvement in vocabulary skills is particularly important for struggling readers and English language learners.

benchmarks on the i-Ready assessment. After the first year of using A2i to individualize reading instruction, the percentage of students meeting ELA benchmarks on i-Ready jumped from 38% in Spring 2018 to 67% in Spring 2019. Moreover, even though this was a literacy-focused effort, there was also a similar increase in student performance on the i-Ready math assessment (from 35% in Spring 2018 to 57% in Spring 2019). It’s important to remember that these are K-2 results, but A2i was only used in K-1 classrooms in the first year of implementation. It’s the K-1 students that powered this increase in reading and math achievement. One other notable outcome: the district’s superintendent reports that the number of students needing Tier 3 intensive reading intervention dropped from 13 (out of 189 students) in Fall 2018 to zero by Spring 2019.<sup>24</sup>

**Table 4. Elmsford Union Free School District – Third Party Confirmation**

i-Ready Performance Measures	2015	2016	2017	2018	2019
<b>K-2 ELA: % ≥ benchmark</b>	43%	36%	37%	38%	67%
<b>K-2 Math: % ≥ benchmark</b>	36%	33%	31%	34%	57%

The collective evidence from both experimental studies and real-world implementation supports the efficacy of the A2i system on reading outcomes. Moreover, the results appear to be robust – across multiple RCTs, grade levels, school districts, curricula and student demographics. While we have yet to see results from a school district that fully mirrors CMS, the evidence we do have appears compelling and with a depth and breadth that exceeds typical literacy interventions.

**Part IV. The Implications: Improving PreK-3 Literacy Outcomes**

I’ve followed the research behind A2i since summer 2017, but only had the chance to dig into the real-world results over the past 15 months. The *Reading Checkup* has begun to revolutionize our work, providing us with tools we could only previously dream of to empower adults in PreK-3 children’s lives to support their reading development at home. After thinking deeply about the research and evidence behind A2i, here are seven of my key takeaways so far:

- 1) **The Four Types of Reading Instruction.** When I share this research with people, they often quickly focus on the A2i assessments and tools. However, I think the science behind A2i stands on its own. I think of the Four Types of Reading Instruction as an invisible “mechanism” that’s long operated in the background. I think about all interventions we provide to children against this framework and ask how we ensure the system holistically delivers what children need to become successful readers.
- 2) **It’s the minutes that matter.** If it’s true that over 90% of children have the intellectual capacity to become proficient readers by third grade, then it’s up to the adults in their lives to ensure children receive the reading supports they need. These days I ask myself how we can best arrange the system to optimally deliver the right amounts of the right types of reading instruction in the right way to the right students at the right time.

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<sup>24</sup> You can hear directly from Elmsford Union Free School District Superintendent Marc P. Baiocco in a February 2020 local news story about these first-year results: <https://youtu.be/t3NKux8ccXs>. The districts in the A2i experimental studies (2005-2011) also reported declines in the number of students needing intensive intervention and/or referral to special education. Other current A2i districts (2018-Present) similarly report declines in referrals for special education.

- 3) **We need a Science of Reading *Instruction*.** Nationally and at the state-level there is an understandable focus in recent years on the “Science of Reading.” Specifically, the Science of Reading refers to the accumulated interdisciplinary knowledge about how children learn to read. However, understanding how a child learns to read is distinct from knowing how to guide children through this process. Dr. Connor and her colleagues have uncovered key insights into effective reading instruction that should inform this work.
- 4) **Children need both code-focused and meaning-focused reading supports.** A common misunderstanding of the Science of Reading is that it’s solely about phonics. Science of Reading is appropriately phonics-based but also includes a focus on vocabulary and comprehension. As Dr. Connor’s research shows, it is the combination and interaction of code-focused and meaning-focused instruction *together* that creates proficient readers.
- 5) **We are placing artificial limits on our students’ reading achievement.** Any low poverty elementary school with less than 80% of their third-grade students reading at grade level is punching below its weight. Dr. Connor’s research finds that students reading on or above grade level have significantly different instructional needs than below-level readers. Students who start the school year above grade level will significantly benefit from more meaning-focused and child-managed instructional minutes. Unless curricula, professional development and/or instructional coaches provide this guidance, we most likely are artificially limiting our students’ reading achievement by not giving them the types of reading instruction that allows them to maximize their reading growth.
- 6) **We need to update our thinking about reading interventions.** Conventionally, interventions are singularly focused on a specific reading skill or concept. The Four Types of Reading Instruction provides a blueprint for a much needed more holistic approach – one that incorporates *both* code- and meaning-focused skill development. In practical terms, it is a grave mistake to only give a child a reading buddy who really needs phonemic awareness and phonics help. In an ideal world, we’d give them both – a well-supported phonics tutor as well as a reading buddy trained in Active Reading to build both code- and meaning-focused skills and accelerate their reading development. Relatedly, we might more effectively accelerate student reading development by combining access to HELPS fluency tutoring (adult-managed, code-focused) with opportunities for meaning focused activities (such as Active Reading with an adult, peer reading and independent reading).
- 7) **We can get smarter faster.** The A2i platform offers the opportunity to test and refine literacy interventions, especially for targeted student subgroups like English language learners. A2i assessments reliably can be given as frequently as every 6 weeks, which allows for rapid cycle testing, learning and improvement.

### Getting Early Literacy Back On Track

In 2019, only two Title 1 CMS schools – Reedy Creek and University Park Creative Arts – had at least 50% of their third graders achieve *College and Career Ready* on the North Carolina state reading assessment.<sup>25</sup> Getting just 20 more third graders to *College and Career Ready* that year

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<sup>25</sup> Since 2014, only four CMS Title 1 schools in total have ever had 50% or more third graders at *College and Career Ready* on the North Carolina third grade reading EOG assessment: First Ward Creative Arts (2016), Shamrock

would have lifted the overall school percentage to 50% or more in 25 additional Title 1 schools.<sup>26</sup> Moreover, getting just 40 more third graders to *College and Career Ready* would have lifted 13 Title 1 schools to 80%.<sup>27</sup> As of mid-April 2020, we don't yet fully understand the impact of the pandemic on children's reading development in Mecklenburg County. We likely have lost ground from two years ago. But the fundamentals of the Science of Reading – how children learn to read – and the Four Types of Reading Instruction – how adults can guide children through this process – remain unchanged.

Despite the disruption caused by the pandemic over the past year, I believe we can reach our 80% proficiency goal by equipping the adults in children's lives from PreK through third grade with timely information about the amounts and types of instructional activities that match their specific reading needs. At the April board meeting, we will talk about how we have already begun this work by helping families to support children's reading development at home with the *Reading Checkup*. At the June board meeting, I will follow up with further ideas about how we can use these insights and tools more broadly to help our students recover from the impact of the pandemic on their reading development and continue the push toward our 80% third grade reading proficiency goal.

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Gardens (2018), Reedy Creek (2015, 2019), and University Park Creative Arts (2019). This does not include Barringer Academic Center or Cotswold Elementary as these are atypical Title 1 schools.

<sup>26</sup> Allenbrook, Ashley Park, Berryhill, Charlotte East Language Academy, Druid Hills Academy, First Ward Creative Arts, Governors Village, Greenway Park, Hickory Grove, Idlewild, J.W. Grier, Lawrence Orr, Lebanon Road, Mountain Island Lake Academy, Oakhurst STEAM, Pinewood, Reid Park, River Oaks, Shamrock Gardens, Statesville Road, University Meadows, Villa Heights, Walter G. Byers, Winding Springs and Windsor Park.

<sup>27</sup> Allenbrook, Ashley Park, Berryhill, Charlotte East Language Academy, Druid Hills Academy, First Ward Creative Arts, Mountain Island Lake Academy, Pinewood, Reid Park, Shamrock Gardens, University Park Creative Arts, Villa Heights and Walter G. Byers.