**Part IIIa**

# Instructional Implications

**A Review**

The major task of the syllabus on the Science of Reading Words has been to describe, in Parts I and II, a theory that explains how **the mystery of reading words**, so quickly and easily, has been solved by researchers like Linnea Erhi, with added clarifications from brain imaging researchers like Sally Shaywitz. **The theory, as implied from its name, Grapheme-Phonemic Connections (GPC), finds learning letter/sound connections to be an essential part of the solution. Bonding letters to sounds, through learning, provides the means in which printed words can be read as "sight-words". This is where the capacity of speech furnishes the final solution by enabling words to be read in the same way as they are heard in speech.** The GPC theory of reading words is **a phonological model that gives prominence to the sounds in speech in reading**.

"Studies suggest that the activation of phonological information **is a ubiquitous feature** of skilled word recognition." [1.]

Part III a&b attempts to show how this theory influences and affects teaching beginning reading and prevents major aspects of dyslexia.

REVIEW

A brief description of how the theory works is laid out in an email message from Linnea Ehri, on February 2014, as well as in chapters from her edited books and published journal articles.

> "Readers store sight words in memory by forming connections between the spellings of individual words and their pronunciations. **The glue that bonds them is provided by the reader's knowledge of the letter-sound mapping system, that is, knowledge of grapheme-phoneme relations**. This glue secures letters in the spelling of that word to sounds **detected** in its pronunciation."
>
> "The connections linking the letters to the pronunciation **are formed out of readers' knowledge of letter-sound correspondences** (**from spoken language**) and other orthographic regularities **linking print to speech**. When readers see a word they have never seen before **they phonologically recode the word**."
>
> **Once such routes are set up, readers can look at spellings and *immediately retrieve* their specific pronunciations without resorting to translation rules and recoding."** Linnea Ehri, email of February, 2014.

### Where the magic really happens, when the brain appears to take over.

> "It is in performing this grapho-phonic (letter/sound) analysis for individual words that the **spellings of words penetrate (gain access or entry into memory bank of words) and become attached to reader's (phonological) knowledge of spoken words in a way that links written language** to the **central mechanism governing spoken language**." (speech) [2.] Ehri
>
> "Readers who have full knowledge of how the orthographic (alphabetic) system symbolizes units in speech form many systematic connections (thousands) linking visual spelling units in print to pronunciations (of words) **stored in memory**. … **As a result of prior recoding experiences with the wo**rd, individual letters **are connected** to individual phonemes within the word. **Knowledge** of letter-sound correspondences is used **to form these connections."** P. 114. [3.]

According to Ehri's theory of reading words, all good readers read words phonetically. (see Part I a&b) This means that words are read instantly by combining letters and sounds. Letters and sounds are the smallest units of words. This is dramatically demonstrated by how good readers do on a phonetic pseudo-word reading test. It is also confirmed by brain-imaging research. There is no other way to read pseudo-words other than by combining the letters and sounds. Therefore, all readers must learn how to combine the smallest units in print into words which is the alphabetic principle. This is the most basic aspect of the theory of reading words. It dictates what needs to be learned in order to be a good reader. In order to become a good reader, the new reader must learn how letters and sounds are combined to make up words.

The bonding of letters and speech sounds is essentially a result of decoding (deciphering) the alphabetic code. In spite of how letter/sound bonding makes reading words possible, reading words competently is not the same thing as decoding the alphabetic connections. (more technically called phonological recoding. ie, changing the printed code into a phonological (speech) code.)

> "This process differs from phonological recoding (decoding) in that **word-specific connections** rather than translation of rules are used to read words. As a result, the words **are accessed directly in memory** from their print forms…. This means in effect that **readers "see" the pronunciation** when they look at the spelling, and **this event creates direct links** between the spelling and its meaning. " P.116 [4.]

> "**The matter of connections is a crucial one**, for this is what **determines how easy it is for readers to retrieve words in memory** from the visual forms that they see. **Connections are formed and set up in memory from prior experiences reading words**….

Researcher, Charles Perfetti's work has consistently concurred with this view, with an added refinement regarding the instant activation of word recognition.

> "I believe that in skilled reading lexical access **involves phonemic information obligatorily**. Neither 'direct access' nor 'speech recoding' quite captures this idea of **obligatory speech activation**. **It is not that letters are recoded (changed) into phonemes and then phoneme strings are used to access a word**, and it is not that a string of letters (as a whole word) directly accesses the word."

> **"Rather phonemic information is activated during lexical access (cognitively) as an intrinsic part of the process. This activation of speech codes (due to the cognitive access or entry) occurs almost always because speech codes are part of the lexical (phonological) representation**. "(see brain image Part II)

> "However, because letters and letter strings are also associated with phonemes, the opportunity for phonemic activation is doubled: activation of the phonemes by letters and activation of phonemic word shapes by words. **An interactive model extends naturally to allow such activation**." p. 150. [5.] Perfetti

The GPC theory has been confirmed and elaborated by the new technology of brain imaging.

> **"…understanding the phonological basis of reading led neuroscientists to develop neuro-imaging methods** for study of dyslexia based on **the phonological theory**. …. Neuro-biological studies have exploited this information **to provide an even more fine-grained understanding.."** Shaywitz, **Making a Hidden Disability Visible,** In Handbook of Learning Disabilities, 2nd ed. 2013. [6.]

> **[The brain]…"learns to connect and integrate at rapid-fire speeds what it sees and what it hears to what it knows…. All this "with a rapidity that still astounds (mystifies?) researchers."**

> "The awareness of the phonological structure of language(speech) **is the basis for accurate recognition** of known words necessary for basic reading." P. 88 [7.]

> *"In the course of 30 years or so, the idea that reading words requires phonology has ascending from a minority view to one with such a substantial majority that* ***it now amounts to a conventional wisdom****.* ***This sweeping change of opinion can be celebrated as a triumph of reading science."*** [8.]

As stated in Part I, **all reading at the word level uses hidden, innate, phonological information that comes from speech and connects to print at the level of the smallest letter/sound units**. **The concept of sight-word reading has been re-conceptualized from a predominantly visual activity to a "phonologically based reading of words"**. It has become a new standard for evaluating instruction. It gives a clearer understanding of what skilled reading – the end point of learning – looks like. To be considered best practice, instruction, by whatever means, must demonstrate this proficiency in reading words.

The body of research and work on this question has resulted in a consensus on the theoretical model. It has thus resolved the "Great Debate" about what the central emphasis of teaching should be in beginning reading or in corrective reading. The emphasis, at first, should be in learning the alphabetic code, not in the meanings conveyed in print.

A team of prominent researchers have stated this conclusion this way.

> *"From … different sources of evidence, two inescapable conclusions emerge: (a) Mastering the alphabetic principle (that written symbols are associated with phonemes) is essential to becoming proficient in the*

> *skill of reading, and (b) methods that teach this principle directly are more effective than those that do not (especially for children who are at risk in some way for having difficulty learning to read)."p. 31* [9.]

According to Seidenberg, in his 2017 publication on **the science of reading**,

> "For reading scientists the evidence that **the phonological pathway** is used in reading and especially important in beginning reading is about as close to conclusive as research on complex human behavior can get." P. 124 (2017)
> "Researchers disagree about many details – it's science, not the Ten Commandments – but there is **remarkable consensus about the basic theory of how reading works (at the word level**) and the causes of reading successes and failures." (Citations were made from five publications since 2001.) [10.]

**What can go wrong?**

Possibly the most valuable contribution made by the GPC theory is assisting in finding a more thorough explanation for how reading can go wrong in the condition now defined as dyslexia and its treatment or prevention. **As theoretical studies have revealed, dyslexia is a neurological weakness in speech, (a phonological deficit) present in some individuals, that has ill effects on reading** (at the very beginning of reading). It interferes with reading at the place where reading and speech are joined by the alphabet in identifying words and in reading words fluently.

This definition gives a clearer understanding of what uniquely needs to be accomplished with dyslexic children. It specifies, at the base, that, any method used, must produce evidence of strengthening phonological weaknesses, observed in learning foundational L/S skills for reading words.

> "There is voluminous evidence that reading difficulties are associated with poor performance in tasks that demand a deep form of **phonological sensitivity** – in particular, tasks that require the more explicit forms of phonemic segmentation." p.12 [11].

This understanding also gives direction and criteria for identifying and evaluating best practices for all beginning readers, and specifically for treating or preventing dyslexia. Even for most new readers, the initial joining of print to speech sounds can be an obstacle to over-come that all instructional practices must address successfully, in order to make the entrance to reading as smooth as possible.

## IMPLICATIONS FOR INSTRUCTION

**WHAT ABOUT INSTRUCTION? Relating theory to Practice? The most important aspect of the GPC theory, however, ends up being how it influences decisions on its application to instruction.**

The consensus on the GPC theory has led to a unique spirit of optimism for improved instructional methods and programs, noted in the ***Scientific Study of Reading,*** **Introduction, first issue.** (1997)

> "Reading instruction … can (now) be designed with greater validity than ever before because of a solid, converging body of scientific research on **reading acquisition**, **reading processes**, and **reading disabilities**. Basic and applied research has established the linguistic, **primarily phonological nature** of reading difficulty. It has cast doubt on the possibility that orthographic processing or 'visual memory' approaches can compensate for, or provide an effective bypass for, a **learning process that depends heavily on the use of phonological codes** in working memory." [12.] SSR Vol 1, #3. Louisa Moats and Barbara Foorman.

With a widely accepted theory of how words are read, it is safe to assume that any teaching method or program of methods should at least be consistent with the theory. Some aspects of instruction are actually drawn directly from the theory.

**But there are problems**

Unfortunately, even with the Great Debate being resolved, which is a big deal, the same degree of consensus among researchers on theory, does not exist on the question of instructional practices. This is partly due to the fact that there are limits to what teaching practices can be determine by theory. A **theory cannot give definitive directions for all instruction. By describing how words are read, theory can only help identify the goals of reading words.** The GPC theory has accomplished an improved understanding of what good reading of words consists, ie, "cipher sight-word reading", and how it can go wrong. **This clarifies WHAT the content should be in teaching beginning reading, not methods on HOW it can be accomplished**.

However, the newly established phonological basis does set up significant constraints on the kind of instruction that produces the outcomes. It clearly specifies that learning phonological knowledge and skills need to be given a prominent place in any teaching methodology. **Reading starts with speech**. (Seidenberg, p. 15)

The GPC theory therefore represents a major advance in reading instruction. It does narrow the options and gives direction in finding best practices. It does provide a clearer picture of what good reading looks like, at the word level. The final decisions on the question of HOW the objectives are achieved require research of instruction itself, **to assure that teaching practices do actually attain the desired results described in the theory**. The theory also has value in providing an additional explanation for why practices, already verified, work so well.

How this learning is acquired is a separate question. The best way of teaching this learning can only be determined separately through a different kind of research. The primary question here is: do the beginning readers learn this basic way of reading on their own , as a result of informal experiences with printed texts, or do they need to be taught in a more planned-out detailed manner. Do the details of how letters and sounds are related in the English language need to be identified and taught in some particular order, or is this something that the new readers can gradually learn with no or with minimal, random, as needed, instruction?

This question has been argued and argued. The theory of reading words has settled some aspects of this argument. It has settled what needs to be learned at this level. The phonetic details of letter/sound connections must be learned, one way of the other. It has been demonstrated that other ways of explaining how words are read, other that using the alphabetic principle, do not apply to good readers. (see Part I)

The same team of prominent researchers puts the question this way.

> "For an alphabetic writing system, a child must learn that letters and letter strings correspond to speech segments. The alphabetic principle, the idea that written symbols are associated with speech sounds, is the key design principle of alphabetic writing and must be grasped by the child. Whether this knowledge is acquired implicitly (through the extraction of print-speech correspondences in text) or explicitly (through direct instruction) varies among children. p. 36 [13.]

**Distinctions Between Theory and Practice**

Whatever influences a phonologically based theory has on instruction, instruction must be ultimately determined and researched separately. For example, the GPC theory asserts that teaching practices must produce letter/sound attachments necessary for reading words and must strengthen neurological activity needed in dyslexic children, yet, how these attachments are attained must be researched beyond the theory. Practical methods must undergo verification from a separate line of inquiry. Yet, as it did for brain imaging research, the GPC theory has given an improved direction to research on instruction in identifying the most likely effective practices to be examined.

Philip Gough, an influencial theorist, stresses the need for maintaining a distinction between theory and methods. He makes it clear that his first concern is in the theory, not practice.

> "It **might be** that direct instruction in synthetic phonics is the fastest route to skilled reading. …. The question of the **role of decoding in reading** and that of its place in **reading instruction** are **surely related**, but **they are distinct questions.** We are concerned only with the first, the question of the connection between decoding skill and reading ability." **14.**

He…

> **"argued that learning is distinct from teaching**, that whatever or however they might be taught, what will determine how children read is what they internalize. … **There is only one way to read well and that is with the aid of the (alphabetic) cipher. Thus, however children are taught, whether by phonics, whole-language, or some eclectic method, they must master the cipher (alphabetic system), or they will read poorly if at all**." **15.**

In keeping with this distinction between theory and practice, instructional methods by researchers have often been left vague. This is seen in the following statement by Ehri, "**Special experiences are needed to engage the brain in deciphering print**." p. 5 **16.** "Special experiences" are left ill-defined, other than they need to be "special", beyond the untaught, general experiences with reading materials. "Deciphering print" does not come naturally and must meet the criteria for reading words described in sound theory. The "experiences" are "special" and must be a part of the planned experiences of children, However, what constitutes these planned "special experiences" needs to be further defined by instructional research and program development.

**Mistakes can be made in not maintaining this distinction.**

Theory and Practice tend to act as checks on each other. Faulty theories, without instructional research verification, as a check on the theory, have directly led to faulty practice. A faulty theory in the turn of the 20th century led to the ineffective "look-say" teaching practice during more than the first half of the century. This happened again in the 1960's when a faulty view of how words are read, led to the "whole-language" teaching practice that failed to be verified.

Because of the primacy of phonology in reading words, the GPC theory's focus has eliminated some instructional practices that do not give phonology this importance, i.e. whole word/whole language. On this point, there now is consensus among researchers. The married team of Liberman and Liberman, from the Haskins Laboratories, have made the contrast between a "Meaning Emphasis" approach from which word recognition derives and a "Code Emphasis" approach which requires breaking words into their phonetic spelling components.

> "Whole Language proceeds from the premise that learning to speak and learning to read are entirely comparable instances of language development." P. 343.
> "We take it as given, therefore, that in teaching children to read and write, our aim must be to transfer the wonders of phonology from speech to script. In our view, this can be done only if the child comes to understand the alphabetic principle, the insight that words are distinguished from each other by the

> phonological structure that the alphabet represents. Surely, this is the principle that links the less natural mode of written communication to its natural, spoken base, and so makes available to the reader – writer the ready-made phonological system that gives to speech the incalculable advantages it enjoys." P. 349 [17].

Even from a solid theoretical perspective, errors can be made in translating a valid theory into practice, without research for support. In these cases, **recommendations on practice, even if based on a valid phonologically based theory, can be premature in terms of having independent verification.** Errant teaching practices, drawn from the GPC theory, that **lack the follow-through research**, run the full spectrum from informal discovery to directly structured and detail planned interventions that haven't been tested against other options. (see below in the discussion on phonemic awareness tasks and teaching decoding skills) These lapses contribute to the lack of consensus on the practical level, even though they seem implied in sound theory.

What is not settled is how this basic way of reading words is best learned and how it is best taught. Does the theoretical research give any guidelines or clues about this question? Researcher and theorist, Phillip Gough, has studied how many children learn to read words without instruction. His studies

> "show that in the absence of reading instruction and knowledge of letter-sound correspondences, children can approach a reading task by memorizing the visual images of words, without learning how the sound-letter system works. Moving to productive reading requires more than memorizing printed words."

For example, he made the following observation.

> "Most of the knowledge that is acquired in the process of *typica*l reading development is discovered by the child during interactions with print. As children read, they notice useful generalizations about print-sound relationships, and they also learn to recognize many words "by sight" which is the first step toward fluent reading." [18].

**Kieth Stanovich, conceded this possibility.**

> "(However) this principle ( alphabetic) may be **induced**; it may be acquired through direct instruction; it may be acquired along with or after the build-up of a visually based sight vocabulary; but it (the alphabetic principle) must be acquired if a child is to progress successfully in reading." [19].

**Gough's ideas on how to teach the alphabetic principle are ambiguous**, with little specifics on how it can be accomplished. It appears to be the result of a combination of discovery and unspecified instruction. Within his similar understanding of Ehri's term, "cipher reading", he asserts that beginning readers learn to read as alphabetic ciphers in a Two Stage process:

> 1.) visual memory, called visual-cue reading and
> 2.) alphabetic, phonetically based cipher word reading (like in GPC).

From these observations, Gough and his group, made the dubious assertion that **all children initially** learn to read by first memorizing words, similar to a Look-say approach.

> "Unlike skilled readers, **beginning readers are supposed to see words 'globally' or as 'wholes'**, to view them as if they were Chinese characters, or to recognize words as they might recognize a tree or a face." [20]. P. 36

In this view, memorization eventually evolves and transitions, mysteriously and unsystematically, into a more advanced alphabetic stage, which he calls cipher reading. It gradually advances into a full application of the alphabetic principle by skilled readers. New learners make this transition **when** the "*pool of distinct features*" used to visually identify whole words, in the early stage, **is exhausted within the learning history of individual children**. It is assumed that **new readers, at some undisclosed point, find that this method ceases to work**. For a time, **this "*mounting confusion and frustration eventually results in a shift to cipher reading***". Any planned way of inducing **this**

**shift was rejected as inappropriate**. It was assumed that each individual could and should work this out from *exposure, in one way or another, to print*". Ehri writes about Gough's view in one of her studies that focuses on this "shift".

> "Gough and Hillerger (1980) did not write much about the course of development of cipher reading. Almost certainly, it does not emerge all at once in its full-blown form. Gough and Hillerger referred to **a period of time** during which **the beginning reader '<u>must be exposed, in one way or another</u>, to enough printed word-spoken pairs <u>to extract</u> (discover) the necessary correspondences**." [21.]

Thus, according to Gough's limited observational studies, many children learn to use the alphabet for cipher reading, by discovery or accident, without being deliberately taught letter/sound relationships in any planned or strategic way. It's hard to believe that the successful new readers didn't receive some direct instruction or guidance in learning some aspects of the phonetic structure of words.

It is interesting to see that Gough, and et al., still do base their views of how children best learn to read words well on a phonological theory, but how these skills are acquired and put to use was still "*an important mystery*" to solve. In studies, he found that capable cipher reading children in grades one and two (the top readers?), **coincidently**, did well on various phonemic awareness tasks and could read at least as many, or more, pseudo homophones as they could irregular words. The studies discovered that high phonemic awareness skills go hand-in-hand with learning to read well. Children with these skills could learn to read and spell new unfamiliar exceptional words faster and more accurately than children who are poor readers. They obviously had learned the alphabetic principle, somehow. How successful the rest of the classroom group was, how the capable ones really learned and how long it took them to attained this high level of reading words, in reality, for better or worse, **varies greatly**.

**The evidence for this understanding is not supported. It's a mistake**.

> "First graders who are at risk for failure in learning to read do not discover what teachers leave unsaid about the complexities of word learning. As a result, it is important to teach them procedures for learning words". [22.]

**From her own work, Ehri advances another example of this lapse in verified follow-through instruction, that has similar features**. In attempting to apply her GPC theory to instruction, she has proposed a **mixed five-phased teaching approach**. (not much on how it's done) The first phase involves teaching only partial phonetic connections that are informally discovered (some guidance but not systematic). How the following phases progress towards the more advanced, full phonetic reading, and transition to sight-word reading is not well described. This occurs in spite of being the primary writer on the **National Reading Panel** report that stresses both explicit and systematic teaching of phonics. (more on this later)

**Stanovich** eventually concluded that "**direct instruction"**, not discovery, incidental or accidental learning "***is one of the most well-established conclusions in all of behavioral science*"** for teaching the necessary alphabetic principle. [23.] This general statement refers to the degree of explicitness, not necessarily how systematic the instruction should be.

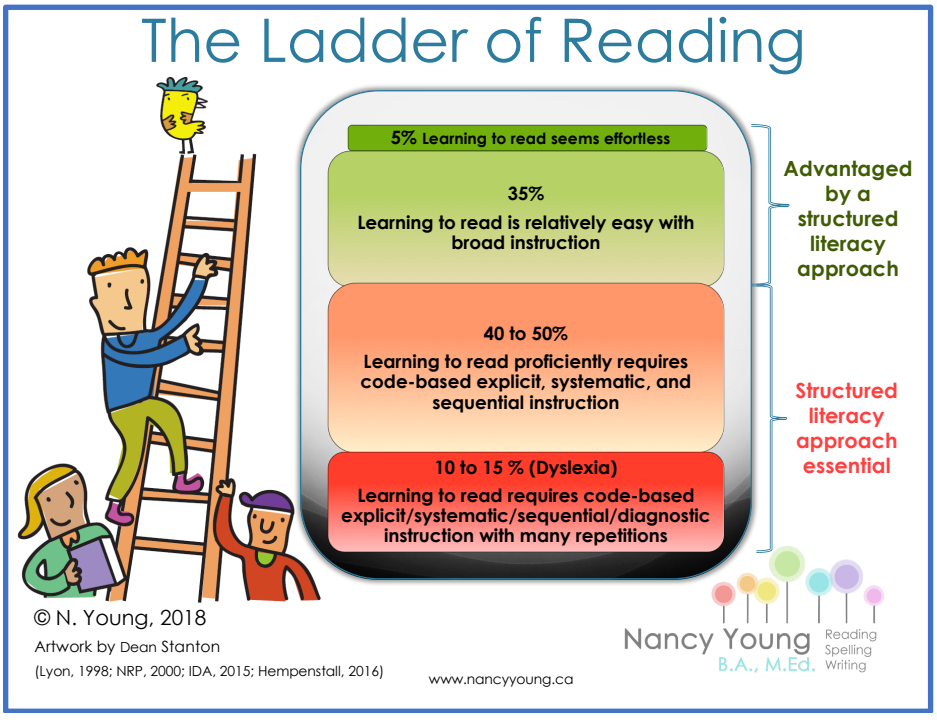
**As it turns out**, increased research at the practical level has progressed simultaneously with research on theory, especially since the early 1970's. Therefore, the **science of theory and practice have significantly come closer together for improved decision making on best practices**. Both fields of research, developed in parallel over the same period of time, have ended up largely coinciding, with some remaining lapses, and intersecting in a reciprocal relationship, therefore providing improved confirmation for each other. This is especially true for early reading and for teaching those with learning difficulties.

Does the theoretical research give any guidelines or clues about the question of "direct instruction"?

In fact, it does. Studies of young readers show a gradation of capabilities with learning the relationship between letters and sounds in speech. At this critical base of learning, theoretical research and instructional research coincide at this point. Both theoretical and instructional research demonstrate that the primary source of difficulty in learning to read is with learning letter/sound relationships. Theoretical studies indicate that this difficulty is centered on the speech or phonological side of the relationship, and that these difficulties are distributed among the human population along the line of the normal curve. [24.]

It stands to reason that how these relationships are taught would somehow coincide with this normal distribution of differences in neurological capabilities. In fact, instructional research does indicate that instruction should be differentiated accordingly to the amount of difficulty children are having with learning these relationships. The Response to Instruction or Intervention (RTI) model aptly applies to this situation. The prescription often is that those with more difficulties need more explicitly planned instruction compared to those with less or very little difficulty. Intervention research for children with dyslexia and other reading difficulties confirm this contention. The details for implementing this concept are left up to curriculum developers and teachers. (see Part III b for examples)

There are estimates that provide a general view for making this determination. The percent of children with the learning disability of dyslexia are in the range of 20% to 30%. Nancy Young has created a graphic that summarizes the statistical basis for making differentiated decisions in instruction.




The estimated percent of those who may need less planned instruction is small. The question here is: would a more detailed plan benefit them regardless or would it do them some harm. The other

problem with implementing this kind of differentiation is in identifying individuals, early, like in kindergarten, who fall into each group.

The screening tests to identify those who may fall in the lowest group have value, but they are not 100% accurate at the kindergarten level. These children would be screened early, or be identified from their difficulties in learning from core approaches and programs during the year, and then given interventions that are more explicit. Other researchers and curriculum developers have programs that demonstrate a particular direct approach, with both explicit and systematic features, that are appropriate for all children, during the kindergarten. This would avoid the risk of failing a significant portion of the population with a less explicit approach before they are given more appropriate teaching.

The RIT model requires some initial teaching to see the kinds of responses there is to core classroom instruction. This may waste valuable time if the core program is only mildly explicit and provides just **minimal guidance**. Researchers, Snow and Juel, in examining this question have recommended teaching all beginning readers, at first, as if they are in the lower level and then adjust the pace and explicitness up from there, during the course of kindergarten and first grade. Their phrase about the more explicit approach is:

**"It's helpful for all children, harmful for none, and crucial for some."**

> "In our view, then, the findings from a wide array of sources – studies of reading development, studies of specific instructional practices, studies of teachers and schools found to be effective – converge on the conclusion that attention to small units in early reading instruction is helpful for all children, harmful for none, and crucial for some. This finding is richly supported in studies done both in the US (NRP, 2000) and the UK (Hatcher, Hulme, & Snowling, 2004). In light of this convergence, it is perhaps puzzling that there remains any conflict about methods for teaching initial reading. " (p. 518) [25.]

**A clarification of terms.** The term direct instruction, used by Stanovich, generally refers to the act of breaking larger objectives of reading into smaller, more explicit components to focus teaching, to some degree, on isolated components before integrating them into larger aspects of reading. The term "direct instruction" has also been used to contrast a Code Emphasis teaching of reading approach (explicit alphabetic principle, phonics) from a Meaning Emphasis approach. It's a general term that requires further specification on how detailed components are taught. It simply divides two general approaches to teaching - a Code Emphasis with more direct focus on the alphabetic code and Meaning Emphasis that does not. Research studies tend to lack information on the kind of systematic details of teaching needed for the general term of "direct instruction".

In general, the term "direct instruction" does connote how theoretical and instructional research interact and coincide – that details matter. It also attempts to indicate the importance of finding the best practice in teaching all beginners in the most effective manner.

On the general question, there has become a consensus among researchers in favor of **some kind of planned direct instruction**, remaining vague about how systematic or what particular design of directness is preferred. The arguments of Katheryn Snow and Connie Juel speak for the importance of explicit "small units", without much said about the systematic arrangement of their presentation to children in classrooms. The over-all belief is that waiting to see what children can work out how to read on their own risks unnecessary failure that eventually results in costly extra effort and teachings. Even the time that it takes for the more capable to work it out could be better used in advancing their reading, after a more direct route towards learning the alphabetic principle is taught to them.

In a recent review, [26] Kerry Hempenstall points out the importance of making a more direct route into a carefully systematic plan.

> "For initial instruction in a skills/knowledge area, however, systematic instruction is generally found to be superior. Additionally, when students are not self-starters, they are inclined to struggle with new learning, then again systematic instruction is generally found to be superior."
>
> "After half a century of advocacy associated with instruction using **minimal guidance**, it appears that there is no body of sound research that supports using the (less planned) technique with anyone other than the most expert students."
> "The debate over effective teaching is not simply technical. Reading researchers over the years have argued that the notion of learning to read by discovery is cavalier and prejudicial to the progress of at-risk students — those least likely to induce the alphabetic principle, and who make up the majority of the children who do not learn to read adequately. 'Discovering' how to read is time-wasting and fraught with risk. If it were true that everyone has a unique reading style it would be understandable, but neuroscience has shown how similar are the processes we employ in reading."

Advances in instructional and theoretical research have been made in regards to identifying what the crucial "small units" are. The remaining decisions regarding the level of clarity and specification and how much and what kind of systematic procedures are most effective in their presentation are a source of much discussion. Eventually the term direct instruction has been displaced by the terms, explicit/systematic in research literature in referring to curricular programs. This usually involves some kind of plan or set of principles that guides how the more explicit components can be, or should be most effectively, sequenced, or grouped, presented, so that progress towards larger combined components of reading words is made by children with various capabilities to learn.

Such a plan requires critical details. It assumes that the grand objectives in reading can be broken down, from larger to smaller **increments** that can be directly taught to most early learners. Teaching beginning reading **requires how-to-do-it details from lesson to lesson**. Somehow the explicit parts need to be put into some kind of order. (The miracle is in the details!) This is particularly crucial for children that, for whatever reason, are having difficulties. Hempenstall clarifies what this means.

> [Once component parts have been broken down in to the 'small units']"The plan is constructed in a logical sequence that proceeds in a hierarchy from simple to complex objectives. There is a planned and observable outcome of the instructional sequence, and the sequence commences from the point at which the students are already competent. The sequence is usually dissected into manageable chunks (small units) that are presented without ambiguity."

Hempenstall has stressed how crucial a direct, planned approach, both explicit and systematic, is for children who start school with potential "at-risk" learning characteristics.

## The National Reading Panel Report of 2000: A Major Source for Research on Instruction

Fortunately, the line of research on instruction, that began in the 70's and ran in parallel to theoretical research, came to a climax in the 2000 landmark report of the congressionally commissioned **National Reading Panel** (NRP) Their report helped in answering questions regarding degrees of direct/explicit/systematic instruction. The **Panel** was charged with the responsibility of examining the effectiveness of instructional reading programs and of identifying kinds of methods that consistently result in reading success. As a general indication of how important a direct instruction approach is, the **Panel** broke the over-all objective of learning to read into **five essential components**: **phonemic-awareness**, **phonics** (letter-sound correspondences), **fluency** (speed),

**vocabulary** (oral base) and **comprehension** (ultimate purpose). This presented teachers and curriculum programmers with a tool to help make decisions on what general approach to teaching reading would be most beneficial in constructing and organizing their teaching plans.

For this report, thousands of studies conducted since 1966 were surveyed. The most scientifically conducted studies were selected for review, analysis and synthesis of the accumulated evidence. It is the largest, most comprehensive review ever conducted of research on how children generally learn to read best. It is recognized as a major source of research on teaching reading and has provided recommendations that showed up in published curriculum programs during the first decade of the 21st century.

Considering Ehri's position on the Panel as lead writer of the first two chapters, Phonemic Awareness and Phonics, the consistency of this report with her GPC theory is understandable. Each of these two chapters were published in journals in 2001, with Ehri as primary writer. The NRP report on instruction resolved the question regarding the kind of focus and approach to teaching beginning reading that is most effective. In a recent review of the Panel's report, Susan Brady, of the Haskin Laboratories, made the following conclusion.

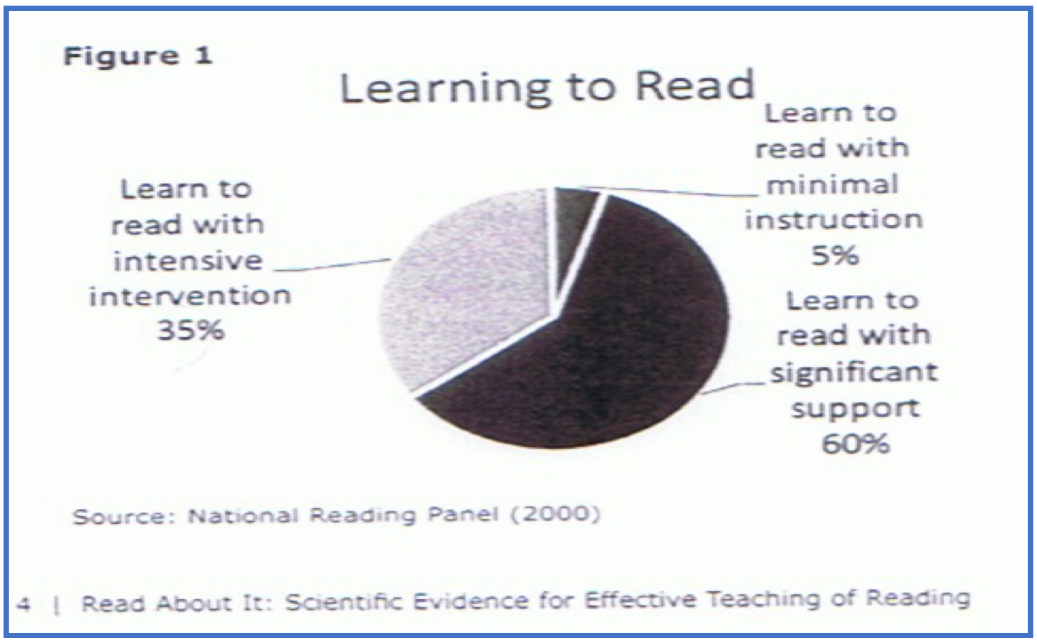
> "The case for the value of systematic, explicit phonics instruction was quite compelling. The convergence of the body of research indicated that **code-based instruction** is beneficial for pupils, particularly in the early grades." [27].

The terms "**explicit systematic**" appear throughout the Panel Report.

- ***Systematic and explicit phonics instruction is more effective than non-systematic or no phonics instruction.*** (i.e., basal programs, whole-language approaches, regular curriculum, whole word curriculum, and miscellaneous programs)
- Systematic and explicit phonics instruction makes a bigger contribution to children's growth in reading than instruction that provides non-systematic or no phonics instruction.

This approach was particularly applicable to students in kindergarten and first grade, as well as children with learning disabilities and low SES. [28].

The Panel reported that this approach was valuable for about 60% of the total school population, those that find early reading somewhat difficult and about 35%, who have great difficulty. [29].



As a result of this report, wide use of the terms, explicit/systematic" became evident in programs. **Douglas Carnine,** in his 2010 text, **Direct Instruction Reading**, (5th edition) [30.] **summarized the effect of this report on reading programs.**

> "By 2002 all the major publishers of comprehensive core reading program had produced new programs that incorporated to varying degrees the finding of the National Reading Panel. The biggest changes in these programs were in how beginning reading was taught. The new programs made more of an effort to explicitly and systematically teach phonemic awareness and phonic skills and to provide exercises to teach students to apply this knowledge to reading text."

**Many questions** within the Panel's frame-of-reference remain. Susan Brady summarizes questions that have risen since the report was published. **Questions regarding: …**

> "concerns (about) whether a **particular method** of teaching systematic phonics makes a difference in student progress in learning to read." [31.]
>
> - "**methods vary in size of phonological or orthographic units,** (small units)
> - **how explicitly patterns are identified,**
> - **systematicity of sequencing,** (how systematic are sequences in use)
> - **the extent of phonics concepts covered,**
> - **and the types of activities employed.** (the kind of PA and decoding tasks used.)
>
> (see paper, **Where Research has Failed**, C. Arthur,)
> http://arthurreadingworkshop.com/wp-content/uploads/2018/09/WhereResearchHasFailed_5.pdf

Brady reports that researched answers to these questions **has so far not** been conclusive. This leaves a lot of unanswered questions, answers that teachers need for planning instruction.
Carnine explains…

> "**While this movement is very positive**, it is important for teachers to be careful consumers. **The translation of research into practice is still in an early stage.** While the findings of the National Reading Panel have provided **general guidance** on teaching reading, **the research findings do not yet provide specific guidance regarding how to put together all the elements that constitute a reading program that can bring success to all children.** Just because a program is based on scientifically based reading research **does not mean that the authors have put these elements together in a manner that will provide success to all children**." 2010. Pg 44

## The need for still greater detail

**Because of the general nature of the report, teachers need to add more critical details or features to their instructional plans in order to apply the general findings in the classroom.**
The report lacks the detail for "appropriately designed systematic instruction" that works in classrooms. "The additional features would include…

- **the amount of new material introduced on each lesson**,
- the **nature of the reviews** that children receive,
- the ways in which the program **tests mastery**,
- the number of times something is presented in **a structured context** before it occurs in other contexts,
- and many more technical details about **how the material is constructed and field-tested**." [32.]

In an attempt to answer these lingering questions, Carnine clarifies, in more detail, what explicit/systematic can mean.
**Explicit** teaching means ….

- "The teacher clearly models or demonstrates (and, if needed, explains) what she wants students to learn.
- The teacher focuses precisely on what she wants students to learn.
- The teacher clearly reveals the concepts and rules she is presenting through modeling and running commentary to students."

**Systematic** teaching includes …

- "a planned, logically progressive sequence of knowledge units (e.g., a carefully selected set of letter-sound relationships introduced into a logical sequence),
- clearly defined objectives (stated in terms of what students will do) for each knowledge unit,
- planned distribution of practice to build fluency and retention, and
- planned work on new examples (e.g., words, text) to foster application or generalization of previously taught knowledge." Carnine 5th ed.

Carnine quotes a summary, by his colleague, Siegfried Engelmann, of the kinds of details that an effective program needs. [33.]

⇒ *" prickly details on how the tasks are formulated,*

⇒ *how the example sets are designed,*

⇒ *how the details of lessons are organized and sequenced from lesson to the next so that only about 10-15% of each lesson presents brand new material,*

⇒ *how exercises are designed so they are unambiguous about details of the content, and therefore,*

⇒ *how the analysis of the content permits the progressive and systematic transmission of the content to the average and low-performing students. …*

*(Without this) the moment-to-moment performance of the students would not be smooth and successful but bumpy, with no control of tiny details that could make it smooth."*

In the recognition that this whole area, of determining what teaching details are needed to carry out the Panel's strong recommendation, still needs research, Carnine makes this cautionary statement:

*"Our suggestions do not necessarily represent the best way to teach or the only way to teach specific content. They are meant to illustrate how general principles can be translated into specific procedures."*

Since their 1st edition in 1979, Carnine and his colleagues have sought to fill in the necessary details on how a direct instruction, explicit systematic teaching approach to teaching beginning reading in classrooms, can be applied. The validity and consistency of much of the content and procedures of this work have been confirmed by the findings of the NRP. The intension of Carnine's textbook has been to provide a source for teachers to incorporate aspects of the NRP report into their own programs.

(a shorter, paperback version of the text can be found in **Teaching Struggling and At-Risk Readers: A Direct Instruction Approach,** D. Carnine et.al. 2006)

Some finer points, consistent with the NRP report, by Carnine

How to apply **explicit teaching and principles of sequencing in classroom teaching.**

1. Demonstrate by using a model, lead, test or "I do, We do, and you do" procedure.
2. Control the Language Used in Teaching Skills and Strategies.
3. Introduce One New Skill at a Time.
4. Provide Guided Practice in Applying Strategies
5. Present Appropriate Introductory Examples
6. Provide Discrimination Practice

Principles on how to **sequence content**.

1. Teach Pre-skills of a Strategy Before the Strategy is Presented
2. Introduce High-Utility Skills Before Less Useful Ones
3. Introduce Easy Skills Before More Difficult Ones
4. In presentation, separate Strategies and Information Likely to be Confused.
5. In daily lessons introduce New Information at a Realistic Rate
6. Provide Adequate Practice and Review.

**Mastery and Sequencing work hand-in-hand. Without mastery**, the sequencing can quickly become too difficult as children progress through their programs. Without mastery in each lesson, children will soon not be ready to move on. They will then begin to struggle, create their own compensations or avoid learning altogether.
**In reverse**, **without careful sequencing**, mastery would be difficult to consistently attain. It's measurement would be erratic.

The Florida Center for Reading Research (FCRR) has described the two aspects of direct instruction.
http://arthurreadingworkshop.com/wp-content/uploads/2018/01/Part1WhatIsSystematicDirectInstructionInReadingFCRR-FAQ.pdf

> **Q. 1. What is systematic instruction? A.** Systematic instruction refers to a carefully planned sequence for instruction, similar to a builder's blueprint for a house. The plan for systematic instruction is carefully thought out, strategic, and designed before activities and lessons are developed. Systematic instruction is clearly linked within, as well as across the five major areas of reading instruction (phonemic awareness, phonics, fluency, vocabulary, and comprehension). For systematic instruction, lessons build on previously taught information, from simple to complex, with clear, concise student objectives that are driven by ongoing assessment. Students are provided appropriate practice opportunities which directly reflect instruction.
>
> **Q. 2. What is direct instruction? A.** Direct instruction is an instructional approach that utilizes explicit and structured teaching routines. A teacher using direct instruction models, explains, and guides the students through extended practice of a skill or concept **until mastery is achieved**. The lessons are fast paced, students are academically engaged, and teachers are enthusiastically delivering instruction. Direct instruction is appropriate instruction for all learners, all five components of reading, and in all settings (whole group, small group, and one-on-one).

## The purpose that Carnine wished his text would serve

"Direct Instruction Reading presents information on how to provide success to students through structuring initial teaching procedures so that

- ◊ the teacher presentation is clear;
- ◊ using language and demonstrations that can be understood by all children;
- ◊ sequencing the content to be sure that all essential skills and knowledge are taught in an aligned and coherent manner;
- ◊ using teacher presentation techniques that foster a high degree of interaction between teacher and student; and
- ◊ providing adequate practice and review to develop high levels of fluency and accuracy." P. vii

Carnine's, model of explicit and systematic instruction was drawn from two lines of scholarship and curriculum development:

1. The vast body of research on teaching reading made available over the last fifty years, plus a synthesis of the "teacher effectiveness" research. Work on the latter, included a set of teaching functions for teaching in small steps with student practice after each step, guiding students during initial practice, and ensuring that all students experience a high level of successful practice. [34.]
2. The work of Siegfried Engelmann and his colleagues in the research and development of classroom programs that apply the above knowledge. These programs include all the necessary details and scripted daily lessons that teachers need to teach reading. Their work goes beyond the generic direct instruction model found in Carnine's text by providing more details in its implementation. [35.] The programs were collectively given the proper noun, Direct Instruction.

The effectiveness of this model has been reviewed in a recently published report by Jean Stockard and Timothy Wood. [36.] And demonstrated by the series of six Arthur Academy Charter schools since started in 2002. [37.]

REFERENCES FOR Science of Reading at the word level, PART IIIa, pgs. 1-15

1. Cognitive Processes in Early Development: Accommodating Individual Differences into a Modal of Acquisition. Stanovich, Kieth and Share, David. Issues in Education, Contributions from Educational Psychology, Vol.1, #1, 1995
2. Learning to Read Words: Theory, Findings, and Issues. Ehri, *Scientific Studies of Reading*, Vol. 9 (2) 2005

3. Grapheme-Phoneme Knowledge Is Essential for Learning to Read Words in English, L. Ehri. P. 9-11, Chapter one, in Word Recognition in Beginning Literacy, J. Metsala & L. Ehri, (Eds.) (1998)
4. Ibid
5. Phonology Is Critical in Reading, But Not the Only Source of Low Reading Skill. Charles Perfetti. In Explaining Individual Differences in Reading: Theory and Evidence. Brady, S. A. , Braze, D., & Fowler, C. A. (Eds.) 2011
   The Representative Problem in Reading Acquisition". Charles Perfetti, chapter 6 In, Reading Acquisition, Gough, Ehri and Treiman (Eds.) 1992
6. Making a Hidden Disability Visible. What Has Been Learned from Neurological Studies of Dyslexia. S.E. Shaywitz and B. A. Shaywitz. (chapter 34) In H. L. Swanson, K.R. Harris & S. Graham, (Eds.) Handbook of Learning Disabilities, 2n ed. 2013
7. Phonology Is Critical in Reading, But a Phonological Deficit Is Not the Only Source of Low Reading Skill. Charles Perfetti. Chapter 8, In Explaining Individual Differences in Reading: Theory and Evidence. P. 153-171. Brady, S. A. , Braze, D., & Fowler, C. A. (Eds.) 2011
8. Ibid
9. How Psychological Science Informs the Teaching of Reading, Rayner, K., Foorman, B., Perfetti, C., Pesetsky, D., & Seidenberg. *Psychological Science in the Public Interest. Vol. 2. No. 2. 2001.*
   http://arthurreadingworkshop.com/wp-content/uploads/2019/01/PSYCHOLOGICALSCIENCE.pdf
10. Language at the Speed of Sight. How we read, why so many can't, and what can be done about it. Mark Seidenberg. 2017
    The Ignored Science that could Help Close the Achievement Gap. *The Atlantic*, November 4, 2016
    http://arthurreadingworkshop.com/wp-content/uploads/2018/04/ScientificExplanation.pdf
11. Explicit syllable and phoneme segmentation in the young child. Libermand, I., Shankweiler, D., Fischer, F., and Carter, B. Journal of Experimental Child Psychology, 18, 201-212. (1974).
12. Introduction to Special Issue of SSR: Components of Effective Reading Instruction, Louisa Moats & Barbara Foorman. (Eds.) *Scientific Studies of Reading*, 1(3) 1997
13. How Psychological Science Informs the Teaching of Reading, Rayner, K., Foorman, B., Perfetti, C., Pesetsky, D., & Seidenberg. *Psychological Science in the Public Interest. Vol. 2. No. 2. 2001.*
    http://arthurreadingworkshop.com/wp-content/uploads/2019/01/PSYCHOLOGICALSCIENCE.pdf
14. Reading, Spelling, and the Orthographic Cipher, Gough, P.B., Juel, C. and Griffith, P L. In chapter 2, Philip Gough, Linnea Ehri & Rebecca Treiman (Eds.) Reading Acquisition, 1992
15. Ibid
16. Grapheme-Phoneme Knowledge Is Essential for Learning to Read Words in English, L. Ehri. P. 9-11, Chapter one, in Word Recognition in Beginning Literacy, J. Metsala & L. Ehri, (Eds.) (1998)
17. Whole Language Versus Code Emphasis: Underlying Assumptions and Their Implications for Reading Instruction. Isabelle & Alvin Liberman. In Reading Acquisition. P. Gough, L. Ehri & R. Treiman. (Eds.) (1992)
18. Learning to Read: An unnatural act. Gough, P.B. & Hillinger, M.L. *Bulletin of the Orton Society*, 30, 1980
19. Speculations on the Causes and Consequences of Individual Differences in Early Reading Acquisition, Stanovich, Kieth. In chapter 11, Philip Gough, Linnea Ehri & Rebecca Treiman (Eds.) Reading Acquisition, 1992
20. Learning to Read: An unnatural act. Gough, P.B. & Hillinger, M.L. *Bulletin of the Orton Society*, 30, 1980
21. Sight Word Learning in Normal Readers and Dyslexics, Ehri, L. In Foundations of Reading Acquisition and Dyslexia: Implications for Early Intervention. Benita A. Blachman (Ed.) 1997
22. National Reading Panel Report, Part 2, Phonics Instruction, Linnea Ehri et al, 2001, *Review of Ed. Research,* Vol. 71, No. 3.
    http://arthurreadingworkshop.com/wp-content/uploads/2018/08/NationalReadingPanel_SystematicPhonics.pdf
23. Romance and Reality, Keith Stanovich, 1994
24. Evidence That Dyslexia May Represent the Lower Tail of a Normal Distribution of Reading Ability. Sally Shaywitz, et al. *The New England Journal of Medicine,* Vol. 326, No. 3. Jan. 1992.
25. Teaching Children to Read: What Do We Know about How to Do It? Snow, C. E. , & Juel, C., In The Science of Reading, A Handbook. Margaret J. Snowling & Charles Hulme (Eds.) 2007
26. Read About It: Scientific Evidence for Effective Teaching of Reading. Kerry Hempenstall, *The Center for Independent Studies, Research Report* #11, March 2016.
27. Efficacy of Phonics Teaching for Reading Outcomes: Indications from Post-NRP Research. Susan Brady. In Explaining Individual Differences in Reading, Theory and Evidence. Susan Brady, David Braze & Carol Fowler (Eds.) 2011
28. National Reading Panel Report, Chapter 2, Alphabetics, Part 1, Phonemic Awareness Instruction, Linnea Ehri, et al, 2001, *Reading Research Quarterly*, Vol. 36. No. 3.
    http://arthurreadingworkshop.com/wp-content/uploads/2018/08/NationalReadingPanel_PhonemicAwareness.pdf
29. Read About It: Scientific Evidence for Effective Teaching of Reading. Kerry Hempenstall, *The Center for Independent Studies, Research Report* #11, March 2016.
30. Direct Instruction Reading (5th ed.) Carnine, D. , Sibert, J., Kame'enui, E., & Tarver, S. 2010
    http://arthurreadingworkshop.com/wp-content/uploads/2018/04/DIReading.pdf
31. Efficacy of Phonics Teaching for Reading Outcomes: Indications from Post-NRP Research. Susan Brady. In Explaining Individual Differences in Reading, Theory and Evidence. Susan Brady, David Braze & Carol Fowler (Eds.) 2011
32. Direct Instruction Reading (5th ed.) Carnine, D. , Sibert, J., Kame'enui, E., & Tarver, S. 2010
    http://arthurreadingworkshop.com/wp-content/uploads/2018/04/DIReading.pdf
33. The Dalmatian and Its Spots. Siegfried Engelmann, Education Week, 2004

34. Synthesis of Research on Explicit Teaching, Barak Rosenshine, *Educational Leadership*, April, 1986
35. Direct-Instruction Reading, E.J. Kameenui, D.D. Simmons, D. Chard, & S. Dickson. Chapter Three in Instructional Models in Reading, S. Stahl & D. Hayes (Eds). 1997
36. The Effectiveness of Direct Instruction Curricula: A Meta-Analysis of a Half Century of Research. Stockard, Jean & Wood, Timothy. *Review of Educational Research*, Vol XX, No. X January 2018. http://arthurreadingworkshop.com/wp-content/uploads/2018/05/StockardDIMetaAnalysis2018.pdf
37. Analysis of Achievement Scores of Arthur Academy Schools. 2007-2013, Jean Stockard & Charles Arthur, *National Institute of Direct Instruction.* *http://arthurreadingworkshop.com/wp-content/uploads/2018/05/ArthurAcademyNIFDIAnalysis.pdf*