Zero Times Anything Is Zero

How Mississippi's Eighth-Grade Plateau Exposes the Missing Half of M = I × O

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ABSTRACT: Mississippi's fourth graders posted the largest reading and math gains in the nation between 2013 and 2024, a result widely reported as the "Mississippi Miracle." Its eighth graders did not repeat it: their 2024 reading score was statistically unchanged from 2022 and only two points above 1998. Alabama and Louisiana, which pursued similar reforms built around decoding, the skill of turning printed letters into words, show the same split, and Mississippi's high-school English II and ACT results, from students who received the reform's full kindergarten-through-third-grade model, carry it into high school. In April 2026 the Mississippi Legislature acknowledged the plateau and passed a new literacy law for grades 4-8. A 2026 NWEA brief covering more than 20 million students across three assessment systems finds the same shape nationally: elementary reading recovering, middle-school reading stalled. The live dispute over how much of Mississippi's fourth-grade gain reflects its third-grade retention policy does not reach the eighth-grade result, because a change in who takes a test cannot explain why the same students go flat four years later. This paper argues that the gap is exactly what M = I × O, the Cognitive Equation at the center of DSRP theory, predicts. M is the mental model, the meaning a mind constructs; I is information; O is organization; and the two multiply rather than add. Information is not yet knowledge. It becomes knowledge when a mind organizes it, and the background knowledge a reader brings to a text is information organized earlier. The science of reading is not in dispute here, and Mississippi's fourth-grade result is strong evidence for it. What the paper disputes is answering a middle-school comprehension gap with more elementary-level reading instruction. That practice drills decoding, a student's access to print, which most of these students already have, and supplies neither the rich information comprehension depends on nor the organizing moves that turn it into knowledge. A multiplier applied to a number near zero still returns a number near zero. Four independent lines of evidence support the claim: Gough and Tunmer's Simple View of Reading, RC = D × LC, a second multiplicative equation from reading science; the Cabreras' companion equation K = I × T(DSRP), knowledge equals information multiplied by thinking; Recht and Leslie's baseball study, in which prior knowledge shaped comprehension whatever a reader's general ability; and Hirsch's account of cultural literacy. Together they support the paper's strongest claim: by building decoding at scale without a comparable investment in content, Mississippi's reform is producing a knowledge-based Matthew Effect, not merely illustrating one. The paper closes with a three-part literacy guarantee for PreK-8 systems covering access, information, and organization, and a research agenda for testing how I and O interact.

SIGNIFICANCE AND PUBLIC UNDERSTANDING: For more than a decade, American reading reform has concentrated on teaching children to sound out words. That work was overdue, and Mississippi proved it can be done well: its fourth graders now read better than the national average. But

sounding out a word is not the same as understanding it. A child who can read every word of a passage about the Civil War, photosynthesis, or the Constitution still cannot make sense of it if school never taught her what those words refer to. American schools have treated that knowledge of the world as optional for a long time, and the standards they answer to rarely require it. Mississippi shows what follows. Fix reading's first problem, leave the long-neglected second one alone, and fourth graders surge while eighth graders stand still. The lesson for parents, teachers, school boards, and lawmakers is direct. Until schools deliberately teach children about history, science, literature, and the arts, and teach them how to organize what they learn, no amount of phonics, screening, or science-of-reading legislation will produce students who understand what they read. Understanding is the product of knowing and thinking. Leave either one at zero, and the product stays at zero.

PRACTICAL IMPLICATIONS: For PreK-8 leaders, the first step is diagnosis. Before assigning an intervention to a struggling reader, find out which term is holding that reader back: decoding, background knowledge, or the organizing moves that turn information into knowledge. A middle schooler who reads every word fluently needs content, and another round of leveled passages will not supply it. Schools can act on this without adding a program. Protect science and social studies time in the elementary schedule, build English language arts units around substantive topics, sequence academic vocabulary on purpose, and write down what students should know by the end of each grade in language a parent could read. Teach the DSRP moves inside every subject, on material students actually know, rather than as a separate course. Boards and states should measure all three parts of the literacy guarantee, access, knowledge, and organization, because a system that measures only decoding will keep building only decoding.

KEYWORDS: Background Knowledge | DSRP Theory | M = I × O | Simple View of Reading | NAEP | Mississippi Miracle | Science of Reading | Systems Thinking | Language Comprehension | Curriculum Design

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1. Introduction

A fourth-grade reading score is not the goal of a K-12 education. It is a proxy, a stand-in for something harder to see. Harvard Business School professor Theodore Levitt used to tell his students that people don't want a quarter-inch drill, they want a quarter-inch hole. The drill is only the tool that gets them there. Derek Cabrera has used the same image to make a related point about systems thinking, though the line itself is Levitt's. Schools face the same distinction. Nobody wants decoding instruction, test preparation, or a fourth-grade reading score for its own sake. Those are drills. What a school system actually wants, whether or not its incentives still say so, is the hole: a student who understands what they read and who grows into a literate, informed adult able to understand the world and take part in it. In practice, a great deal of education policy behaves as though the drill were the goal, because the drill is what gets measured, reported, and rewarded, while the hole is harder to see and easier to lose track of. Economist Charles Goodhart observed that a statistical regularity tends to collapse once pressure is placed on it for control purposes, an idea now usually summarized as "when a measure becomes a target, it ceases to be a good measure" (Goodhart, 1975; Strathern, 1997), and the point applies to education as directly as to anything else it has been invoked for. A system that falls in love with its drill can make it

sharper, faster, and more precise every year without ever checking whether a hole got made. This paper's argument is that Mississippi has built one of the best drills in the country, and its fourth-grade scores prove the tool works. What the state has not yet produced, at anything like the same scale, is the hole: adults who leave school knowing history, science, literature, and the arts well enough to read a newspaper, follow an argument, vote with some understanding of what they are voting on, and hold a job that asks more of them than decoding print. A rising fourth-grade score is not a false result. It measures the drill, and a decade spent perfecting the drill while the hole waits is a decade a state cannot give back to the students who lived through it.

A student who cannot decode the word "photosynthesis" cannot read a sentence containing it, however much that student already knows about plants. That much is obvious, and it is the premise behind structured literacy reform, the explicit, step-by-step teaching of how letters map to sounds: teach the code first, because nothing downstream works without it. A less obvious premise, and the one this paper is about, runs the other way. A student who can decode "photosynthesis" perfectly, who can sound it out, pronounce it, and recognize it instantly on the page, still cannot understand a passage that assumes the reader already knows what a chloroplast is, why plants need sunlight, and how the process connects to the food chain described two paragraphs earlier. Decoding got the word off the page. It did not put the concept in the reader's head, because the concept was never there to begin with. No reading strategy, however well taught, manufactures knowledge a reader does not have.

Mississippi is currently the clearest natural experiment the country has, a real-world case that lets us watch these two premises produce two different results in the same state, among the same students, under the same reform, years apart. Mississippi's fourth graders scored 219 in reading on the 2024 NAEP, outscoring the national public-school average of 214 for the first time in the state's history, and posted the largest reading and math gains of any state between 2013 and 2024 (Breazeale, 2025; Oxford Eagle, 2025). The result has been widely called the Mississippi Miracle since 2019, when the state's fourth graders first matched the national average, and the 2024 results turned that story into an outright lead. The reform credited with the gain is well documented. Mississippi's 2013 Literacy-Based Promotion Act mandated structured, systematic phonics instruction, early screening and intervention, teacher training in the science of reading, and a third-grade reading gate that held back students who could not yet decode at grade level (Mississippi Legislature, 2013). In the terms this paper develops below, it was a reform aimed at access. It rebuilt the decoding skills that turn print into words, the step that has to happen before background knowledge or organizing moves can do anything with a text.

Mississippi's eighth graders, tested on the same NAEP assessment in the same years, tell a very different story. Their 2024 reading score of 253 was statistically unchanged from 2022, and only two points above the state's own 1998 result of 251 (National Center for Education Statistics [NCES], 2024c). Their math score rose from 266 to 269, an increase the National Center for Education Statistics does not report as statistically significant (NCES, 2024b). Both scores remain below the national public-school average, by four points in reading and three in math (NCES, 2024b; NCES, 2024c). The state has genuinely gained ground in national rank, moving from 50th to 41st in eighth-grade reading and from 49th to 35th in eighth-grade math since 2013 (Oxford Eagle, 2025), and some of that movement reflects real progress against a national backdrop of decline. But a rank that improves partly because other states fell is a different claim from the fourth-grade story. At fourth grade, Mississippi's own scale score, the underlying NAEP point total that measures performance on a fixed scale across years, rose while the national average

fell, and Mississippi crossed above it. The eighth-grade scale score has not moved in any comparable way. Whatever the 2013 reforms did for third and fourth grade, it has not yet repeated itself five years further into the same students' schooling.

This paper's claim is that the pattern is neither mysterious nor evidence that the reform failed. It is precisely what M = I × O predicts. It looks surprising only under an assumption built into much of the public conversation about reading reform: that comprehension is additive, so that any gain in decoding should produce a matching gain in comprehension, whatever the student happens to be decoding. M = I × O rejects that assumption. "M" is the mental model, the meaning or understanding a reader builds from a text. "I" is information, the raw material: facts, vocabulary, stories, events, and concepts. Information is not yet knowledge. It becomes knowledge when a reader organizes it, and the background knowledge a reader brings to a text is information taken in and organized earlier, which is what lets the information in a new text connect to anything at all. "O" is organization, the operations that structure that raw material into understanding. The terms multiply. An enormous O applied to an I near zero still returns a product near zero, just as an enormous I with almost no O does, and just as decoding with no concepts to decode into returns nothing. Mississippi built access to print aggressively, and specifically for early readers. Its eighth-grade plateau is the visible signature of an I that was never built to the same scale, showing up exactly where the multiplication says it should: at the grade where texts begin to demand more than a reader's existing knowledge can carry, and decoding, however fluent, stops being what holds comprehension back.

The paper proceeds in six steps. Section 1.1 restates M = I × O and the rest of DSRP's theoretical framework, building on the background this author set out in a companion paper on syntopical reading (Nittolo, 2026). Section 2 opens by distinguishing NAEP, the sampled, federally run assessment most of this paper's evidence rests on, from MAAP, Mississippi's own yearly test of every student, because the two measure different things in different ways and confusing them undermines everything that follows. Section 2 then works through the Mississippi case in detail, treating it as a natural experiment in what happens when access to print is built at scale and I is not. It takes up the contested question of how much the state's retention policy inflates its fourth-grade result, places Mississippi within a wider pattern that includes Alabama and Louisiana, and examines Mississippi's high-school English II and ACT results, which carry the eighth-grade pattern to a third measurement point. Section 2 closes with Mississippi's own 2026 legislative response, a new grades 4-8 literacy initiative enacted after officials acknowledged the same plateau, and then widens the lens to a 2026 national research brief and to practitioners who describe the same elementary-recovery, middle-school-stagnation pattern nationwide. Section 3 connects M = I × O to Gough and Tunmer's Simple View of Reading, a second multiplicative equation developed independently in reading research four decades ago, and shows that the two describe the same underlying structure. Section 4 examines DSRP's six cognitive moves one at a time and argues that each one needs information already in place before it can do any structuring work, a point this paper treats as its central argument rather than the passing qualification it was in the companion paper. It also names a specific instructional habit, repeating elementary-level reading practice in the upper grades, that this argument shows cannot close a gap caused by missing knowledge. Section 5 sets out what a PreK-8 system built to supply both terms of the equation actually looks like. Section 6 draws on Hirsch's account of cultural literacy to argue that Mississippi's own reform design does more than illustrate a knowledge-based Matthew Effect. It is the mechanism producing one, distinct from, though related to, the civic Matthew Effect the companion paper develops. The paper asks eight questions:

1. Does the divergence between Mississippi's fourth-grade and eighth-grade NAEP results fit the multiplicative structure of M = I × O better than it fits an additive account of reading skill?
2. Is DSRP's requirement that organization needs something to organize, stated briefly in prior work, better understood as the central reason decoding-focused reform plateaus at the grade where comprehension starts to depend on knowledge?
3. Does repeating elementary-level reading instruction, meaning decoding drills and generic comprehension strategies applied to short, content-thin, leveled texts, actually build I for a middle-school student who already decodes fluently? Or does it give that student more practice at a skill they already have, while the real gap, the missing information the student has nothing to organize, goes untouched?
4. What would a PreK-8 curriculum look like if it treated supplying I, the rich content information from which students build background knowledge, and O, the organizing moves that work on it, with the same explicitness, sequencing, and accountability Mississippi brought to building access to print?
5. Is Mississippi's eighth-grade plateau best understood as a static gap, a one-time shortfall that holds steady and does not grow, or as the early, visible stage of a widening, knowledge-specific Matthew Effect that the reform's own design, by concentrating almost entirely on decoding, is actively generating rather than merely failing to close?
6. Does the same fourth-to-eighth-grade divergence appear in other states that pursued similar decoding-centered reforms, and does Mississippi's own high-school testing data carry the pattern beyond the grades NAEP directly measures?
7. Does Mississippi's 2026 legislative response to this plateau, the Adolescent Literacy Initiative, target I, the background information this paper identifies as the real limit at eighth grade, information that becomes knowledge only once a reader organizes it? Or does it extend the same work on access, more decoding and reading-strategy drilling, that produced the fourth-grade result, without supplying the information the eighth-grade plateau actually depends on?
8. Does the elementary-recovery, middle-school-stagnation pattern Mississippi shows also appear nationally (across states and assessment systems with no connection to Mississippi's statute or timeline) in a way that suggests the mechanism this paper identifies is a general feature of decoding-first reform rather than a quirk of one state's design?

1.1 Theoretical Background

DSRP theory and O-Theory (Cabrera & Cabrera, 2025b; Cabrera, 2025) define thinking, and by extension meaning, as the organization of information, formalized in what Cabrera and Cabrera call the Cognitive Equation:

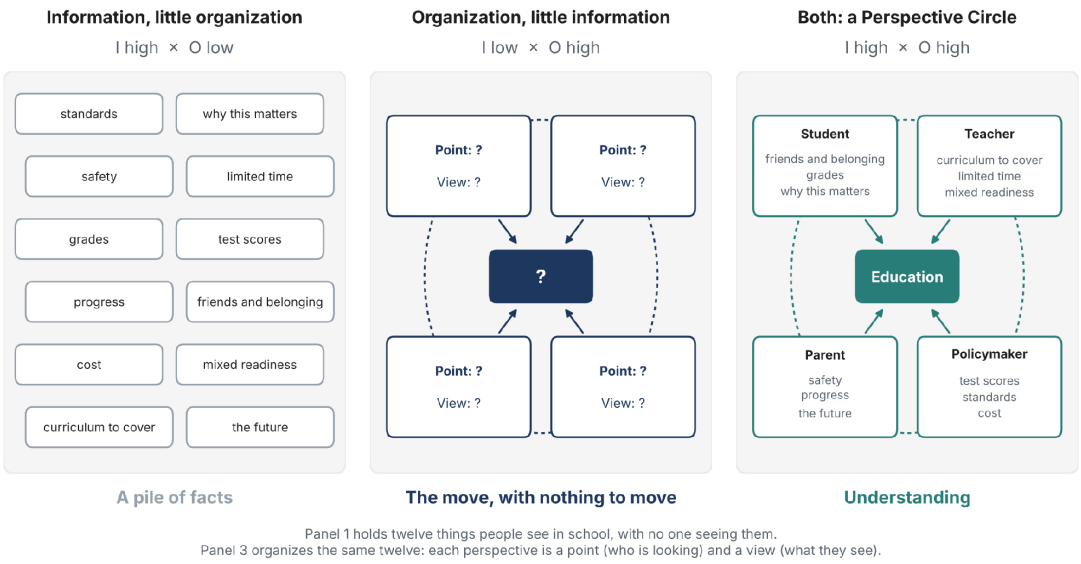
$$M = I \times O$$

where M is the mental model, the meaning, mindset, or understanding a mind constructs, I is information, and O is organization. This is multiplication, not addition, and that distinction is the entire argument of

this paper. Abundant information organized poorly produces confusion rather than understanding. Sophisticated organizing skill applied to little or no information produces nothing at all, because there is nothing there to organize. Both terms are necessary, and neither can stand in for the other.

One consequence deserves to be stated plainly, because the rest of this paper depends on it: information is not knowledge (Cabrera & Cabrera, 2025a; Cabrera & Cabrera, 2025c). Information is what a reader takes in. Knowledge is what the reader builds by organizing it. When this paper speaks of background knowledge, it means knowledge a reader built earlier, information once taken in and organized, which is what lets the information in a new text connect to anything at all. A school cannot hand a child knowledge. It can supply rich information and teach students to organize it, and the knowledge is theirs to build.

Image 1. The Same Information, Unorganized and Organized. Twelve things people see in school appear as a loose pile with no one seeing them (left), as an organizing move with nothing to work on (center), and organized as a DSRP Perspective Circle (right), where each of four perspectives (student, teacher, parent, and policymaker) joins a point to a view. Understanding appears only when both terms are present.



Panel 1 holds twelve things people see in school, with no one seeing them.
Panel 3 organizes the same twelve: each perspective is a point (who is looking) and a view (what they see).

One point of precision matters here, and the rest of the paper depends on getting it right. O, in DSRP's own sense, names the four organizing patterns, Distinctions, Systems, Relationships, and Perspectives, applied to concepts a mind already has. Decoding, converting printed marks into recognized words, is not one of those four. It is better understood as the access step, what this paper calls the access channel: the mechanical work that gets raw information off the page and into a form the mind can use at all, before any organizing, and before any background knowledge, can be brought to bear. A reader who cannot decode has no access to what a text contains, so neither I nor O can do anything with it. A reader who can decode has that access, but decoding has not yet organized the information into anything, and it has not supplied the background knowledge the organizing would need. This paper therefore treats Mississippi's K-3 reform as having built access at scale, not as having built O directly. The question the rest of the paper pursues is what happens once that access is open, and whether the organizing moves and the background knowledge a reader needs are waiting on the other side of it.

The companion paper's emphasis fell on O, for two reasons. DSRP's contribution to reading and civic thinking is mainly an organizational one, and the background-knowledge tradition this paper draws on, led by Hirsch's account of cultural literacy (Hirsch, 1987) and the researchers cited below, has already argued forcefully for the necessity of I. This paper reverses that emphasis. Its argument is that I, not O, is the term whose absence explains Mississippi's eighth-grade plateau, and that a public conversation about reading reform built almost entirely around access to print, around phonics, decoding, and "the science of reading" in its narrowest sense, has spent a decade building one factor of a multiplication and treating the product as though it depended on that factor alone.

For a reader meeting this framework for the first time, DSRP identifies four universal structuring patterns, unchanged from the companion paper's account. Distinctions (D), the identity/other pattern, separate one thing from another. Systems (S), the part/whole pattern, relate a thing to what it is made of and what it belongs to. Relationships (R), the action/reaction pattern, connect two things, whether because one causes the other or because they are linked in some other way. Perspectives (P), the point/view pattern, recognize that any of the above depends on a vantage point from which it is seen. These four patterns generate six cognitive moves that put them to direct use: Is/Is Not List, Zoom In, Zoom Out, Part Party!, RDS Barbell, and Perspective Circle (Cabrera & Cabrera, 2025a; Cabrera & Cabrera, 2025c). Section 4 examines all six against reading comprehension specifically and argues that each one assumes an existing store of information before it can be run at all. The companion paper made that point once, briefly, as a limiting condition: "A reader who runs Zoom Out, Is/Is Not, or RDS Barbell perfectly, against no material, has performed the moves against an empty set" (Nittolo, 2026). This paper takes that sentence as its starting premise instead of its footnote, and it treats Mississippi's eighth-grade NAEP results as the real case where the empty set is not hypothetical. Section 6.2 introduces a companion equation from Cabrera and Cabrera's own DSRP work, $K = I \times T(DSRP)$, knowledge equals information multiplied by thinking, where thinking is the four patterns themselves. That equation states the same multiplicative structure with knowledge as its output, and the paper uses it where the argument concerns the slow accumulation of knowledge rather than comprehension in the moment.

2. Mississippi as a Natural Experiment in I and O

2.1 What NAEP Actually Is, and What Mississippi's Own Test Is

Before working through what Mississippi's results show, the two tests behind them need to be kept apart. They measure different things, in different ways, for different purposes, and confusing them is the easiest way to misread everything that follows.

Mississippi's own state test is the Mississippi Academic Assessment Program, or MAAP. Mississippi writes it, gives it, scores it, and sets its passing standards, and it is taken every year by essentially every enrolled student in the tested grades and subjects, a census rather than a sample. If a parent wants to know how their own child did in reading this year, MAAP is the number that answers the question, because every student takes it and gets an individual score.

NAEP, the National Assessment of Educational Progress, is a different kind of instrument entirely. It is a federal program, developed, administered, and scored by the National Center for Education Statistics (NCES) inside the U.S. Department of Education, not by Mississippi or any other state (NCES, n.d.-a). Congress requires every state to take part in the NAEP reading and math assessments at grades 4 and 8 as a condition of receiving federal education funding, and those grades are tested every two years, not every year: 2022, 2024, 2026, and so on (NCES, n.d.-b). NAEP is never given at grade 8 in an off year, and it does not cover every grade a state might want measured. A state cannot get a NAEP reading score for sixth grade or eleventh grade in any year, because NAEP's main assessment does not test those grades.

The part most likely to be misunderstood is that NAEP, unlike MAAP, is not given to every student. It uses a sample. Neither Mississippi nor any other state chooses which of its schools or students take it. That selection is made by Westat, a private statistical research firm working under federal contract to NCES, using a multistage random sampling design drawn from the Common Core of Data, the federal government's own comprehensive list of every public school in the country (NCES, n.d.-d; Office of the State Superintendent of Education, n.d.). Schools are grouped into strata, categories based on traits such as how urban they are and how they have performed in the past. A random sample of schools is drawn from each stratum, and within each selected school, students are chosen at random, roughly 30 per subject per school (NCES, n.d.-e). A state cannot choose which of its schools take part, and a selected school that declines puts the whole state's result at risk; NCES will not report a state's NAEP results if fewer than 85 percent of the sampled schools participate (NCES, n.d.-e). A state's NAEP sample typically runs to about 3,000 students drawn from roughly 100 schools (Office of the State Superintendent of Education, n.d.).

In Mississippi's own numbers, the difference between the two tests is large. Federal sampling records put Mississippi's 2024 public-school enrollment at roughly 32,600 fourth graders and 34,600 eighth graders, and nearly every one of them sits for MAAP (NCES, n.d.-c). NAEP's fourth- and eighth-grade Mississippi samples run to about 3,000 students apiece, the same order of magnitude NCES documents for state samples generally. MAAP's tested population is therefore roughly ten to twelve times the size of NAEP's, for the same grade, in the same state. That is a real and defensible reason to treat MAAP as the more complete measure in one specific sense: it counts every student instead of estimating from a fraction of them. This paper leans on NAEP anyway for the comparisons that matter most, and Section 2.7 explains why. Completeness and neutrality are different virtues, and NAEP's smaller, sampled population is the price of a yardstick Mississippi cannot adjust to flatter itself.

The distinction shapes how every later section should be read. Where this paper cites a MAAP result, the number reflects every tested student in the state that year. Where it cites a NAEP result, as most of its evidence does, the number reflects a representative sample chosen by an outside federal contractor, and it exists only for grades 4 and 8, only in even-numbered years. A reader is right to notice that a yearly census would in some respects answer the question of how Mississippi's students are doing more directly and completely than a sample managed from outside the state every other year. The reason this paper relies on NAEP despite that limitation is the one Section 2.7 develops. NAEP is the one instrument in this comparison that Mississippi does not control, cannot adjust, and cannot use to look better by changing its own standards. That independence suits it to the question this paper asks, whether Mississippi's fourth-grade gains are real and whether they last to eighth grade, even though it means trading the completeness of a state census for the neutrality of an outside sample.

2.2 What the 2013 Reforms Actually Targeted

Mississippi's Literacy-Based Promotion Act (LBPA), passed in 2013, is specific enough about how it works that it is possible to say exactly what kind of reform it was without guessing. The law required universal screening for reading difficulties beginning in kindergarten, required intensive intervention for students identified as at risk, funded statewide teacher training in structured literacy and phonics-based instruction, placed literacy coaches in low-performing schools, and created a third-grade retention gate that held back students who could not show grade-level reading proficiency, with defined exemptions, before they moved on to fourth grade (Mississippi Legislature, 2013). Every one of these levers targets the same capacity: the ability to turn printed symbols into words accurately and, with practice, automatically. That capacity is decoding, what Section 1.1 calls the access channel, the step that puts a text's information within reach before any organizing of it, or any knowledge brought to it, can happen. Mississippi built this machinery deliberately and systematically, and on the evidence of its fourth-grade NAEP results, it built it successfully. The state's own announcement of the results describes the 2013 reforms as having made reading instruction a major focus in pre-K through grade 3 (Oxford Eagle, 2025).

2.3 What the Fourth-Grade Result Actually Shows

Mississippi's 2024 fourth-grade reading score of 219 was not statistically different from its 2022 score of 217, but the national public-school average fell from 216 to 214 over the same period, which put Mississippi above the national average for the first time in the assessment's history (Breazeale, 2025). Fourth-grade math told a clearer story of improvement on its own terms. Mississippi's score rose from 234 to 239 between 2022 and 2024, a gain large enough to be statistically significant by itself, not merely relative to a falling national baseline (Breazeale, 2025; NCES, 2024a). Mississippi ranked ninth in the nation in fourth-grade reading and sixteenth in math in 2024, up from 49th and 50th respectively in 2013, and recorded the largest score increases in the nation in both subjects over those eleven years (Office of Governor Tate Reeves, 2025). These are genuine results, not statistical side effects of a declining comparison group, though the reading result in particular benefits from two things at once: real improvement in the state's own numbers, on a test where most of the country was moving the other way.

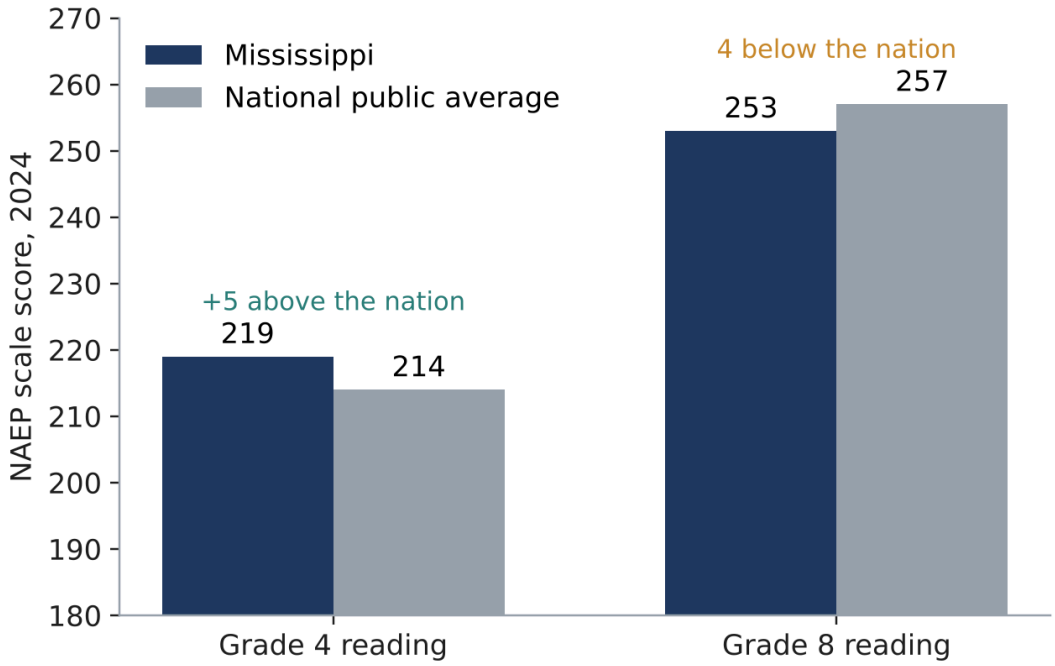
Read through $M = I \times O$, the result shows that a state can build access to print, decoding specifically, at scale, through deliberate policy, in a fairly short window, and that doing so produces nationally leading gains at the grade where access to print is still the main obstacle to comprehension. Fourth-grade reading passages stay close enough to a child's spoken vocabulary and everyday experience that a student who decodes accurately and fluently can usually understand what has been decoded. The information, I, needed for a typical fourth-grade passage is modest enough that most students, including those from under-resourced backgrounds, already have enough of it. Access to print was the limiting factor, and Mississippi's reform went straight at it.

2.4 What the Eighth-Grade Result Actually Shows

The same students who benefited from the 2013 reforms as kindergartners and first graders reached eighth grade in the early 2020s, and their NAEP results do not repeat the fourth-grade pattern. Mississippi's 2024

eighth-grade reading score of 253 was statistically unchanged from its 2022 score, also 253, and only two points above the state's 1998 result of 251, across a span of twenty-six years (NCES, 2024c). The eighth-grade math score rose from 266 in 2022 to 269 in 2024, but the National Center for Education Statistics reports the increase as not statistically significant, and the 2024 score remains below Mississippi's own pre-pandemic 2019 level (NCES, 2024b). Both eighth-grade scores sit below the national public-school average, four points behind in reading and three in math (NCES, 2024b; NCES, 2024c). Mississippi's own officials have described this honestly rather than defensively. Coverage of the 2024 release quoted Lance Evans, the state superintendent of education, directly: "While Mississippi has made tremendous progress, we need to build upon our momentum to close achievement gaps and ensure all students are proficient. We have more work to do, particularly in middle school" (Oxford Eagle, 2025).

Image 2. Two Grades, One Reform. Mississippi's 2024 NAEP reading scores compared with the national public-school average. Fourth graders crossed above the nation; eighth graders, who had also been through the reform's early grades, remained below it (Breazeale, 2025; NCES, 2024c).



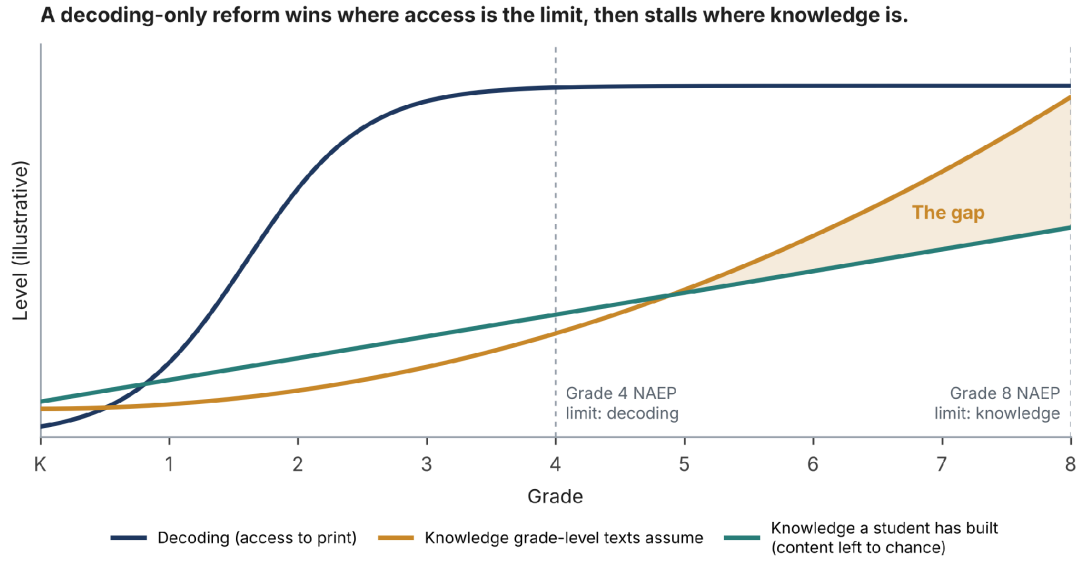
The rank improvements are real and should not be dismissed. Mississippi's eighth-grade reading rank rose from 50th in 2013 to 41st in 2024, and its math rank rose from 49th to 35th over the same period (Oxford Eagle, 2025). Some of that movement reflects Mississippi's results holding fairly steady while other states' eighth-grade scores fell further, a pattern documented nationally: eighth-grade NAEP reading scores fell in 31 states between 2022 and 2024, and 47 states remain below their pre-pandemic levels, and against that backdrop Mississippi's flat line looks more like relative improvement than like a breakthrough comparable to fourth grade (Toch & DiMarco, 2025). None of this amounts to failure. It is a question of which of two different things happened. Mississippi's eighth graders did not become dramatically better readers in any absolute sense; the rest of the country, in many states, got worse, and Mississippi's place in that field improved as a result. Both can be true, and separating them matters for what comes next, because only absolute improvement would show that the 2013 reform's benefits carried

into middle school the way the fourth-grade story, where Mississippi's own scores genuinely climbed, shows they did at the earlier grade. Spencer's own analysis points the same direction from the other side. Measuring Mississippi against a synthetic comparison, a statistical stand-in built from other states to estimate what Mississippi would have scored without the law, he finds effects lasting through at least seventh grade on state tests, with some fadeout (Spencer, 2024). In a later, informal analysis he reports positive effects on eighth-grade NAEP reading as well, while cautioning against reading much into post-pandemic results (Statistical Modeling, Causal Inference, and Social Science, 2026). That finding and this paper's argument are not in conflict. A positive effect relative to comparison states that declined is fully consistent with an absolute eighth-grade score that barely moved, and it is the absolute score that would show whether the reform's early gains carried into middle-school comprehension. What Spencer's work does establish is that the reform did real good, which this paper does not dispute.

2.5 Why This Is Multiplication, Not a Broken Promise

The reform did what it was built to do, at the grade where that mattered most, and nothing was promised that the eighth-grade results break. This is the structure $M = I \times O$ predicts and an additive model of reading does not. Under an additive model, reading ability is a single quantity built up through instruction, so a reform that produces large decoding-driven gains at fourth grade should produce comparable, compounding gains at eighth grade: more reading skill now should mean more reading skill five years later, all else equal. The multiplicative model predicts something else. Gains from opening access to print, getting words off the page, should show up at fourth grade, where access is the main obstacle. By eighth grade the obstacle has changed. Students now need information to work with, I, and the organizing moves to make sense of it, O, and the reform was never designed to supply either. Students can keep getting better at decoding, but the gains stop showing up in comprehension. Mississippi's results match the second prediction, not the first.

Image 3. What the Equation Predicts for a Decoding-Only Reform. A schematic of this paper's argument, not measured data. Decoding reaches its ceiling by about third grade, while the knowledge grade-level texts assume rises faster than the knowledge students build when content is left to chance. The gap opens between the two grades NAEP tests.



Schematic of the paper's argument, not measured data.

2.6 The Retention Confound

Age relative to peers, rather than skill, can win a competition on its own, and youth sports makes this obvious in a way test scores usually do not. A fifth grader playing at the lowest level of Little League, against third and fourth graders, will throw harder than anyone else on the field because he is two years older, not because he is a better ballplayer than the boys his own age two levels up. He would not dominate at his own age level. He dominates the lowest level because the comparison group is younger than he is. His advantage comes entirely from who he is measured against, and it vanishes the moment he faces peers his own age. Retention does something structurally similar to a fourth-grade reading score, and the analogy is worth holding in mind before the more technical version of the same question. A tested group is not a fixed population. It is whoever happens to sit for the fourth-grade exam that year, and a policy that holds back the weakest readers changes who that group is. If passing the fourth-grade test becomes the goal in itself, one way to hit it, intended or not, is to keep the weakest readers in third grade until they can clear the bar before they ever reach the tested grade, the reading-score version of stacking a roster with players older than their division.

Mississippi's third-grade retention gate complicates the fourth-grade result in just this way. The Literacy-Based Promotion Act holds back third graders who are not reading at grade level, so the weakest readers, the students most likely to pull an average down, are missing from the fourth-grade class that sits for NAEP. Scores can rise for that reason alone, because of who is taking the test rather than because anyone read better. Researchers still debate how much of the gain this explains (Statistical Modeling,

Causal Inference, and Social Science, 2025). The retention numbers moved in stages. Retention rose sharply in the law's first year and then fell. It rose again in 2018 to 2019, when the state raised its proficiency bar, and reached about 10 percent of third graders that year before settling at a lower, steadier rate (Macek, 2026).

The studies disagree on the size of the effect. Economist Noah Spencer, in a peer-reviewed study that tried to separate retention's effect from everything else the law changed, estimated that retention accounts for about 22 percent of the gain in the most affected cohort, a meaningful share but well short of the whole. He also found that the law did not change the makeup of the test-takers by race, gender, English-learner status, or disability status (Spencer, 2024). A separate study, by Kirsten Slungaard Mumma and Marcus Winters, followed retained students themselves and found that they made substantial gains of their own by sixth grade, evidence that the extra year taught them something and did not merely postpone their test date (Mumma & Winters, 2023). Advocacy groups defending the reform argue that critics who put the retention effect at nearly 10 points have the timing wrong. The gate did not take effect until 2015, and by this account most of Mississippi's early gains came before any retained student reached the NAEP-tested grade (Canter, 2023).

Because the timing is easy to get wrong, the question worth asking directly is which NAEP-tested fourth-grade class was the first to have retained students actually missing from it. The answer is none of the early ones. The 2014-2015 school year was the first in which retention carried consequences, so the fourth graders tested on NAEP that year had finished third grade before the gate existed and were not affected by it, yet Mississippi's gains were already underway. The first class from which a retained student could plausibly have been missing was the 2016-2017 administration, two full NAEP cycles later, because a retained student simply repeats third grade for one year, moves on to fourth, and sits for NAEP the following cycle rather than vanishing from the data. That 2016-2017 class is the one Spencer's 22 percent estimate describes, a finding about that one cohort rather than a claim that retention explains the broader trend (Spencer, 2024). Mississippi First, the advocacy organization that tracks these numbers closely, notes that by 2017 roughly fifteen of Mississippi's twenty-point gain between 1992 and 2019 had already happened, before retention had touched any NAEP-tested class (Canter, 2023). The same logic applies to Mississippi's own yearly state test. The single cleanest comparison year is Mississippi's fourth-grade class of 2013-2014, whose third-grade year came before the LBPA entirely; Section 9 proposes finding that class's results on the state's pre-MAAP assessment as the most direct test of the retention question available.

This paper's argument does not depend on settling the dispute, and it would be dishonest to claim more certainty than the research currently supports. Two things can be true at once. Retention almost certainly inflates the fourth-grade result to some real but contested degree. That is a composition effect, a change in test results caused by a change in who takes the test rather than in how well students read, layered on top of whatever genuine decoding gain the reform produced. The account of Mississippi's fourth-grade success in Section 2.3 should be read with that qualification attached, not as a claim that the entire 20-point gain reflects pure instructional improvement. At the same time, retention does not touch this paper's central claim about the eighth-grade plateau. Removing weak readers from the fourth-grade pool works the opposite way at eighth grade, because those retained students, now a year older than their classmates, are still in the K-8 system and are still eventually tested. Whatever could inflate the fourth-grade number cannot explain why the same group's scores go flat four years later instead of

continuing to show the benefit of the extra year of intervention. If anything, a reader skeptical of the size of the fourth-grade gain has more reason to take the eighth-grade plateau at face value, since the composition effects that cloud the earlier number are not present in the same way at the later one. The Little League analogy reaches the same conclusion from another angle. An older pitcher's fastball is a real fastball, and a retained student's extra year of intervention is real instruction. Neither fact settles what the resulting statistic measures: skill at the sport, or the effect of the intervention, set against a comparison group that is not quite what the number implies.

One honest gap deserves to be named rather than papered over. The two retention studies answer different questions. Spencer's 22-percent estimate concerns the fourth-grade NAEP cohort as a whole (Spencer, 2024). Mumma and Winters's sixth-grade ELA finding follows the retained students themselves, and their window stops at grade six (Mumma & Winters, 2023). Neither reports eighth-grade results for the students who were retained. This paper cannot say, and no published causal study currently can, whether the large sixth-grade ELA advantage for retained students lasted, shrank, or disappeared by eighth grade. NAEP cannot answer the question either. It is a sampled, cross-sectional assessment, a snapshot of a different group of students at each tested grade rather than the same students followed year to year, so it cannot pick out a formerly retained student from any other test-taker in a later grade (NCES, n.d.-a). This is a real limit on what the retention research can currently tell a reader, but this paper's argument does not need it resolved. Mississippi's eighth-grade NAEP plateau describes the whole tested population, retained and never-retained students together, and it holds regardless of how any one subgroup within that population fared.

2.7 Could Mississippi Simply Be Moving the Goalposts?

A skeptical reader who knows how state testing works might reasonably ask whether Mississippi's fourth-grade result reflects the state quietly lowering its own passing bar, the same move a school district might make to help a struggling program look successful on paper. Plausible as it sounds, the objection does not survive a look at what the fourth-grade claim actually rests on. Mississippi's headline result is a NAEP score, not a MAAP score, and Mississippi has no authority over NAEP. NAEP is developed, administered, and scored by a federal program that uses the same test, the same scale, and the same definitions of each achievement level in every participating state, in a specific and public year. A state cannot make its students look better on a test it does not write, score, or set the passing bar for. Mississippi's rising NAEP scale score cannot be explained by anything Mississippi did to its own MAAP cut scores, the score thresholds that define each performance level, because MAAP and NAEP are entirely separate instruments (NCES, n.d.-a).

The state's own MAAP data, for what it is worth, points the opposite way in the one place it would matter most. When Mississippi changed the passing standard for the third-grade reading gate in the 2018-2019 school year, the change described in Section 2.6, it raised the bar one level, to Level 3, instead of lowering it to manufacture easier passes (Boykin, 2019). A state trying to inflate its results moves the goalposts the other way. That does not settle every question about Mississippi's state-level data. A careful reader should still ask about who made up the tested class, the issue Section 2.6 addresses, about NAEP's sampling uncertainty, and about how much of Mississippi's improved national rank reflects other states falling rather than Mississippi climbing, the pattern Section 2.4 documents. None of those questions is the

goalpost objection, though, and the goalpost objection does not hold up against a test the state in question does not control.

2.8 Mississippi Is Not Alone, and the Pattern Extends Into High School

The pattern this paper traces to Mississippi's reform design is not unique to Mississippi, and treating it as though it were would overstate the case. Alabama and Louisiana, often discussed alongside Mississippi as part of what researchers and journalists have called the "Southern surge" in early literacy, show a strikingly similar split: substantial fourth-grade NAEP gains between 2013 and 2024, driven by comparable structured-literacy and science-of-reading reforms, that have not carried into eighth grade with anything like the same force (Adams et al., 2026; Barshay, 2026). A team of literacy researchers writing about all three states in 2026 put it directly. Improvements in fourth-grade reading have not translated into similar eighth-grade gains in Alabama, Mississippi, or Louisiana, and early gains in decoding do not by themselves produce success with the more complex, vocabulary- and knowledge-dependent texts eighth grade requires (Adams et al., 2026). Louisiana's eighth-grade reading scores are similar to the state's 2002 level; Alabama's have been falling and rank among the lowest in the country even as its fourth-grade results have improved (Barnum, 2025). Dan McGrath, a retired federal official who oversaw NAEP administration for years, asked publicly the question this paper is built to answer: why has the "Mississippi miracle" not yet reached eighth grade? He noted that Mississippi's eighth graders saw their progress stall even as fourth graders across the achievement range kept improving, with more eighth graders scoring at the lowest achievement level in 2019 than in 2013 (Barshay, 2026). This paper's answer to McGrath is that waiting longer will not bring the gains. A reform built almost entirely around decoding does not, on its own terms, build the factor eighth-grade comprehension depends on, in any of the three states that took this approach.

Mississippi's own high-school testing offers a further check, and its clearest piece is the English II exam. It works for Mississippi the way the New Jersey Graduation Proficiency Assessment (NJGPA) works in New Jersey: a test students must pass to graduate, scored against the state's own standard rather than against a national pool with uneven participation. Mississippi requires students to pass the English II end-of-course exam, part of MAAP, to graduate high school, alongside required exams in Algebra I and Biology; the state board dropped the U.S. History exam as a graduation requirement in 2025 (Pittari, 2025). In the 2024-2025 results, pass rates on all four end-of-course exams, English II among them, were similar to or slightly higher than the year before. Proficiency told a different story. The share of students scoring proficient or advanced (the top two of five performance levels) fell across English, math, science, and U.S. history, the first such downturn in years apart from the pandemic (Bose, 2025). Mississippi's chief accountability officer called the results "unusual for Mississippi" given the state's steady prior improvement, and the state board's discussion separated passing a test from being proficient in the underlying content, a distinction that tracks this paper's own distinction between decoding fluency and the accumulated knowledge comprehension depends on (Bose, 2025).

Reading that result correctly depends on timing. The law passed in 2013, and most of its provisions, including literacy coaches and the start of statewide teacher training, rolled out during the 2013-2014 school year (Breazeale, 2024; Mississippi Legislature, 2013). A student who entered kindergarten in fall 2013 received the reform's instruction from the first day of kindergarten, moved through first grade in

2014-2015, second grade in 2015-2016, and third grade in 2016-2017, and sat for the third-grade reading gate that spring, fully inside the law for all four foundational years. That class, the first to go through kindergarten to third grade entirely under the LBPA, reached twelfth grade in the 2025-2026 school year and graduated in spring 2026. As of this writing, it has already finished high school and has already produced its English II, ACT, and graduation results, and every Mississippi class behind it, in every grade from kindergarten through twelfth, has also had the full LBPA model. Two dates are worth keeping separate here. The law's retention consequence first applied to the 2014-2015 third-grade class, most of whom had only second and third grade under the law rather than all four years. The first class to receive the complete K-3 model the reform was built around was the fall-2013 kindergarten class, which graduated in spring 2026.

With the timing straight, Mississippi's high-school data is more than a weak or early signal. It is a legitimate, if imperfect, downstream test of the same reform that produced the fourth-grade NAEP result, applied to students who received the full K-3 model rather than part of it. Read this way, steady pass rates paired with falling proficiency are real evidence for this paper's argument. The same students, or nearly the same students, who built the country's strongest K-3 decoding foundation have not gone on to post standout results on the reading and English measures available at the end of high school, which carries the eighth-grade NAEP pattern to a third, later point of measurement. The ACT points the same way. Mississippi gives the ACT to every public high school junior during the school day (Jackson, 2023). Statewide junior averages have run between 17.3 and 17.5 in recent years and stood at 17.4 in 2024 (Mississippi Department of Education, 2024). Mississippi's graduating class of 2024, every graduate tested, averaged 18.8 against a national figure of 19.4, and 36 percent met ACT's college-readiness benchmark in reading, against 40 percent nationally (ACT, 2024a, 2024b). That comparison carries its own separate confound, since Mississippi's 100 percent testing mandate brings in a broader population than the more self-selected groups who take the ACT in many other states.

2.9 Mississippi's Own 2026 Response Confirms the Diagnosis

The clearest confirmation of this paper's argument comes from the Mississippi Legislature itself rather than from an outside researcher. In April 2026, Governor Tate Reeves signed Senate Bill 2294, creating the Adolescent Literacy Initiative. The program extends literacy screening, coaching, intervention, and evidence-based instruction into grades four through eight (alongside a parallel initiative for mathematics), and it took effect July 1, 2026 (Bose, 2026; S.B. 2294, 2026). The Legislature directed 9 million dollars to the literacy expansion, funding literacy coaches for grades four through eight beginning in the 2026-2027 school year (Bose, 2026). That sits on top of the roughly 15 million dollars a year the state has invested in literacy since the original K-3 law (Heubeck, 2023). State officials were explicit about why the new law was needed. A legislator central to the effort said policymakers had expected the K-3 literacy classes eventually to show clear gains by eighth grade, and that those classes had already passed through eighth grade with reading scores that stayed flat (Bose, 2026). That is the fourth-to-eighth-grade split this paper documents, offered by the Legislature as its own reason for new legislation rather than by an outside critic of the state's reform.

The design of the 2026 law tracks this paper's argument closely enough to walk through. The Adolescent Literacy Initiative requires evidence-based literacy practices aligned to the science of reading in grades

four through eight. It bans the three-cueing model, a method that teaches children to guess words from pictures and context, which the state had already excluded from K-3 instruction. It requires universal screeners three times a year, diagnostic tools, and ongoing progress monitoring, along with job-embedded coaching and professional learning for grades 4-8 educators. It also requires future English, science, and social studies teachers in those grades to complete reading training before certification, explicitly extending responsibility for literacy beyond the English department (Mississippi First, 2026). A June 2026 interview with Mississippi's state superintendent framed the initiative as applying the science of reading beyond third grade, a phrasing that keeps the reform's vocabulary anchored to decoding and evidence-based reading instruction even as it moves into grades where, on this paper's argument, decoding is no longer the main limit for most students (ExcelinEd in Action, 2026). One industry account of the rollout is candid about whom the law reaches. Districts are seeing measurable Lexile growth, a standard measure of the text difficulty a student can handle, among older students receiving intensive, explicit, systematic reading intervention, described as work with "the students who did not benefit from early intervention and phonics-based instruction" the first time through (Eldridge, 2026). That work is real and worthwhile. In this paper's terms, it is more work on access, for students whose limit may genuinely still be access. It is a different matter from what this paper argues is missing for the larger share of Mississippi's middle schoolers, who already decode fluently and whose eighth-grade NAEP plateau this paper attributes to I.

Two features of the new law bear directly on this paper's central argument. First, the Legislature deliberately did not create an eighth-grade version of the third-grade retention gate. Lawmakers concluded that holding back adolescents carries more risk to eventual graduation than the third-grade policy does for younger children, and chose to rely on screening, intervention, and remediation without a promotion consequence (Bose, 2026). That is a defensible judgment on its own terms. It also means the new law cannot borrow the accountability mechanism, the promotion consequence Section 2.2 describes, that helped make the K-3 reform as thorough as it was. Second, and more directly relevant to this paper's core claim, the statute and the public accounts of the initiative describe expanded reading intervention, diagnostic screening, and evidence-based literacy instruction across subjects. They do not describe a parallel, comparably funded mandate for sequenced content in history, science, civics, or the arts, the I that Sections 5 and 6 argue is the real limit at these grades. One report on the rollout does note that a Wayne County pilot teacher coordinated with a history teacher so students met similar topics across both classes, which is the right direction and consistent with what Section 5.3's three-part guarantee recommends (Bose, 2026). A single coordination practice mentioned in early pilot reporting is still not a statewide, legally specified content-knowledge mandate of the kind Section 6.2 argues the original 2013 law never built either. Whether the 2026 law repeats that omission in a new grade band, or genuinely closes it, is the open question this paper predicts will decide whether Mississippi's eighth-grade NAEP results move in the next assessment cycle.

The law is too new to judge by its outcomes. Pilots began in a small number of districts, Wayne County, Kosciusko, and Moss Point among them, and statewide implementation began only with the 2026-2027 school year; there is no NAEP or state-assessment evidence yet that could confirm or contradict what the law will produce (Bose, 2026). Based on how long the original K-3 law took to show up in fourth-grade NAEP results, a reasonable timeline puts the earliest plausible district-level evidence at 2028 to 2030 and the earliest credible statewide NAEP evidence at 2030 or later, depending on which classes and assessment cycles are involved. This paper's argument makes a specific, falsifiable prediction about that

evidence, one precise enough that the data could prove it wrong. To the extent the Adolescent Literacy Initiative works mainly as more decoding and reading-strategy intervention for grades four through eight, more work on access delivered to students whose limit is largely I, it should help the minority of middle schoolers whose problem really is decoding without producing eighth-grade NAEP movement on the scale Mississippi achieved at fourth grade. To the extent implementation follows the direction one pilot account hints at, coordinating reading instruction with knowledge-building in the content areas instead of treating comprehension as a stand-alone skill, this paper predicts a noticeably larger result. Mississippi has, in effect, already agreed with this paper that a problem exists in grades four through eight. Whether its 2026 remedy targets the factor this paper argues is missing is the question the next several years of Mississippi data will answer.

2.10 The Pattern Is National, Not Mississippi's Alone

Everything so far treats Mississippi as a case study, one state whose data makes the difference between I and O unusually visible because its K-3 reform worked so well. A 2026 research brief from NWEA shows the same pattern nationally. NWEA is the nonprofit behind MAP Growth, a student assessment used in thousands of American districts. Its brief drew on data from more than 20 million K-8 students and checked the finding against three separate assessment systems rather than one: MAP Growth; i-Ready, a competing adaptive test whose own validity evidence has recently drawn public criticism for relying heavily on research its publisher funded (Altavena, 2026); and NAEP itself. The result held across all three. Average middle-school reading scores have stagnated since 2022, and the lowest-performing readers in particular keep declining year over year, with no sign of the recovery seen in early-elementary reading and in math (Kuhfeld et al., 2026; NWEA, 2026). The i-Ready controversy concerns the tool's own claims about how well its instruction works, not the finding reported here, and NWEA, not i-Ready's publisher, Curriculum Associates, ran this cross-system comparison. The concern is still worth naming, and it is why this paper gives weight to the three-way agreement specifically because NAEP, built and scored independently of any test publisher, confirms the same pattern on its own. The lead researcher, Dr. Megan Kuhfeld, NWEA's Director of Growth Modeling and Data Analytics, said the results call for focused attention on the lowest-performing middle-school readers, and that closing the gap will take a coherent, system-level response running from kindergarten through middle school rather than isolated interventions (NWEA, 2026). Three separately built assessment systems converging on the same shape, elementary recovery, middle-school stagnation, worst among the weakest readers, is the same kind of evidence Section 7 relies on for Mississippi itself. Independent measurements that were never designed to agree with one another, agreeing anyway, are hard to dismiss as a fluke.

A second, independent voice reaches the same mechanism from a different direction. Dacia Toll, a former charter-school leader who co-founded the AI-powered literacy platform Coursemojo, describes what she calls the comprehension wall: the point, usually in late elementary or early middle school, where a student who reads every word on a page fluently still cannot answer a basic question about what it means (Toll, 2026). Toll traces the wall to texts that grow more complex while the background knowledge they demand climbs, and the EdSurge podcast episode built around the same NWEA finding describes students who read fluently in fourth grade yet struggle with comprehension by sixth, as the knowledge their texts assume becomes more specialized (EdSurge, 2026). Nothing in that pattern says decoding got worse. It describes I, background information, failing to keep pace with what the texts require while access to print

holds steady, and M, the resulting comprehension, falling as a result, which is exactly the mechanism Section 3 sets out formally.

Toll also names the assumption behind the problem: the United States, she writes, "has treated its reading crisis as an early grades problem" (Toll, 2026). It is the same accountability-gap argument Sections 2.1 through 2.9 make about Mississippi, restated as a pattern across the country's wave of literacy reform: aimed almost entirely at decoding, aimed almost entirely at the earliest grades, and silent about what happens once a student who can decode meets a text whose meaning depends on knowledge the reform never touched. Toll's work also speaks to the empty-set argument in Section 4. She separates AI reading tools that simply speed a student to the answer, a generic chatbot used to finish assignments faster, from tools built to teach rather than tell, sending the student back to a specific sentence or paragraph to reread and revise (Toll, 2026). What decides whether a tool builds comprehension or merely performs it is that difference, rather than whether AI is involved at all. It is the same line Section 4.3 draws between a genuine DSRP move run on material a student understands and the same move made as an empty motion against material the student does not.

3. The Simple View of Reading as a Second Multiplicative Equation

3.1 Gough and Tunmer's Formula

In 1986, reading researchers Philip Gough and William Tunmer published what became known as the Simple View of Reading in the journal *Remedial and Special Education*. They proposed a deliberately falsifiable formula, one specific enough that evidence could disprove it, to settle a long-running dispute about how decoding skill relates to reading ability (Gough & Tunmer, 1986). Their formula states:

$$RC = D \times LC$$

where RC is reading comprehension; D is decoding, defined as accurate, efficient word recognition; and LC is language comprehension, the ability to draw meaning from spoken language once the words themselves have been recognized, which depends on vocabulary, syntax, and background knowledge (Gough & Tunmer, 1986; Hoover & Gough, 1990). As in M = I × O, the terms multiply rather than add, and Gough and Tunmer were explicit about what follows: if either term is zero, the product is zero, however strong the other term is (Hoover & Gough, 1990). A reader with perfect decoding and no language comprehension of a particular passage, because it assumes knowledge the reader lacks, will not understand that passage. A reader with rich language comprehension and no decoding ability cannot get into the passage at all. Neither term makes up for the other's absence. Both must be present, and the comprehension that results is held down by whichever term is weaker rather than averaged up toward whichever is stronger.

3.2 The Same Structure, Independently Derived

Gough and Tunmer built RC = D × LC from research on how children learn to read, working with data on children's decoding and comprehension, with no reference to systems theory, organizational theory, or anything resembling DSRP (Gough & Tunmer, 1986). Cabrera's M = I × O comes from a general theory of how minds organize information, developed separately and for different purposes (Cabrera & Cabrera, 2025b; Cabrera, 2025). Two research traditions, working from different data, different methods, and different decades, arrived at structurally identical equations: a raw-material term multiplied by a processing term. Neither borrowed its equation from the other. The more reasonable conclusion is that the underlying phenomenon is real. Comprehension collapses toward zero when either its raw material or its processing capacity collapses toward zero, and that feature of understanding is sturdy enough to be found independently from two directions. This paper treats the two equations as mapping onto each other, with one point of precision. I corresponds to the knowledge-dependent parts of LC, chiefly background knowledge and vocabulary. Strictly speaking these are knowledge, information a reader took in and organized earlier, and that is exactly why they matter: they are what lets the information in a new text connect to anything. D, decoding, corresponds not to O but to the access step that must happen before either I or O can act on a text at all. RC and M are the same output under different names, comprehension, understanding, meaning, and both collapse toward zero whenever access, knowledge, or organization is missing, whichever one that turns out to be.

The mapping also clarifies something Gough and Tunmer's formula leaves loose. LC, language comprehension, is itself a bundle: vocabulary, syntax, background knowledge, and inferential reasoning, several distinct capacities folded into a single term (Hoover & Gough, 1990). Applying M = I × O to the I side of that bundle singles out background knowledge and content vocabulary as the part of LC this paper is concerned with, without claiming that syntax and inference do not matter. On the evidence available, Mississippi's eighth graders are not failing at syntax. They are more plausibly failing to understand passages whose subject matter, whether historical, scientific, civic, or literary, assumes content knowledge many of them have not yet built up with enough breadth or depth. Section 3.3 develops the evidence for that specific claim.

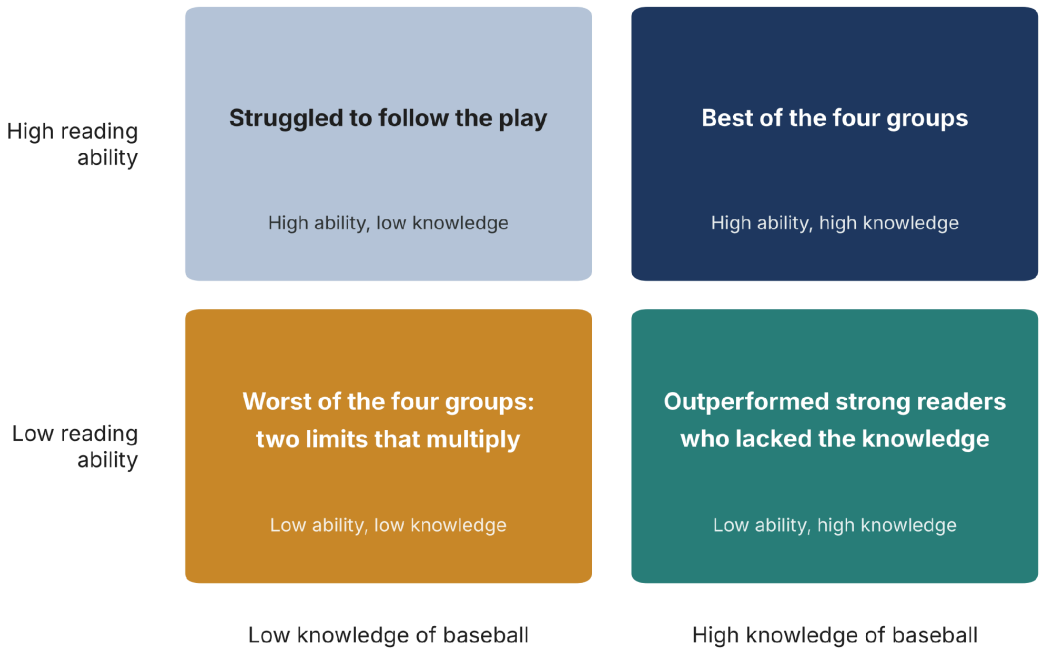
3.3 The Baseball Study

In 1988, Donna Recht and Lauren Leslie published what has since become known as the baseball study. It tested exactly the interaction this paper's argument depends on: what happens to reading comprehension when general reading skill and knowledge of a particular topic are varied separately instead of being assumed to move together (Recht & Leslie, 1988). Recht and Leslie tested 64 seventh and eighth graders and sorted them into four groups by crossing two variables, general reading ability, high or low, and prior knowledge of baseball, high or low (Recht & Leslie, 1988). Each student read a passage describing half an inning of a fictional baseball game and then acted out the play on a miniature field with wooden player figures, a method chosen to measure comprehension through action rather than through a format that itself depended on reading or writing skill (Recht & Leslie, 1988).

The result ran against the simple additive assumption that more reading skill should always predict more comprehension, whatever the subject. Students with little baseball knowledge, including those in the

stronger reading group, did worse at reenacting the play than students with a lot of baseball knowledge, including those in the weaker reading group. On several measures, knowledge of the topic shaped performance more than reading-ability grouping did, and the original analysis found no significant interaction between prior knowledge and reading ability, meaning the knowledge effect held regardless of which ability group a student was in (Recht & Leslie, 1988). Recht and Leslie described the mechanism plainly: "Prior knowledge creates a scaffolding for information in memory" (Recht & Leslie, as cited in Terada, 2019). That description maps directly onto this paper's I, since the scaffolding is precisely the structure a reader's existing knowledge provides for taking in new, related information from a text. This paper follows the careful reading of the study that later commentators have urged, rather than the stronger popular version sometimes attributed to it. The defensible claim is that relevant prior knowledge can substantially affect middle-school readers' comprehension and memory of a text, including helping some readers make up for weaknesses that would otherwise get in the way. It is not that one baseball passage proves background knowledge outweighs reading skill in general (Shanahan, 2020). A later systematic review of 23 studies on background knowledge and reading comprehension found a consistent pattern across a wide range of texts and readers: readers with stronger topic knowledge understood texts better than readers with weaker topic knowledge, among skilled and less-skilled readers alike (Smith et al., 2021). In this more careful form, the finding has held up across nearly four decades of later research.

Image 4. The Four Groups in the Baseball Study. Recht and Leslie crossed general reading ability with prior knowledge of baseball. Weak readers who knew baseball outperformed strong readers who did not, and the group low on both, facing two limits that multiply, did worst of all (Recht & Leslie, 1988).



The relevance to Mississippi's eighth-grade results is direct. Seventh and eighth graders are exactly the population Recht and Leslie tested, and the mechanism their study isolated, prior knowledge substantially shaping comprehension regardless of a reader's general ability, is a documented case of the mechanism this paper argues explains why a state that built decoding at scale did not see a matching jump in

eighth-grade comprehension. Decoding skill sits closer to what Recht and Leslie called general reading ability than to topic knowledge. Their finding that prior knowledge shaped comprehension independently of reading-ability grouping is, in this paper's terms, evidence that I can limit M even when a reader's general skill, decoding included, is not the problem, in exactly the population and grade band where Mississippi's NAEP plateau appears.

4. Why DSRP's Six Moves Cannot Compensate for Missing Information

4.1 The Empty-Set Problem, Stated as the Central Argument

DSRP's six cognitive moves (Is/Is Not List, Zoom In, Zoom Out, Part Party!, RDS Barbell, and Perspective Circle) are often described, including in this author's own earlier work, as the tools that turn raw reading into structured understanding (Cabrera & Cabrera, 2025c; Nittolo, 2026). That description is accurate, and it is also incomplete in a way this paper needs to make explicit. Every one of the six moves is an operation performed *on* something. None of them produces the something it operates on. This section works through each move against a comprehension task and shows that each one assumes prior information of exactly the kind Section 3 identifies as the limit at eighth grade: background knowledge, content vocabulary, and the conceptual scaffolding Recht and Leslie described.

Is/Is Not List. This move asks a reader to decide what something is and what it is not, drawing a distinction around a claim, a concept, or a category. Run against a passage about federalism, it requires the reader to have some concept already of what federalism is, or is not, in order to sort new information against that boundary. A reader with no prior exposure to federalism cannot run Is/Is Not against it, because there is no existing category to sort the new information against. The move does not create the category. It sharpens one that must already exist, however roughly, before the move has anything to act on.

Zoom In. This move narrows attention from a whole to a specific part relevant to the reader's question. Applied to an unfamiliar historical passage, Zoom In requires the reader to recognize already which parts of the passage carry weight, the causal claims, the named actors, the chronology, in order to know where to focus. A reader with no framework for what matters in a historical account zooms in at random, or not at all, because the move depends on already having enough structure to pick out a part worth isolating.

Zoom Out. This move steps back from specific details to find the larger pattern or question they belong to. It may be the move most dependent on prior knowledge, because recognizing that several details are instances of a larger pattern requires knowing already that the pattern exists. A reader meeting "segregation," "industrialization," and "urbanization" for the first time in a single passage about the Great Migration cannot zoom out to the pattern those terms belong to, because that pattern is exactly what the reader lacks. Zoom Out arranges existing knowledge into a bigger picture. It does not supply the pieces that make the bigger picture visible in the first place.

Part Party! This move breaks a whole into its parts and examines how those parts relate. Applied to an unfamiliar system, such as an ecosystem, a branch of government, or a chemical process, it requires the reader to know, at least roughly, what the system's parts are in order to break it down correctly. A reader with no prior exposure to the water cycle cannot do much with Part Party! on a passage about it beyond the most literal, sentence-by-sentence breakdown, because the move's value lies in relating parts the reader already has some independent grasp of, not in producing those parts from nothing.

RDS Barbell. This move examines the relationship between two claims or sources by "cracking open" the connection between them and treating it as a system with its own structure, as the companion paper describes when applying this move to syntopical reading (Nittolo, 2026). Applied to two claims about, for instance, the effects of a Supreme Court decision, the move requires the reader to understand both claims well enough to tell whether they genuinely agree, genuinely disagree, or differ only on the surface. A reader who understands neither claim, because the legal and civic vocabulary is unfamiliar, cannot run RDS Barbell on the relationship between them. There are not yet two understood positions to place the barbell between.

Perspective Circle. This move holds several viewpoints on an issue at once and builds a synthesis that takes in their disagreement instead of flattening it. It depends most obviously of all on the reader already understanding each perspective well enough to hold it, since a perspective the reader has not understood cannot be held alongside others. It can only be ignored or misrepresented in the resulting synthesis.

4.2 What This Means for the Mississippi Case

Taken together, the six analyses point to one conclusion. DSRP's moves are organizing operations, the O in $M = I \times O$, and every one of them requires I, information to work on, and in practice the background knowledge a reader built by organizing earlier information, before it can be run at all. A student trained rigorously in all six moves but reading a passage about Reconstruction, cell division, or federalism with no prior exposure to the content is a student with excellent tools and nothing to use them on. That limitation is not hypothetical. It is the specific mechanism this paper argues explains why Mississippi's eighth graders, whatever thinking or reading strategies they have been taught, plateau on NAEP passages whose meaning depends on historical, scientific, or civic knowledge many of them have not yet had the chance to build through a coherent, content-rich curriculum. DSRP training and reading-strategy instruction sit on the O side of the equation. Decoding fluency sits on the access side, a separate precondition that neither term can replace. None of these is I, and none of them can become I. An O of any strength, multiplied by an I near zero, returns a product near zero. That is a mathematically precise description of a flat eighth-grade comprehension score that follows a real fourth-grade investment in decoding and a much thinner investment, in the years between, in building content knowledge.

4.3 You Cannot Think About Nothing

It is worth saying plainly, because the rest of this paper depends on it. A reader cannot run Zoom Out, RDS Barbell, or Perspective Circle, and cannot think in any structured sense, about a text whose content the reader does not have. Metacognition, thinking about one's own thinking, needs some thinking

underneath it to work on. A student asked to reflect on, organize, or synthesize material they have not understood is not doing a harder version of thinking. They are going through the outward motions of thinking against nothing, and the result looks like engagement without being engagement, because there is no understood content beneath the strategy for the strategy to act on. Section 1.1 quoted the companion paper's version of the same claim: a move run against no material is a move performed against an empty set. This paper's contribution is to show that the empty set is far from a rare edge case confined to unusual texts. It is the everyday condition of a middle-school reader working through grade-level content without the background knowledge that content assumes, and therefore the everyday condition of the instruction many struggling middle-school readers receive.

That instructional model deserves to be named directly, because it is common, well-intentioned, and, on the argument developed here, built in a way that cannot close the gap it targets. A middle-school student who scores below grade level on a reading assessment is often placed in an intervention built from the same kind of material, and often at the same level, as elementary reading instruction: leveled passages controlled for vocabulary and sentence complexity, practice with comprehension strategies, and repeated exposure to short, content-thin texts chosen because they are accessible rather than because they build toward anything. The problem is not a lack of effort or teaching skill. The problem is that this is a return trip to access. It re-drills decoding fluency and generic comprehension strategy, the same work on access that Section 2.2 identifies as Mississippi's 2013 reform, in students who in most cases already have access to print and whose real limit is I or O: the missing years of content knowledge, academic vocabulary, and exposure to the disciplines that a program of leveled, content-thin passages does not supply and was never designed to supply. Running that model harder, for more minutes a day, across more years of middle school, does not change what it aims at. It is still the same drilling on access, delivered again, to a student whose problem was never decoding. The empty-set problem in Section 4.1 predicts the outcome. Strategy instruction repeated on material too thin to build knowledge produces students who can recite the strategy, Zoom Out, ask a guiding question, summarize a main idea, without the growing background knowledge that would let those same strategies, applied later to substantive content, actually produce understanding. The strategy becomes a routine rehearsed in a vacuum rather than a tool used on something real.

This is also the direct link between this paper and its companion. The syntopical reading paper argues that DSRP's six moves are what expert readers do, mostly without noticing, when they build understanding across several sources, and that naming the moves is what makes the practice teachable rather than an accident of privilege (Nittolo, 2026). That argument assumes a reader who has something to synthesize: sources whose content the reader can understand well enough to place in relation to one another. A student who has spent middle school in elementary-level reading practice, however well delivered, has not been given that raw material. Teaching such a student the six DSRP moves in the abstract, or drilling comprehension strategies on passages chosen for their simplicity rather than their content, produces a student who can describe what syntopical thinking would involve without being able to do it, because the moves have nothing to run on. The science of reading in its full and proper sense, phonemic awareness, phonics, fluency, vocabulary, and language comprehension together, remains the necessary foundation, which this paper does not dispute and which Section 2 credits directly for Mississippi's fourth-grade result. This section's argument is narrower and, for a middle-school leader, more useful. Once access to print is in place, more of the same practice stops being the next step in literacy growth and becomes a ceiling, because it keeps rebuilding the same skill in a student whose results are limited by I or O, and no amount of that rebuilding moves the product.

5. What Building Both Terms Actually Requires

5.1 Where Standards Hold Students Accountable for Knowing Things

A common objection to everything above deserves a direct answer instead of being assumed away. It holds that schools already try to build broad knowledge, so a call for a knowledge-rich PreK-8 curriculum describes something schools are already doing, or attempting, through their content standards. A close reading of the standards that actually govern instruction does not support it. The anchor standards that organize English Language Arts instruction in nearly every state, including New Jersey and, through the Common Core's direct lineage into its state standards, Mississippi, are process verbs applied to whatever text a teacher or testing program happens to choose: "read closely to determine what the text says," "determine central ideas or themes," "analyze how and why individuals, events, and ideas develop," "cite specific textual evidence," "delineate and evaluate the argument" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Every one of these can be met, and routinely is, by a student working with a text on any subject at all, picked for its reading level or availability rather than for what it teaches, because the standard names the operation the student must perform and leaves the content entirely open. New Jersey's own ELA standards say so outright. The 2016 standards' recurring "Note on range and content of student reading" tells teachers that students must read from "a broad range of high-quality, increasingly challenging literary and informational texts," and it even says the curriculum should be "intentionally and coherently structured to develop rich content knowledge." Yet it names no text, topic, or body of knowledge, and leaves what that knowledge should be, and whether a student is responsible for keeping any of it, to each district (New Jersey Department of Education, 2016). A student can fully satisfy New Jersey's reading standards across an entire K-12 career while accumulating almost nothing lasting about history, science, geography, or the arts, because nothing in the standard requires it. The standard is met by the performance, whatever the student does or does not retain.

The complaint is far from a fringe one. E.D. Hirsch, whose account of cultural literacy Section 6 draws on directly, has criticized the Common Core reading standards for exactly this reason. He argues that all-purpose comprehension skills, cut loose from any specified body of content, cannot be taught or assessed in a vacuum, and that they end up training students to perform generic operations on interchangeable texts instead of building the knowledge those operations are supposed to serve (Hirsch, 2016). A parallel critique applies to science under the Next Generation Science Standards. Those standards organize expectations around three dimensions, disciplinary core ideas, crosscutting concepts, and science and engineering practices, and they state explicitly that crosscutting concepts such as "patterns," "cause and effect," and "systems" should not be assessed separately from the practices and core ideas, and that students should not be tested on defining them as vocabulary words (NGSS Lead States, 2013). The concepts are meant to work as thinking tools across whatever core idea a unit happens to cover. A comparison from before the Common Core makes the contrast concrete. Massachusetts's earlier state ELA framework named actual content, specific bodies of literature, mythology, and cultural touchstones students were expected to know by a given grade. A published critique of the newer standards argues that this specificity was replaced by open-ended language that produces "awareness" rather than "knowledge," since a standard asking students to engage with literature "representative of a variety of

periods, cultures, and worldviews" names no period, culture, or worldview a student must actually come away knowing anything about (Bauerlein et al., 2017).

None of this means teachers do not teach content, or that no student learns history, science, or literature in an American classroom. Many do, because individual teachers and schools choose to build knowledge-rich curricula on top of standards that do not require them. What it means is that the standards themselves, the documents that define what a school is formally accountable for and what a state tests, hold students accountable for demonstrating a process rather than for knowing a specified thing. That gap in how the standards are built is the one this paper's argument depends on. A student can be fully proficient by every measure a state ELA standard uses, citing evidence, finding central ideas, analyzing structure, and laying out an argument flawlessly, without ever having been held accountable by those standards for knowing what the Missouri Compromise was, what mitosis does, who Frederick Douglass was, or what happens in the second act of a Shakespeare play. Mississippi's eighth-grade plateau is what $M = I \times O$ predicts when I is left this open. It is also what standards built almost entirely from process verbs should be expected to produce, whatever choices a single state makes in carrying them out, because the standards never require I to be built at all.

The same gap has recently surfaced from an entirely different direction. A January 2026 Brookings report, drawing on consultations with students, teachers, parents, and experts in 50 countries and a review of over 400 studies, warns about cognitive offloading, students handing the effortful parts of schoolwork to generative AI, and links overreliance on these tools to declining reading, writing, and critical-thinking skills. The effort gets skipped, and the capacity it was supposed to build goes undeveloped even as the assignment gets done (Burns et al., 2026). The report's proposed framework (three pillars it calls Prosper, Prepare, and Protect) centers almost entirely on how institutions should manage AI tools through adoption policy, AI literacy, and safeguards, rather than on whether thinking has ever been taught as a structured, nameable skill in the first place (Burns et al., 2026). It is the same gap described above in reading standards, reached from the opposite side. Standards that name process verbs without naming content produce students who can perform "analyze" and "evaluate" on demand without the knowledge those operations need to be more than motion. Handed a tool that performs the same motions faster and with no effort, those students have little reason, and less and less capacity, to notice the difference between having done the thinking and having watched it get done. AI did not create this weakness. It found a gap that process-only standards had already left open, the same gap Section 4.3's empty-set argument describes. An operation, whether Zoom Out, citing evidence, or a generative-AI prompt, performed by or for a student who has neither the content knowledge nor the practiced habit of thinking with it, produces the look of engagement without the thing engagement was supposed to build.

5.2 Science of Reading, Narrowly and Broadly Construed

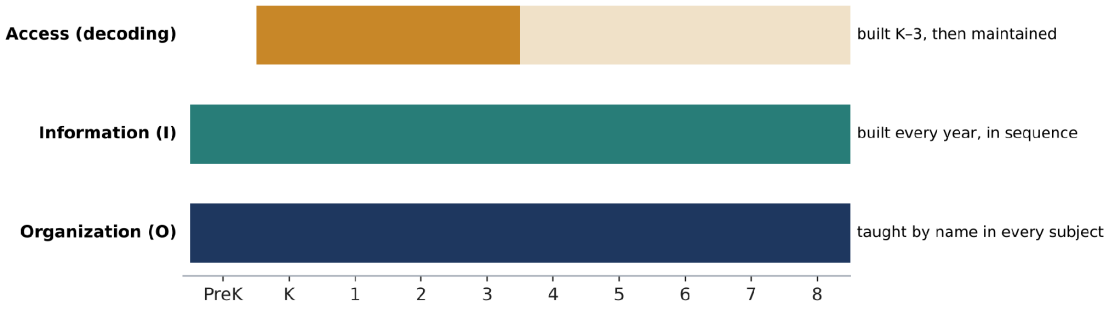
Over the past decade, the phrase "science of reading" has come to mean, in much of public policy, something narrower than the research it claims to represent. Mississippi's reform, in its explicit statutory language, shows the narrow version: phonemic awareness, phonics, decoding, fluency, and early intervention, all of it aimed squarely at access rather than at the organizing moves or the knowledge base that access alone does not build (Mississippi Legislature, 2013). That is no criticism of the reform on its own terms. Decoding was the right target for the grades and outcomes the law addressed, and the

fourth-grade results prove it. The criticism, such as it is, falls on a wider pattern in which "science of reading" is treated, in professional development, state policy, and popular reporting, as another name for the K-3 phonics agenda, rather than as the fuller account of literacy the research actually describes. That account has always included vocabulary, background knowledge, syntax, and comprehension as parts of skilled reading that stand alongside phonics and decoding, not beneath them (Hoover & Gough, 1990; Smith et al., 2021). Systematic phonics is necessary. It has never been sufficient, and nothing in the research this paper draws on claims otherwise. The gap lies between what the research says and what a decade of implementation has actually built, in many states including Mississippi.

5.3 A Three-Part Literacy Guarantee

For a PreK-8 district, Sections 2 through 4 do not imply that foundational-skills instruction should give way to content knowledge. They imply that a district needs to guarantee all three pieces the equation requires, as Section 1.1 refines it, not only the one Mississippi's reform concentrated on. The first guarantee (delivered in grades K through 2 or 3) is access: every student reads words accurately and with growing automaticity, which opens the channel that lets a text's information reach them at all. The second and third guarantees run continuously from PreK through grade 8 rather than sitting in any single grade band. Every student takes in rich content, academic vocabulary, and the stories, events, and ideas of history, science, literature, and the arts, through a coherent curriculum sequenced so that each year builds on the last, the I guarantee. Every student is also taught explicitly the organizing moves, DSRP's four patterns, that turn that knowledge into understanding, the O guarantee. Access alone, however well built, has nothing to work on without the other two. Notice that none of the three promises knowledge on its own. Information is not knowledge; knowledge is what a student builds when the second guarantee meets the third, which is why they have to run together.

Image 5. The Three-Part Literacy Guarantee. Access is built in the early grades and then maintained. Information and organization are built continuously from PreK through grade 8, and taught together, because knowledge comes from the two together.



In practice, the I guarantee requires specific structural choices, not good intentions. It means protecting science and social studies time in elementary schedules, where those subjects are often the first to be squeezed out by larger early-literacy blocks, a trade that defeats itself if content is the I that comprehension depends on later. It means building ELA units around substantive, content-rich topics and coordinated sets of texts, instead of disconnected passages chosen mainly to practice a generic comprehension skill, since a "skill" practiced on content-free passages produces exactly the empty-set

problem Section 4 describes: a well-drilled operation with nothing lasting to work on. It means sequencing academic vocabulary on purpose instead of trusting chance exposure, treating read-alouds, class discussion, and writing as knowledge-building work in their own right rather than as comprehension-skill practice, and expecting every middle-school subject, not only English language arts, to contribute to reading and writing in its discipline. Eighth-grade NAEP passages draw on history, science, and civic knowledge that no single subject can be expected to supply on its own.

The distance between the first guarantee and the other two is the distance between a K-3 reading initiative and a PreK-8 system for literacy and knowledge. Mississippi has built the first, and built it well. Its eighth-grade NAEP results are the visible evidence of what remains to be built, and this paper's argument is that the shortfall is predictable, structural, and fixable, far from a mysterious failure to sustain early gains.

6. A Second Matthew Effect: Knowledge Compounds Too

6.1 The Mechanism

Keith Stanovich's Matthew Effect in reading, documented in his 1986 paper in *Reading Research Quarterly*, describes how early advantages in reading compound over time. Children who read well read more, and reading more builds the vocabulary and background knowledge that make later reading easier, while children who struggle read less and fall further behind each year (Stanovich, 1986). This author's companion paper carries Stanovich's mechanism into civic epistemology, the study of how citizens come to know and justify what they believe about public life. It argues that citizens who acquire syntopical thinking keep compounding that capacity, while citizens who do not keep piling up information with no structure to organize it (Nittolo, 2026). This paper identifies a related but distinct compounding mechanism, closer to Stanovich's original: knowledge itself compounds, whatever thinking method is applied to it, because background knowledge is what makes new, related knowledge easier to gain.

A student who has built substantial knowledge of American history finds a new passage about Reconstruction easier to understand, and therefore easier to learn from, than a student meeting Reconstruction with no historical scaffolding at all, which is exactly the mechanism Recht and Leslie described in Section 3.3. That easier comprehension leaves more knowledge behind, which makes the next related passage, on the Gilded Age, on industrialization, on the origins of Jim Crow, easier still. The gap between the two students does not stay fixed. It widens with each new text, because I does not simply add up from text to text; each new piece of knowledge makes the next piece easier to acquire, and that is the compounding structure a Matthew Effect describes. A student who reaches eighth grade after a K-3 experience heavy on decoding and comparatively light on content-rich curriculum arrives with a smaller store of I than a student whose elementary years built both at once. On a NAEP assessment that increasingly tests comprehension that depends on knowledge rather than on decoding, the gap between them will tend to widen, not close, as both move through the grades that follow.

6.2 Mississippi Is Not an Illustration of the Matthew Effect. It Is a Production of One.

This section's argument should be stated more strongly than the general mechanism in Section 6.1 allows on its own. Mississippi is more than a convenient case that happens to show a knowledge gap after the fact. Its own reform design is the mechanism that creates the gap. The 2013 Literacy-Based Promotion Act, as this paper's sources document its scope, concentrated its explicit legal levers, screening, intervention, teacher training, and a retention gate, entirely on decoding. It carried no comparable, statewide, legally specified mandate for building content knowledge in history, science, the arts, or literature across the elementary and middle grades (Mississippi Legislature, 2013). The decision to put resources into decoding first is not what this paper questions; Section 2 argues that decoding was, correctly, the limiting factor for the students and grades the law targeted. The point concerns what a reform that stops there produces once it succeeds at its actual target: a class of students who decode fluently but who have not been given (with anything like the same institutional intensity) the sustained, sequenced exposure to history, science, civics, literature, and the arts that Hirsch, writing decades before this NAEP data existed, argued is the real substance comprehension runs on (Hirsch, 1987).

Hirsch's name for that substance was cultural literacy: a shared body of background knowledge, names, events, concepts, and references, that competent readers and citizens draw on constantly and mostly without noticing, because texts assume it instead of explaining it (Hirsch, 1987). A student who decodes fluently but lacks this shared background is not illiterate in Hirsch's sense. The student can read every word. That student is still positioned to be relatively uninformed, in a specific and consequential way: able to recognize words accurately in content the student cannot place in any larger framework of historical, scientific, literary, or civic understanding, because that framework was never built.

This section's claim is about knowledge specifically, a narrower and more demanding target than the general comprehension $M = I \times O$ describes. A companion equation from Cabrera and Cabrera's own DSRP work states the point more precisely than $M = I \times O$ does here: $K = I \times T(DSRP)$, knowledge equals information multiplied by thinking, where thinking means the DSRP operations themselves, distinguishing, systematizing, relating, and taking perspective, applied to that information (Cabrera & Cabrera, 2025a; Cabrera & Cabrera, 2025c). Information a student merely encounters, a fact read once in a passage and never organized, connected to anything else, or revisited, is not yet knowledge in any lasting sense. It becomes knowledge only once DSRP's structuring operations have acted on it, separating it from what it is not, placing it within a system, relating it to other facts, and viewing it from more than one angle. This is the same multiplicative structure as $M = I \times O$ and $RC = D \times LC$, a raw-material term multiplied by a processing term, but $K = I \times T$ names the output as knowledge, which is the quantity this section is actually about. By this equation, Mississippi's reform built access to print and, through generic comprehension-strategy instruction, a thin version of T, without building I at the scale needed to turn the fourth-grade success into lasting knowledge in the later grades. A student can be taught to think, in this equation's sense, exceptionally well and still gather very little cultural-literacy knowledge, because T working on a thin I yields an equally thin K, for the same reason a strong O working on a thin I yields a weak M in Section 1.1's equation. The two equations describe the same failure from two angles. One asks whether a text was understood. The other asks whether a lasting fact was kept and organized into what the

student knows. Mississippi's eighth-grade plateau is evidence of both at once, because comprehension and the building of knowledge are two measures of the same multiplication starved of the same input.

That is the outcome this paper argues Mississippi's results should be read as early evidence of, and it is a more specific claim than a flat eighth-grade score. A flat score says comprehension did not improve. The mechanism behind it, on this paper's argument, is that a class of technically literate students is moving through a system that taught them to decode print with real skill while not building, at comparable scale or specificity, the knowledge of history, the arts, science, and literature that Sections 3 and 4 have already shown to be the actual limit once decoding is secure. Left alone, the compounding mechanism in Section 6.1 predicts that this gap will not stay where it is measured in eighth grade. It will keep widening through high school and into adulthood, producing the outcome Hirsch's original argument warned against: citizens who can read anything placed in front of them yet cannot place what they read within the shared body of historical, scientific, literary, and civic knowledge that gives a text its fuller meaning, and on which democratic and cultural participation, the subject of this author's companion paper, depends (Hirsch, 1987). Mississippi's fourth-grade success does not cut against this claim. It is the reason the claim can be stated so specifically. Because the state built access to print so effectively and so early, its eighth-grade results come close to a clean reading of what happens to comprehension when I is not built to match, free of the complication of a state that was also struggling with decoding.

6.3 Why This Reframes the Mississippi Result

Seen this way, Mississippi's eighth-grade plateau is more than the absence of a fourth-grade-sized gain. It is the signature of a compounding gap already underway, one that a reform focused on access, however successful at its own target, does not address and cannot close later through decoding instruction alone, since decoding is not what the gap is made of. This does not mean Mississippi's students are worse off than they would have been without the 2013 reforms. The fourth-grade evidence argues strongly against that reading, because decoding is a genuine prerequisite for everything downstream, and a student who cannot decode is shut out of the text entirely, whatever knowledge that student brings. The claim is that the reform solved one necessary problem, access to print, without yet solving a second, equally necessary one, and that the second problem does not fix itself just because the first has been fixed and a few more years have passed. Stanovich's original mechanism has decades of intervention research behind it, aimed at interrupting the reading Matthew Effect through early, targeted support (Stanovich, 1986). The knowledge-specific Matthew Effect this paper describes, the one Section 6.2 argues Mississippi's reform is actively producing rather than merely illustrating, has comparatively little intervention research aimed at it, which Section 9 identifies as the most pressing open question this argument leaves for future work.

7. Discussion

The central claim of this paper is that Mississippi's eighth-grade NAEP plateau is the predictable signature of a multiplicative relationship between I and O, neither a puzzle nor a policy failure. Three independent lines of evidence support it, and they arrive at the same structure without having been designed to confirm one another. The NAEP data shows the split directly: large, nationally leading gains at the grade where decoding is the limit, flat results at the grade where it is not. Gough and Tunmer's

Simple View of Reading, developed independently in reading research four decades ago, describes the same multiplicative structure in different terms, decoding and language comprehension rather than organization and information. Recht and Leslie's baseball study, and the systematic review that followed it, show the mechanism at the level of individual readers, in the same grade band where Mississippi's plateau appears: prior knowledge substantially shaping comprehension regardless of a reader's general ability. None of the three was assembled with the others in mind, and their agreement is what makes the argument stronger than any one piece of it.

What this paper adds beyond restating that evidence is the application of DSRP's own equation, and DSRP's own six cognitive moves, to a case with direct and current policy stakes. Section 4's analysis of the six moves, showing that each one assumes information it cannot produce, turns a point this author's earlier work made briefly as a caveat into this paper's central mechanism, and grounds it in a live case instead of a hypothetical one. That matters because DSRP is sometimes presented, including in this author's own earlier framing, mainly as a toolkit for organizing information a thinker already has. Taken seriously, DSRP's own logic is equally a warning against expecting organizing tools, however well taught, to substitute for the knowledge they need in order to work. The warning applies directly to how systems-thinking curricula, including this author's own DSRP-based curriculum work, should be sequenced alongside content instruction rather than offered as an alternative to it.

The paper's most direct practical target, developed in Section 4.3, is the habit of treating a middle-school comprehension gap as the same problem a third grader faces and answering it with the same tools: more decoding practice, more leveled passages, more generic comprehension-strategy drilling, delivered more intensively and for more years. This paper does not question that the habit is well-intentioned, or that decoding remediation is genuinely necessary for the minority of middle-school readers who have not yet cleared that threshold. What it questions is an assumption rarely stated outright but often built into program design: that repeating this kind of practice at greater volume amounts to comprehension instruction for students who have already cleared the decoding threshold. It does not. It is work on access, plus generic strategy practice, delivered again, and Sections 4.1 and 4.2 show why that work cannot move the product for a student whose limit is I. The remedy this paper argues for is not less foundational-skills instruction, which Section 2's fourth-grade evidence supports as strongly as anything here. It is a willingness to diagnose which factor in the equation is actually holding back a particular middle-school reader before assigning the intervention, since giving an access or strategy intervention to a reader limited by I spends real instructional time without touching the real constraint.

Section 2.6's Little League analogy and this section's middle-school argument carry the same warning, worth stating once, plainly, outside the metaphor. A number can rise for reasons that have nothing to do with the ability it was built to represent, whether through an older pitcher facing younger batters or through a reading score treated as an end in itself instead of as a stand-in for a knowledgeable, capable reader. Once passing the test becomes the target, a system will find ways to move the number that do not require moving what the number was meant to measure, and retention and repeated foundational-skills drilling are, each in its own way, examples of that pattern.

A further, more speculative piece of evidence suggests why Mississippi's institutional attention settled so heavily on K-3 in the first place, beyond the third-grade retention gate Section 2.2 documents. Mississippi's earlier teacher-evaluation framework, as publicly described by the Southern Regional

Education Board, split a teacher's rating evenly between professional practice and student growth, and gave teachers in state-tested grades and subjects individual growth scores calculated from their own students' test results. Teachers in untested grades and subjects instead developed Student Learning Objectives, individual goals a teacher and evaluator set and later check against evidence of student progress, and all teachers also received a schoolwide growth score, a real but less personally consequential form of accountability (Southern Regional Education Board, 2016). Under that structure, a third- or fourth-grade reading teacher had a personal, individually traceable stake in students' reading growth that a fifth-, sixth-, seventh-, or eighth-grade content-area teacher outside a tested subject did not have in the same way. This paper offers the mechanism as a plausible contributor to the gap in institutional seriousness between K-3 and grades 4-8, not as a proven cause. The weighting rules changed over time and can vary by district, and confirming the explanation for any given year would require checking that year's actual evaluation plan instead of relying on a general description of the framework. If the mechanism holds, the accountability gap this paper's argument turns on was not only a matter of how the statute was written, the third-grade promotion consequence Section 2.2 describes being the clearest driver, but also a matter of which teachers, in which grades, had the most personally at stake in the outcome the state was measuring.

Section 2.9's account of Mississippi's 2026 Adolescent Literacy Initiative deserves a last word here, because it changes the standing of this paper's central claim in a specific way. Before that law existed, the argument that Mississippi's eighth-grade plateau reflects a real, structural gap, rather than noise or a quirk of measurement, rested entirely on this paper's own reading of NAEP, ACT, and English II data. It now has independent support from the party with the deepest knowledge of the reform and the least reason to invent a problem: the Mississippi Legislature, which watched its own K-3 classes pass through eighth grade, found the plateau this paper documents, and spent nine million dollars responding to it. That does not answer the further question this paper cannot yet answer, whether the 2026 response targets I or simply extends the existing work. It does close off one objection to everything argued in Sections 2 through 4, that the fourth-to-eighth-grade gap might be a statistical artifact this paper is reading too much into. The state that produced the data agrees the gap is real.

8. Limitations

Several limitations should govern how this paper's claims are read. First, the link drawn between Mississippi's NAEP results and $M = I \times O$ is an interpretation of existing, publicly reported data. It is not a study designed to isolate I and O as separate variables the way Recht and Leslie's controlled experiment did. NAEP does not report any direct measure of test-takers' background knowledge alongside their comprehension scores. The paper's claim that a shortfall in I specifically explains the plateau, rather than some other factor that rises or falls with grade level, rests on inference from the pattern of results and from independently established research on background knowledge in comprehension, not on a direct measurement within the Mississippi data.

Second, the paper attributes part of Mississippi's rank improvement to national decline rather than to absolute state gains, a reading consistent with the reported scale scores. It has not, however, carried out an independent statistical breakdown of how much of Mississippi's rank movement reflects each factor.

Third, Section 4's analysis of the six DSRP moves is a structural, conceptual argument, of the same kind as the companion paper's Section 2 analysis. It is not an empirical test of whether DSRP-trained students actually show the predicted empty-set failure when reading texts they lack the knowledge for; no such study has been done.

Fourth, the paper's account of what a three-part literacy guarantee requires draws on established curriculum-design research and this author's own experience leading a district. It has not been tested as an integrated program against a comparison group; Section 9 proposes the study that would test it.

Fifth, and most relevant to Section 6.2's claim that Mississippi's reform is actively producing a knowledge-specific Matthew Effect rather than merely failing to close one, this paper has not directly measured Mississippi students' cultural-literacy knowledge in Hirsch's sense. The claim rests on the legal scope of the 2013 reform as documented in public sources, on the general mechanism Section 6.1 sets out, and on the NAEP pattern Section 2 documents. It does not rest on a direct assessment of what Mississippi students currently know about history, science, literature, or the arts compared with another population. A direct measure of that kind, discussed in Section 9, is the evidence that would turn this claim from a well-supported inference into a demonstrated finding.

Sixth, Section 2.6's treatment of the retention confound is this paper's best-faith account of an unresolved dispute in the research, not a resolution of it. Independent analysts disagree about how much of Mississippi's fourth-grade gain reflects genuine instructional improvement and how much reflects a change in which students sit for the test. This paper's central argument is built to hold however that dispute is eventually settled, but readers should treat the fourth-grade figures cited here as somewhat less certain than the eighth-grade figures the central claim rests on.

Seventh, the high-school data in Section 2.8 compares groups of different sizes, tested under different conditions, than the NAEP fourth- and eighth-grade data, even though this paper treats it as evidence from students who received the full K-3 model. This paper has not examined whether the state's cut scores for English II performance levels have shifted over the period in ways that would affect year-to-year comparisons, the same kind of standard-setting question Section 2.6 raises about the 2018-to-2019 change in the third-grade reading gate's proficiency bar. The Mississippi ACT comparison also carries a separate, acknowledged confound: the state's 100 percent testing mandate brings in a broader population than the more self-selected groups who take the ACT in many other states.

Eighth, Section 2.9's discussion of the 2026 Adolescent Literacy Initiative is necessarily speculative about outcomes, since the law took effect in July 2026 and has produced no assessment data of any kind as of this writing. The paper's view that the law's design leans toward extending existing reading intervention rather than building I comes from public summaries of the statute and early pilot reporting, not from a full analysis of the law's text or its eventual implementation. The one pilot detail suggesting coordination with the content areas, cited in Section 2.9, may prove more or less representative of statewide practice than early reporting suggests.

Ninth, the teacher-accountability mechanism raised in Section 7 as a possible contributor to Mississippi's K-3 focus is explicitly speculative and labeled as such where it appears. It draws on a general description of Mississippi's earlier evaluation framework rather than on district-level evaluation plans for any specific

year, and this paper has not confirmed whether or how that framework's weighting rules changed over the period it otherwise examines.

9. Future Research

The most direct test of this paper's central claim would use NAEP or state-assessment subscores to separate knowledge-dependent comprehension items, passages that require historical, scientific, or civic background knowledge to interpret, from items that depend less on knowledge, and would test whether Mississippi's eighth-grade plateau is concentrated in the knowledge-dependent items rather than spread evenly across the assessment. If the plateau is concentrated as this paper predicts, that would be strong, direct evidence for the knowledge-shortfall explanation over competing ones, such as a general ceiling on reading-strategy instruction unrelated to content knowledge.

A second direction would extend Recht and Leslie's baseball-study design to a sample representative of Mississippi, crossing measured content knowledge in specific domains, American history, life science, civics, with measured decoding fluency. The aim would be to learn whether the interaction Recht and Leslie found in 1988 holds in this population and predicts NAEP-style comprehension with the effect size this paper's argument requires.

A third direction is available sooner than any of the others, because the natural experiment is already underway. It would track the Adolescent Literacy Initiative's implementation and outcomes directly against the prediction in Section 2.9: that gains will concentrate among students whose limit really was decoding, and that eighth-grade NAEP or MAAP scores will not move on the fourth-grade scale unless implementation shifts meaningfully toward sequenced knowledge-building in the content areas rather than extended reading-strategy intervention. A researcher with access to district-level implementation data could code each participating district's actual practice, screening and intervention only, or screening and intervention combined with content-area knowledge sequencing, and test the prediction once outcome data begins to arrive around 2028, years before this paper's author could complete such an analysis alone.

A fourth direction follows from the fifth limitation in Section 8. It would give a Hirsch-style cultural-literacy assessment, a direct measure of accumulated knowledge across history, science, literature, and the arts, to a representative sample of Mississippi middle schoolers, and compare their results with a population matched on decoding fluency but drawn from a state or district with a more explicitly content-sequenced elementary curriculum. If Mississippi's students, despite comparable or stronger decoding skill, score measurably lower on accumulated cultural-literacy knowledge, Section 6.2's claim would move from a well-supported inference (based on the reform's legal scope and the NAEP pattern) to a direct, demonstrated finding, and the results would show which domains, history, science, literature, or the arts, carry the largest gap.

A fifth direction would evaluate the three-part literacy guarantee proposed in Section 5.3 directly. It would identify or pilot a PreK-8 program that protects content-rich instruction in science and social studies alongside systematic phonics, on the model Section 5.3 describes, and compare eighth-grade outcomes on knowledge-dependent comprehension for students who went through that program with outcomes for students who went through an equally strong decoding-focused program without the same

content sequencing. That comparison would test directly whether closing the gap in I, and not merely holding on to the early gains in access, produces the eighth-grade improvement this paper predicts a decoding-only approach cannot produce on its own.

A sixth direction follows from Section 4.3. It would compare two middle-school intervention designs for students who read below grade level but have already cleared the decoding threshold. One would follow the repeated elementary-level model, leveled passages and generic comprehension-strategy practice. The other would supply content knowledge directly, through knowledge-rich, topic-sequenced sets of texts in the domains NAEP passages draw on. The study should measure comprehension gains, and it should also test whether students in the second group apply DSRP-style structural moves, building a guiding question, identifying genuine disagreement between sources, holding several perspectives, more successfully once they have enough content knowledge to apply those moves to. If the two groups received comparable strategy instruction but only the knowledge-rich group improved in both comprehension and strategy use, that would be the most direct test available of this paper's central claim: that O repeated against an unchanged I does not move the product, and that DSRP and metacognitive strategy instruction need I in order to have anything to work on.

A seventh direction would test the knowledge-specific Matthew Effect proposed in Section 6 over time. It would track a group of students' background knowledge across specific content domains from kindergarten through eighth grade, alongside NAEP or equivalent comprehension results, to learn whether the gap between high- and low-knowledge students widens in the way Section 6.1 predicts. Stanovich's original reading Matthew Effect has already been tested this way extensively; the same test would apply here to knowledge accumulation rather than to reading skill in general.

An eighth direction follows from Section 2.8's account of the timing of each class. Because Mississippi's current and recent high-school classes have already received the full K-3 model, the most valuable remaining long-term test looks forward. The 2024 fourth-grade NAEP class, which posted the nation's largest gains, will reach the grades where English II and the ACT are given around 2029 to 2031. If Mississippi expands its investment in building I during those years, along the lines Section 5 proposes, that class's high-school outcomes would show directly whether the investment changes the trajectory this paper documents. Comparing its results with the baseline Section 2.8 establishes, from classes that received the reform's K-3 model without a comparable investment in content knowledge, would isolate the effect of what Mississippi does between fourth grade and high school for students whose K-3 foundations are already comparable.

A ninth, narrower direction concerns one specific class this paper was unable to pin down: Mississippi's fourth graders in the 2013-2014 school year, the one clean baseline against which the retention debate in Section 2.6 could be tested directly. That class's third-grade year, 2012-2013, came before the LBPA entirely, so it is the only fourth-grade class on record with no possible retention effect in either direction: no student missing because they were held back, and no formerly retained student present, since the policy did not yet exist to produce one. Finding that class's score on Mississippi's pre-MAAP state assessment, the MCT2, and comparing it with the 2014-2015 and 2016-2017 fourth-grade classes that followed would offer the cleanest available test of how much of Mississippi's early gains came before any retention effect at all.

10. Conclusion

Mississippi's fourth graders posted the largest gains in the nation on NAEP, the federal exam often called the Nation's Report Card. Mississippi's eighth graders, the same students five years further into the same system, did not. The state's own Legislature saw the same gap this paper describes and answered it in 2026 with a new literacy law for grades four through eight. That gap is easy to misread as proof the 2013 reforms failed. They did not fail. They taught children to decode, to turn printed letters into sounds and sounds into words, and they taught it with real skill. What they left comparatively untouched was the other half of $M = I \times O$, the equation at the center of DSRP theory: I, information, the facts, vocabulary, events, and ideas a reader takes in and, once they are organized, builds into the background knowledge every later text depends on. Because the two halves multiply rather than add, strong decoding cannot make up for thin knowledge, and the shortfall surfaces exactly where the tests begin asking students to understand passages about history, science, and the wider world.

The evidence for this reading comes from several directions at once. Gough and Tunmer's Simple View of Reading, a formula reading researchers built with no knowledge of DSRP, has the same shape: reading comprehension equals decoding multiplied by language comprehension. Recht and Leslie's baseball study shows the mechanism directly, in the same grade band where Mississippi stalled. Students who knew baseball understood a passage about baseball far better than students who did not, whatever their general reading ability. DSRP's six cognitive moves, tested here against the problem, confirm what this author's earlier work stated only in passing. A reader cannot think about nothing. Organization needs something to organize, and no amount of skill at organizing will open a text the reader lacks the knowledge to enter. Hirsch, writing about cultural literacy decades before any of this data existed, described the outcome Mississippi's numbers now point toward: a generation of students who can read the words in front of them yet know relatively little of the history, science, literature, and arts a fully informed reader draws on. Mississippi did not arrive at this result by accident. A reform built almost entirely around decoding produces it, and whether the 2026 law changes the pattern depends on whether the state has correctly identified which half of its equation was missing.

None of this is an argument for less phonics. The fourth-grade results make the case for foundational reading skills as strongly as anything in this paper, and the science of reading remains necessary at every grade discussed here. What the evidence asks of PreK-8 schools is harder. They must build the second half of the equation with the same care, sequence, and seriousness Mississippi brought to the first: protecting content-rich instruction, teaching academic vocabulary in a deliberate order, and treating the slow accumulation of knowledge as literacy work in its own right instead of an extra layered on top. The evidence also warns against a well-meant fix that is already spreading. When middle schoolers struggle to understand what they read, the instinct is to give them more of the elementary practice that worked in third grade. That drills a skill most of them already have, and it leaves their knowledge, along with their capacity to organize it, exactly where it was.

Zero times anything is zero. A district that builds excellent decoding in its early grades and leaves background knowledge to chance has built half an equation. It should not be surprised when a test that now demands the other half returns, five years later, roughly the number the multiplication predicts. Nor should it be surprised that the students behind that number can read anything put in front of them and still

be strangers to the history, science, literature, and arts that make a reader an informed citizen and not merely a literate one.

None of this was ever about a fourth-grade test score. Decoding instruction is the drill, and Mississippi built a very good one. The hole was always the point: a citizen who leaves school able to understand what they read, set it against a broad base of historical, scientific, literary, and civic knowledge, think clearly with the DSRP moves described in this author's companion paper, and take a full part in a society that expects more of an adult than the ability to sound out words. A state that mistakes the drill for the hole will keep buying better drills. It already has a proven method for doing so, and Mississippi has shown that method can be run well. The middle-school remedy this paper warns against is the same mistake made literally: more drills, handed to students who already own one. A sharper drill is still not a hole, however precisely its performance is measured, and a decade spent perfecting the tool is a decade the students living through it do not get back.

References

ACT. (2024a). *Average ACT scores by state, graduating class of 2024: Average score by section*. https://act.org/content/dam/act/unsecured/documents/2024-Average-ACT-Scores-by-State-Average-Score-by-Section.pdf

ACT. (2024b). *Average ACT scores by state, graduating class of 2024: Percent meeting benchmarks*. https://act.org/content/dam/act/unsecured/documents/2024-Average-ACT-Scores-by-State-Percent-Meeting-Benchmarks.pdf

Adams, B., Blinkoff, E., Allee, K., & Hirsh-Pasek, K. (2026). Reading gains in Alabama, Mississippi and Louisiana are often touted, but don't show full picture of literacy. *The Conversation*. https://theconversation.com/reading-gains-in-alabama-mississippi-and-louisiana-are-often-touted-but-dont-show-full-picture-of-literacy-280889

Altavena, L. (2026, May 19). Millions of students use i-Ready. But many parents view it as a villain in the ed tech fight. *Chalkbeat*. https://www.chalkbeat.org/2026/05/19/iready-vs-parents-teachers-students-in-ed-tech-fight/

Barnum, M. (2025, October 28). The "Southern surge" offers lessons for student learning, but we don't fully understand it yet. *Chalkbeat*. https://www.chalkbeat.org/2025/10/28/lessons-from-the-southern-surge-on-naep/

Barshay, J. (2026, March 16). Southern states boost early reading, but gains stall in middle school. *The Hechinger Report*. https://hechingerreport.org/proof-points-8th-grade-reading/

Bauerlein, M., Milgram, J., & Robbins, J. (2017, December 12). *Mediocrity 2.0: Massachusetts rebrands Common Core ELA and math*. Pioneer Institute. https://pioneerinstitute.org/mediocrity-2-0-massachusetts-rebrands-common-core-ela-and-math/

Bose, D. (2025, August 21). Percentage of Mississippi students scoring "advanced" or "proficient" falls for first time since pandemic. *Mississippi Today*.

Bose, D. (2026, June 29). Mississippi focuses on boosting middle school students' reading scores. *Mississippi Today*. https://mississippitoday.org/2026/06/29/mississippi-middle-school-reading/

Boykin, P. (2019, May 22). Majority of 3rd graders meet higher standard to pass reading test. *MageeNews*. https://mageenews.com/majority-of-3rd-graders-meet-higher-standard-to-pass-reading-test

Breazeale, G. (2024, February 6). *Literacy series: Pre-pandemic and post-pandemic literacy achievement in Mississippi*. Mississippi First. https://www.mississippifirst.org/literacy-series-part-1/

Breazeale, G. (2025, February 18). *Contextualizing Mississippi's 2024 NAEP scores*. Mississippi First. https://www.mississippifirst.org/contextualizing-mississippis-2024-naep-scores/

Burns, M., Winthrop, R., Luther, N., Venetis, E., & Karim, R. (2026, January 14). *A new direction for students in an AI world: Prosper, prepare, protect*. Brookings Institution, Center for Universal Education. https://www.brookings.edu/research/a-new-direction-for-students-in-an-ai-world

Cabrera, D. (2025). The unified calculus of organization, structure, emergence, and meaning: The patterns that connect mind and nature. *Journal of Systems Thinking, 5*. https://doi.org/10.54120/jost.2025-000002

Cabrera, D., & Cabrera, L. (2025a). *Connect the dots: The 4 habits of mental fitness to think clearly, adapt with grace and grit, and thrive in complexity*. STSI/Odyssean.

Cabrera, D., & Cabrera, L. (2025b). O-theory: The science of organization. *Journal of Systems Thinking, 5*(1). https://doi.org/10.54120/jost.v25i1.dc6dtot6

Cabrera, D., & Cabrera, L. (2025c). The Pareto structure of thought: Empirical discovery of the six foundational mental moves. *Journal of Systems Thinking, 5*(1). https://doi.org/10.54120/jost.v25i1.dc6par6

Canter, R. (2023, July 5). *The truth about Mississippi's NAEP gains*. Mississippi First. https://www.mississippifirst.org/the-truth-about-mississippis-naep-gains/

EdSurge. (2026, September 16). *The missing middle: Why kids still struggle to read after third grade* [Audio podcast episode, featuring M. Kuhfeld and D. Toll]. In *This Week with EdSurge*. https://edsurge.com/news/the-missing-middle-why-kids-still-struggle-to-read-after-third-grade

Eldridge, S. (2026, July 29). *Turning Mississippi Senate Bill 2294 into literacy growth: An evidence-based approach for grades 4–8*. Reading Horizons. https://readinghorizons.com/blog/blog-mississippi-senate-bill-2294-literacy-grades-4-8/

ExcelinEd in Action. (2026, June 11). *Building on success: Mississippi's push on adolescent literacy* [Audio podcast episode, featuring State Superintendent L. Evans]. In A. Mullins (Host), *ExcelinEd in Action: Statehouse Spotlights*. https://shows.acast.com/excelined-in-action-statehouse-spotlights/episodes/building-on-success-mississippis-push-on-adolescent-literacy

Goodhart, C. A. E. (1975). Problems of monetary management: The U.K. experience. In *Papers in monetary economics* (Vol. 1). Reserve Bank of Australia.

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*(1), 6–10.

Heubeck, E. (2023, June 19). Mississippi students surged in reading over the last decade. Here's how schools got them there. *Education Week*. https://www.edweek.org/teaching-learning/mississippi-students-surged-in-reading-over-the-last-decade-heres-how-schools-got-them-there/2023/06

Hirsch, E. D., Jr. (1987). *Cultural literacy: What every American needs to know*. Houghton Mifflin.

Hirsch, E. D., Jr. (2016). *Why knowledge matters: Rescuing our children from failed educational theories*. Harvard Education Press.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing, 2*(2), 127–160.

Jackson, T. (2023, December 15). Mississippi's ACT scores drop as test-prep resources vary across state. *Mississippi Free Press*. https://www.mississippifreepress.org/mississippis-act-scores-drop-as-test-prep-resources-vary-across-state/

Kuhfeld, M., Duran, N., Lewis, K., Phillips, C. H., & Musacchia, S. (2026). *Struggling adolescent readers left behind: Evidence of post-COVID-19 declines and pathways forward* [Research brief]. NWEA. https://www.nwea.org/uploads/struggling-adolescent-readers-left-behind-evidence-of-post-covid-19-declines-and-pathways-forward_NWEA_Research-brief.pdf

Macek, M. (2026, March 17). *Mississippi learning: Lessons on literacy laws for Michigan lawmakers*. Mackinac Center for Public Policy. https://www.mackinac.org/S2026-01

Mississippi Department of Education. (2024, November 7). *Mississippi high school juniors' spring 2024 ACT results released* [Press release].

Mississippi First. (2026, March 11). *Senate Bill 2294: Conference report summary*. https://www.mississippifirst.org/legislative_tracker/senate-bill-2294/sb2294_confreport_summary/

Mississippi Legislature. (2013). *Literacy-Based Promotion Act*, Miss. Code Ann. §§ 37-177-1 to 37-177-21.

Mumma, K. S., & Winters, M. A. (2023). *The effect of retention under Mississippi's test-based promotion policy* [Working paper]. Wheelock Educational Policy Center, Boston University. https://excelined.org/wepc_msretentionpolicybrief_2023/

National Center for Education Statistics. (n.d.-a). *About NAEP: The Nation's Report Card*. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/about/

National Center for Education Statistics. (n.d.-b). *About state NAEP*. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/about/state.aspx

National Center for Education Statistics. (n.d.-c). *Fourth- and eighth-grade schools and enrollment in the 2024 state assessment sampling frame* [NAEP technical documentation]. U.S. Department of Education.

https://nces.ed.gov/nationsreportcard/tdw/sample_design/2024/fourth_and_eighth_grade_schools_and_enrollment_in_the_2024_state_assess_sampling_frame.aspx

National Center for Education Statistics. (n.d.-d). *Sampling frame for the 2024 state assessment* [NAEP technical documentation]. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/tdw/sample_design/2024/sampling_frame_for_the_2024_state_assessment.aspx

National Center for Education Statistics. (n.d.-e). *State sample design FAQs: Participant selection*. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/assessment_process/samplesfaq.aspx

National Center for Education Statistics. (2024a). *2024 mathematics state snapshot report: Mississippi, grade 4, public schools*. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/subject/publications/stt2024/pdf/2024219MS4.pdf

National Center for Education Statistics. (2024b). *2024 mathematics state snapshot report: Mississippi, grade 8, public schools*. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/subject/publications/stt2024/pdf/2024219MS8.pdf

National Center for Education Statistics. (2024c). *2024 reading state snapshot report: Mississippi, grade 8, public schools*. U.S. Department of Education. https://nces.ed.gov/nationsreportcard/subject/publications/stt2024/pdf/2024220MS8.pdf

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards for English language arts and literacy: Anchor standards for reading*.

New Jersey Department of Education. (2016). *New Jersey Student Learning Standards for English language arts*. https://www.nj.gov/education/standards/ela/Docs/2016NJSLS-ELA_Grade5.pdf

NGSS Lead States. (2013). *Next Generation Science Standards: For states, by states* (Appendix G: Crosscutting concepts). The National Academies Press. https://doi.org/10.17226/18290

Nittolo, J. (2026). The missing method: The civic case for teaching syntopical reading with DSRP. *Journal of Systems Thinking, 6*(1). https://doi.org/10.54120/jost.v26i1.cjkq1ec

NWEA. (2026, August 4). *Reading scores for lowest-performing middle schoolers continue to slide, new NWEA study says* [Press release]. https://www.nwea.org/news-center/press-releases/reading-scores-for-lowest-performing-middle-schoolers-continue-to-slide-new-nwea-study-says/

Office of Governor Tate Reeves. (2025, January 29). *Governor Reeves statement on Mississippi's nation-leading NAEP gains, record achievement* [Press release]. https://governorreeves.ms.gov/governor-reeves-statement-on-mississippis-nation-leading-naep-gains-record-achievement/

Office of the State Superintendent of Education. (n.d.). *NAEP frequently asked questions (FAQs)*. Government of the District of Columbia. https://osse.dc.gov/page/naep-frequently-asked-questions-faqs

Oxford Eagle. (2025, January 30). Mississippi 4th graders No. 1 in the nation for NAEP gains over time. *Oxford Eagle*. https://oxfordeagle.com/2025/01/30/mississippi-4th-graders-no-1-in-the-nation-for-naep-gains-over-time/

Pittari, J. (2025, June 19). Mississippi State Board of Education removes U.S. History end-of-course testing requirement. *Magnolia Tribune*. https://magnoliatribune.com/2025/06/19/mississippi-state-board-of-education-removes-u-s-history-end-of-course-testing-requirement/

Recht, D. R., & Leslie, L. (1988). Effect of prior knowledge on good and poor readers' memory of text. *Journal of Educational Psychology, 80*(1), 16–20.

S.B. 2294, 2026 Leg., Reg. Sess. (Miss. 2026).

Shanahan, T. (2020, March 14). Prior knowledge, or "he isn't going to pick on the baseball study" [Blog post]. *Shanahan on Literacy*. https://shanahanonliteracy.com/blog/prior-knowledge-or-he-isnt-going-to-pick-on-the-baseball-study

Smith, R., Snow, P., Serry, T., & Hammond, L. (2021). The role of background knowledge in reading comprehension: A critical review. *Reading Psychology, 42*(3), 214–240. https://doi.org/10.1080/02702711.2021.1888348

Southern Regional Education Board. (2016, June 15). *Mississippi: Educator effectiveness*. https://www.sreb.org/post/mississippi-educator-effectiveness

Spencer, N. (2024). Comprehensive early literacy policy and the "Mississippi Miracle." *Economics of Education Review, 103*, Article 102598. https://doi.org/10.1016/j.econedurev.2024.102598

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*(4), 360–407.

Statistical Modeling, Causal Inference, and Social Science. (2025, December 1). *How much of "Mississippi's education miracle" is an artifact of selection bias?* [Blog post]. https://tagteam.harvard.edu/hub_feeds/1973/feed_items/17062122

Statistical Modeling, Causal Inference, and Social Science. (2026, January 5). *Last post on the estimated effects of Mississippi school reforms* [Blog post, with a response from N. Spencer]. https://statmodeling.stat.columbia.edu/2026/01/05/last-post-on-the-estimated-effects-of-mississippi-school-reforms/

Strathern, M. (1997). 'Improving ratings': Audit in the British university system. *European Review, 5*(3), 305–321.

Terada, Y. (2019, October 11). Research zeroes in on a barrier to reading (plus, tips for teachers). *Edutopia*. https://www.edutopia.org/article/research-zeroes-barrier-reading-plus-tips-teachers

Toch, T., & DiMarco, B. (2025, January 29). The new NAEP scores highlight a standards gap in many states. *FutureEd*. https://www.future-ed.org/the-new-naep-scores-highlight-a-standards-gap-in-many-states/

Toll, D. (2026, August 28). AI can help one of K-12's biggest challenges: Middle school reading. *EdSurge*. https://edsurge.com/news/ai-can-help-one-of-k-12s-biggest-challenges-middle-school-reading