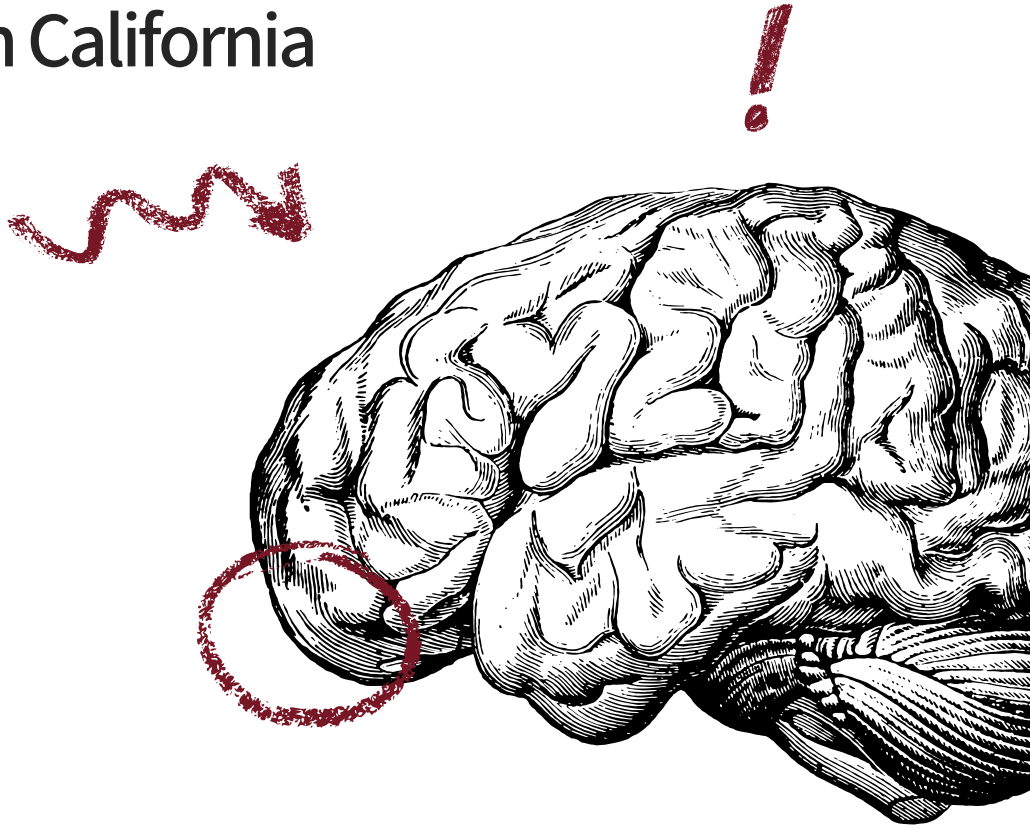
(Re)Designing for Adolescent Thriving

Using developmental science to reimagine secondary schools and systems in California



USC CANDLE
Center for Affective Neuroscience, Development, Learning and Education

ASU Center for Whole-Child Education

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USC's Center for Affective Neuroscience, Development, Learning and Education (CANDLE) is transforming adolescent education by uniting cutting-edge, innovative teaching practices and bold policy advocacy to ignite human potential and drive lasting change.

ASU's Center for Whole-Child Education advances key insights from educator practice, scientific research, and student experience, so that together we can create equitable learning environments.

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About this Report

Why This Report Exists

California has made an extraordinary bet on secondary education. Across career pathways, community schools, integrated student supports, and a set of related investments, the state has committed billions of dollars to the proposition that high school can work differently than it does.

Much of that work is good. Some of it lasts.

The difference between the two is rarely funding, and it is almost never effort. It is whether the people carrying an initiative forward can name which parts of it are actually doing the work.

In 2012, researchers Li and Julian described developmental relationships as the **active ingredient** in programs serving young people, in the way that fluoride is the active ingredient in toothpaste. Interventions designed around a real understanding of what adolescents need were significantly more effective than interventions that were not. Everything else in a program is the delivery mechanism: necessary, but not the thing that works.

That framing carries an uncomfortable implication for anyone redesigning secondary education. An initiative built without attention to how adolescents actually develop can have every component in place – articulated pathways, signed partnerships, a rebuilt master schedule—and still accomplish very little. And an initiative that does work, but whose designers cannot name why, is nearly impossible to sustain. The people who inherit it will preserve its activities faithfully, because activities are what is visible. What they cannot do is tell which parts are load-bearing. So when budgets tighten or leadership turns over, the essential thing is sometimes cut and the incidental thing protected, and afterward no one can explain why the results changed.

Understanding adolescent development is not an enrichment for leaders who have time for it. It is what allows good work to be protected under pressure, adapted without being gutted, and handed to whoever comes next.

This report sets out what developmental science now says about adolescence, what it implies for the design of classrooms and systems, and what it takes for that design to endure. It is not a new framework. Much of what follows is already happening in California classrooms, built by educators who arrived at it through experience rather than through neuroscience. What the science offers is an account of why it works, and language those educators and leaders can use to defend it.

Who This Report Is For

We wrote this for two audiences in particular:

Educators in middle and high school classrooms, and the coaches and instructional leaders who support them, will find the science behind practices many of them already use, along with concrete moves for going further.

Leaders of California's secondary redesign initiatives, in districts, county offices, and the intermediary organizations that carry this work across sites, will find an account of why these efforts succeed when they succeed, and what makes the difference between an initiative that takes root and one that fades. School leaders and policymakers shape the conditions that make any of this possible, and the report closes by speaking to each of them directly.

How This Report Is Organized

The sequence follows an argument rather than a survey. We begin with the problem as students and teachers describe it, then with what adolescence actually is developmentally, because the design implications do not follow without it. From there we turn to what has to be true in a learning environment before deep thinking is possible, then to what that thinking looks like when it happens, then to what it looks like in real classrooms, and finally to what makes any of it last beyond a single teacher, principal, or funding cycle.

- **Chapters 1 and 2** make the case that the system was not built for how adolescents develop, and describe what developmental science now shows.
- **Chapters 3 and 4** describe the conditions that make deep thinking possible, and name the thinking itself.
- **Chapter 5** shows what this looks like in practice, with examples from real classrooms.
- **Chapter 6** addresses what sustains this work, and what commonly gets in its way.

If you lead an initiative or a system, Chapters 1, 2, and 6 carry the argument most directly. If you teach or coach teachers, Chapters 3 through 5 are where the practice lives. The report is written to be read straight through, but it does not require it.

How We Did This Work

This report draws on three bodies of evidence.

The first is USC CANDLE's longitudinal neuroscience research on adolescent development, which followed a cohort of Los Angeles teenagers from public high schools serving diverse, lower-income communities into their early twenties, combining brain imaging, interviews, and follow-up over several years.

The second is two decades of work at ASU's Center for Whole-Child Education translating developmental science into design principles for schools and systems, including the 2024

report Strengthening Coherence Across Initiatives: A Whole-Child Lens in Secondary, from which this project directly emerged.

The third is a set of interviews conducted for this project in spring 2026. We spoke with thirteen students in grades seven through twelve, at schools including John Muir Middle School in Burbank, Madison Park Academy in Oakland, and Oakland High School, about what sets them up to learn well and what gets in the way. We spoke with nine classroom teachers and instructional coaches working in California and New York, about where they have seen students do their most meaningful learning and what stands between them and more of it. And we spoke with leaders of California's major secondary redesign efforts, including career pathways and community schools, along with a consultant working on applying neuroscience in education.

Those conversations did not simply illustrate conclusions we had already reached. They shaped them. Student accounts of what makes a classroom safe enough to take an intellectual risk are the reason Chapter 3 exists in its current form. Teachers' descriptions of the constraints they work within shaped what Chapter 5 asks of them, and produced the fifth obstacle named in Chapter 6. The obstacles in Chapter 6 came directly from leaders who have watched promising work spread and then thin out, and who were candid about why. *(See the full list of contributors on p.ii.)*

Our hope for this report was to lift up the voices of researchers, practitioners, and students, who all shared unique and meaningful perspectives and experiences, which were equally important in shaping this project. Thank you for taking the time to hear them.

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1. Our Challenge

"School feels like getting good grades rather than actual learning," explained a 7th grade student advisor. When we asked middle and high schoolers in California about their experience in school, this was too often the sentiment. It was also clearly echoed by educators; "Teachers and kids are so used to closed-ended [learning] that the biggest question you hear in class is: 'Is that right? Did I get it right?'" said one advisor.

Students and educators alike described this challenge: A system of education that was fundamentally built to produce a narrow set of measurable outputs, like standardized test scores, GPAs, and competitive rankings. While those things play an important role in things like school accountability structures and getting post-secondary opportunities, this system is leaving our students and teachers disengaged, stressed, and burned out. "Students are dealing with stress that 12-year-olds should not be dealing with," said a 7th grade student advisor.

The scale of this is not anecdotal. In a survey of more than 20,000 American high school students, roughly three quarters described their feelings about school in largely negative terms, naming stress, tiredness, and boredom most often of all (Moeller et al., 2020).

It's no surprise that we face this challenge in the year 2026: our current education system was built on a factory model centuries ago, without a deep understanding of how adolescents learn and develop (and with racist, classist, and sexist assumptions about who was capable, and who was not). As Farrington explained, "The foundational structures laid in the 1800s and early 1900s still largely dictate the type of education most students receive in high schools today, regardless of how our beliefs and goals might (or might not) have changed" (2019, p.3).

How *have* our collective understandings, beliefs, and goals changed? We want learning to feel meaningful and purposeful, for students to achieve success in their lives, become the best versions of themselves, and participate meaningfully in society to make the world a better place. Our question then becomes: What does it look like to build schools and systems around what we now know about how adolescents grow and develop, and what might happen if we do?

What does it look like to build schools and systems around what we now know about how adolescents grow and develop, and what might happen if we do?

2. The Adolescent Brain

We collectively understand early childhood as a period of enormous developmental growth, likening babies' brains to ‘sponges,’ and imagining the endless possibilities ahead of them. On the other hand, we often talk about adolescence as notoriously difficult, where ‘raging hormones’ and an ‘underdeveloped prefrontal cortex’ impair logical reasoning and decision-making. **But what if we told a different, more scientifically-grounded story of the teen years?**

Adolescence isn't just growth, it's reorganization.

After the age of 5, adolescence is “the time of the brain's most dramatic growth spurt” (Cicchetti, 2016, as cited in Osher et al., 2020, p.19). In fact, we can think of this period as a fundamental reorganization of the brain not possible earlier in childhood. Two major processes are taking place at this moment: the brain is becoming both increasingly specialized and efficient.

Simply put, the adolescent brain becomes more specialized by strengthening important neural pathways and getting rid of the less important ones (Blakemore & Choudhury, 2006). The many connections built across childhood are now being prioritized in a use-it-or-lose-it process, while unused pathways are literally pruned away like wilted roses cut off the bush.

This means that the way adolescents think and how they feel during this time shapes the structure and function of their brain. Simultaneously, the adolescent brain becomes more efficient by adding a healthy layer of fat (called myelin) around those important connections. This protective coating enables signals in the brain to become significantly faster and more frequent, resulting in more effective and efficient processes. As a result, this period of plasticity is an opportunity for adolescents to become who they want to be, on a neurobiological level.

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Emotion and cognition are integrated.

As researchers Immordino-Yang and Damasio explain, emotional processes are structurally and functionally intertwined with the cognitive capacities required for learning (2007). In fields like education, we have not always understood thinking and feeling to be two sides of the same coin, and have created programs, interventions, and

learning experiences with this gap in our knowledge. Now, however, neuroscience research is clear: our thinking and learning are not separated in the brain from the processing of our social and emotional experiences. In reality they leverage the same brain systems and impact each other.

This integration is reflected, in part, in the physical architecture of the developing brain. Across adolescence, ongoing myelination and other forms of maturation increase the efficiency of communication along long-range pathways that link distributed neural systems to one another (Goddings et al., 2021). Among these are connections between networks that are involved in processing emotion and social meaning and those involved in supporting reasoning, memory, and planning. As these networks develop, emotional and cognitive processing do not become more separable. They become more tightly coupled, increasingly integrated, while also more specialized (Casey et al., 2019).

> "It is literally, neurobiologically impossible to think deeply about and remember things about which you've had no emotion."
>
> — Mary Helen Immordino-Yang

In the adolescent brain, we can see this integration of emotion and cognition through the work of the **Salience Network (SN).** The Salience Network weighs the relevance and perceived importance and urgency of information and external stimuli to facilitate our actions (Menon & Uddin, 2010; Seeley et al., 2007), which may include paying attention to factors in the outside world (such as moving your body down the hallway such that you don't bump into anyone with your backpack, talking with a friend at the lockers, or reviewing the instructions for an essay you need to write), or disconnecting from what's around you and looking inward (such as considering why a confusing pattern you've noticed in your friendships keeps happening, coming up with a possible hypothesis for a science class experiment, or daydreaming). In other words, this network directs our thinking according to what is emotionally salient to us. This is especially relevant in a learning context: **What we have emotions about, we think about — and what we are thinking about, we can learn about.**

Teens are developmentally primed for significance, not just facts.

As the adolescent brain undergoes this period of plasticity and reorganization, complex networks emerge. Along with them emerge new skills and abilities that enable teens to engage in different and more advanced kinds of thinking, distinct from childhood (Immordino-Yang et al., 2018).

In early and middle adolescence, young people become increasingly sensitive to emotional reward and social reputation, making them highly attuned to the interrelational nature of what they are learning. They are also increasingly capable of higher-order and abstract thinking, long-term planning, and self-regulation, which sets

them up to take on more complex, difficult, and open-ended academic tasks. At the same time, the kind of brain development happening in this period lends itself to cultivating in-depth interests and developing a stronger sense of identity. As young people enter late adolescence and early adulthood, these trends continue. They are able to engage in more complex cultural, ethical, and scholarly thinking, see cross-context connections, and reflect on deeper "why" and "how could this be different" kinds of reasoning. All of this means that adolescents are developmentally primed to care about what something means and why it matters, and to connect it to self, others, and the world, in or out of school.

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These insights from developmental science create tension for traditional schooling. Instead of leveraging this window of opportunity for students to engage emotionally about the content of their learning, the emotions school reliably produces are about grades and compliance (e.g., worry, pride, relief, embarrassment). Alternatively, students are told to "leave emotion at the door" in order to focus on the academic task at hand. In contrast, we know that emotion propels the teenage brain, which is ready to grapple with why something matters and to connect it to themselves, not just to master isolated facts and procedures.

If the adolescent brain is fueled by emotion, and emotions are the rudder of our thinking (Immordino-Yang, 2015), the next question becomes: **What has to be true in a classroom or school for students to feel safe enough to bring their emotions, and therefore their full thinking, into their learning at all?**

IN SUMMARY

The Adolescent Brain

1. Adolescence isn't just growth, it's reorganization.
2. Emotion and cognition are integrated.
3. Teens are developmentally primed for significance, not just facts.

3. Creating the Container: Relationships, Trust, and Safety

Before deep thinking can happen, students need a learning context that is safe, built on relationships and trust, where they can bring their whole selves and take intellectual risks. What's more, research shows that the more attuned educators are to students socially and emotionally, the more students can engage in this way (Osher et al., 2020).

Physically, Emotionally, and Identity Safe Spaces

When a student's nervous system perceives a threat, whether that threat is academic embarrassment, social exclusion, or an unpredictable adult, the brain prioritizes survival over exploration. The same networks that support deep, meaning-centered thinking are the first to go offline under chronic stress. This isn't a metaphor; it's what neuroscience shows us plays out in real classrooms, with real consequences for how, and whether, students learn.

For a school environment to support this kind of thinking, it has to be more than just orderly. A truly supportive environment is one that is physically, emotionally, and identity safe for every student, especially those who hold identities our systems marginalize.

A classroom can be quiet and still be unsafe; a classroom can be lively, even loud, and still be one of the safest places a student encounters. What matters isn't the noise level, but whether students can trust that the adults and peers will respond to them with consistency and care.

> **"Other students that mock or embarrass others...people will make you feel bad about yourself if you speak about the wrong thing, which can lead to some not wanting to speak up at all. That is the largest barrier in trying to learn and engage with the classroom."**
>
> - Student Advisor

That distinction matters because the idea of safety is too often synonymous with comfort, or with the absence of challenge. Students don't need to be protected from difficulty, disagreement, or being wrong. Instead, they need room to persist through content and

conversations that stretch them, that ask them to sit with what's unresolved or with perspectives that differ from their own.

Relationships and the Student Brain

> **"Having friends in my class kind of gives me confidence, because I know I have a safe space there... that way I feel better sharing more ideas and more stuff about me."**
>
> - Student Advisor

If safety is the precondition, relationships are what build it. Human beings are relational by design, and the strength of a student's relationships with the adults and peers around them shapes not just how they feel at school, but how their brain develops. These relationships aren't defined by warmth or good intentions alone. They are characterized by an enduring emotional attachment, shared and reciprocal activity, progressively increasing complexity, and a balance of power that shifts, over time, from the adult toward the young person (Li & Julian, 2012).

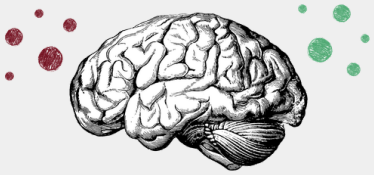
For adolescents specifically, this means being known, not assumed about. It means an adult who has taken the time to understand a student's background, interests, and goals, and who holds high expectations for that student precisely because they believe in what that student is capable of. Trusting, attuned relationships with adults and peers give students the emotional and intellectual room to take risks; to venture a wrong answer, to ask a question they're afraid is naive, to bring an unfinished thought into a class discussion. Adolescents are hungry for this kind of connection. When school doesn't offer it, students go looking for belonging elsewhere, sometimes in enriching places and sometimes in risky ones.

Students are also precise about what being assumed about feels like from the inside: *"A lot of teachers assume they know everything about students. I get it, you were a student once too, but that was a different time. They always think, 'You're probably on your phone all day,' when really I was trying to clean my house, going to my extracurriculars, trying to study for four different tests in the same day, and completing homework for five different classes,"* said one student advisor.

This is difficult to build at scale inside a factory-model structure. A teacher who sees 150 to 200 different students across a single day, or a counselor carrying a caseload of 500, faces real structural limits on how well they can know any one of those students. This isn't a failure of individual educators' effort or care, it's a mismatch between the structure schools inherited and what relationship-building actually requires.

One teacher we interviewed explained, *"Kids have to see themselves in the work. The way to do that is to catch them as a human — checking in if they're seeming tired, did you eat, did you have breakfast. Those I'm-here-for-you moments, and then also, this thing we're gonna do is something you can do and is exciting. They trust me."*

In the Adolescent Brain: Cortisol and Oxytocin



Chronic, unbuffered levels of the stress hormone **cortisol** can change the structure and function of key brain areas for learning over time (Shonkoff et al., 2012). These structures become primed to be on high alert for danger, and to react quickly, which can affect the ability to regulate emotion, attention and behavior, and to learn and remember—all key components of academic success. In the classroom, this might look like a student who is easily triggered and quickly escalated, has trouble paying attention or maintaining concentration, has difficulty waiting or taking turns, or has trouble adjusting to changes in a routine.

The brain's malleability can be a vulnerability in a negative context, but also an opportunity (Cantor et al., 2019). Positive relationships can buffer the impact of stress on the developing brain (National Scientific Council on the Developing Child, 2004). The hormone **oxytocin** (sometimes called the "love hormone") offsets the damaging effects of cortisol (Heinrichs et al., 2003), protecting the brain at the cellular level and creating the type of support that can fundamentally change the way a young person develops.

Relationships and the Teacher Brain

How, then, do we know a container built on safety and relationships actually leads anywhere? That it doesn't just make students feel good, but changes how they think? Kundrak and colleagues (2026) studied how teachers talk and think about their own students, and found something striking: teachers who related to their students in more developmentally attuned ways (who described them with social and emotional nuance, not just as a set of grades or behaviors) showed measurably different patterns of brain activity when reviewing and giving feedback on that student's work. Specifically, these teachers showed greater engagement in brain regions associated with social processing when evaluating their own students, compared to when they evaluated unfamiliar students' work. Notably, teachers gave consistent grades across their own and other students, but the neural processes they used to get there differed. So if the grade is the same, why does this matter?

The consequences of this attunement reach the students themselves. In a related study, Gonzalez (2026) found that teachers whose instructional narratives centered their students' development, not just their compliance or achievement, had students whose written reflections showed measurably more higher-level, meaning-centered thinking. Put plainly: **the more attuned an educator was to who their students are, socially and emotionally, the more those students demonstrated deeper thinking.** This research makes clear what great

educators already know: Understanding your students deeply is more than a soft skill sitting alongside the “real” work of instruction. That relationship creates the foundation for students to thrive.

Attunement of this kind shows up in small acts of interpretation. A teacher who knows a student well hears something different in a familiar complaint.

> **“A kid says ‘this is boring,’ what they really mean is, I have no idea what to do here.”**
> — Educator Advisor

A safe, trust-based container doesn't guarantee deep thinking, but it makes it possible. It's what allows a student to take an idea further than the assignment requires, to say the thing they're not sure is right, to bring who they are into what they're learning.

4. Centering Meaning and **Purpose:** Transcendent Thinking

The Longitudinal Study

In a landmark study, USC CANDLE researchers recruited a cohort of teenagers from public high schools in Los Angeles serving diverse, lower-income communities (Gotlieb et al., 2024a). These young people, researchers reasoned, had lived experience that made them especially attuned to the complexity of the social world around them. Over the course of a single day, participants watched short videos depicting real stories of other adolescents from around the world and were interviewed about their reactions.

That same day, and again roughly two years later, researchers conducted brain scans to understand what was happening neurologically while the teens engaged with and responded to these stories. For the three years that followed, as most participants moved into their early twenties, the team continued to learn about their developmental path through additional scans, online questionnaires, and phone conversations, building detailed pictures of how adolescents' thinking, and their brains, develop over time.

Through this work, researchers found that they could trace a cascade of outcomes from students who more frequently engaged in deep, meaning-centered thinking as teens to those with more positive life outcomes in early adulthood.

The Core Finding: Transcendent Thinking

Let's look at an example from the study. In one instance, teens were asked about why they thought some people had committed violent crimes in their neighborhood.

"They have, like, a lot of emotions. They're really mad, so they just kill somebody. Like, overly aggressive."

- Student A

"Everyone has a history. Like, everybody has an action or choice or some sort of history – some sort of thing happened to them that affects how they act in the future."

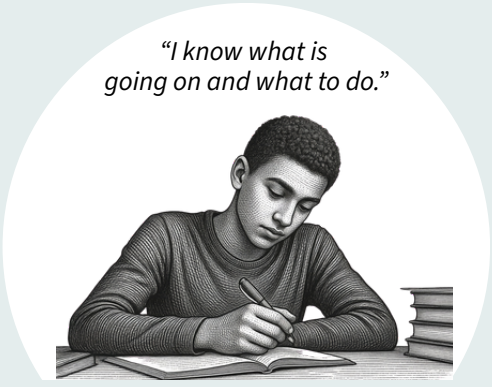
- Student B

What's the difference between the student responses above? Student A is able to consider someone's motivation in the moment. Student B, however, goes beyond what might be happening in that moment, in the "here and now," and makes connections to a broader context and greater theme around how people are shaped by the story of their lives. Researchers coined this cognitive work as **transcendent thinking**, a form of deep, meaning-centered thinking in which students move beyond the immediate task, text, or problem to consider broader patterns, systems, values, and possible futures and to connect those ideas to their own identities, emotions, and sense of purpose. Students engage in transcendent thinking when they ask not only what is happening or how something works, but also why it matters, who it affects, what it reveals about the world, and what kind of person they want to be in relation to it.

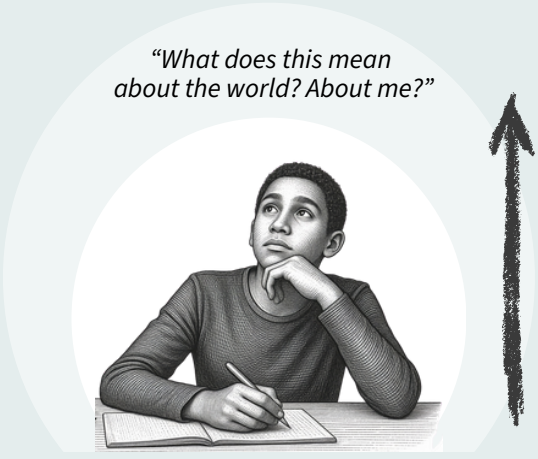
Transcendent thinking can occur in any academic domain; humanities, sciences, mathematics, arts, and technical subjects, not just around civics or social issues. A student may think transcendently about a historical event, a scientific discovery, a mathematical pattern, a novel, an engineering design, or a real-world problem when they connect disciplinary knowledge to larger human questions, systems, and values.

What is Transcendent Thinking?

Transcendent thinking is a form of deep, meaning-centered thinking in which students move beyond the immediate task, text, or problem to consider broader patterns, systems, values, and possible futures and to connect those ideas to their own identities, emotions, and sense of purpose.



Learning in the "Here and Now"



Transcendent Thinking, "Above and Beyond"

Transcendent thinking involves both abstraction beyond the immediate and emotional engagement with the subject matter.

This type of thinking can look like:

- **Exploration of Significance:** Students interpret significance, implications, or lessons, asking "why this matters" as well as "what it is."
- **Connection to Identity and Values:** Students relate what they are learning to who they are, what they care about, and what they believe is important or right.
- **Future-Oriented Thinking:** Students consider consequences, possibilities, responsibilities, or imagined futures for themselves or the broader world.
- **Integration Across Contexts:** Students connect ideas and information across disciplines, time periods, situations, or perspectives rather than treating knowledge as isolated.

In Students' Own Words

Transcendent thinking also shows up, unprompted, when you ask young people to describe learning that mattered to them. The California students we interviewed for this report were not asked about transcendent thinking, or told what it was. They did it anyway.

Example: A student exploring the significance of an idea

> *"At the internship, we were brought to a factory right by an elementary school, and it turns out a lot of the elementary kids had a lot of cases of asthma. And you could see how they had a border of trees around the property — kind of to hide it. I never noticed that, and it was really eye-opening. That's why I really like learning that connects to real-world things."*

Example: A student connecting learning to their identity and values

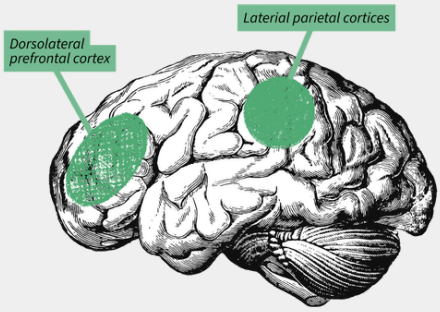
> *"I traveled abroad to Guatemala to help build a school for an underserved community... Every day, just shaping the holes, filling it with the cement, tying rebar — it was difficult, but what kept me going was the importance of education... I want everyone to be able to learn. I think that learning is the foundation of our success."*

Example: A student integrating their knowledge across contexts

> *"When I went to visit the Norton Simon Museum with friends and their parents, I was able to give my insight on all of the paintings — I could teach all of them something new, too. Most students use the excuse that they'll never use things they learn in school in real life, but I found that in my history class, learning about Renaissance art was really interesting and intriguing."*

In the Adolescent Brain: Three Coordinating Networks for Transcendent Thinking

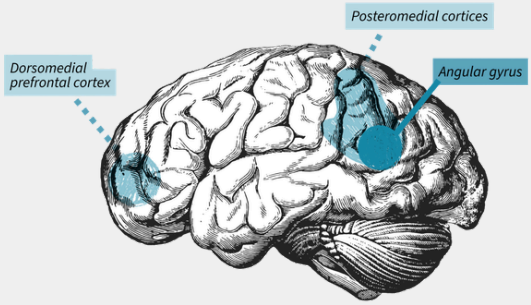
In the adolescent brain, three key neural networks work together to enable this kind of deep, meaning-centered thinking.



Executive Control Network

Learning in the "Here and Now"

The type of concrete learning students are doing in the "here and now" is largely driven by the **Executive Control Network**. This network facilitates outward attention, energy and action, allowing people to hold information in mind, shift strategies as necessary, interact with others, and focus on the completion of tasks. This network is important for ignoring extraneous information and distractions, controlling impulses, regulating emotions, and maintaining goals. Concrete talk in the narratives we construct as we make meaning of the world around us is associated with increased activity in the Executive Control Network.

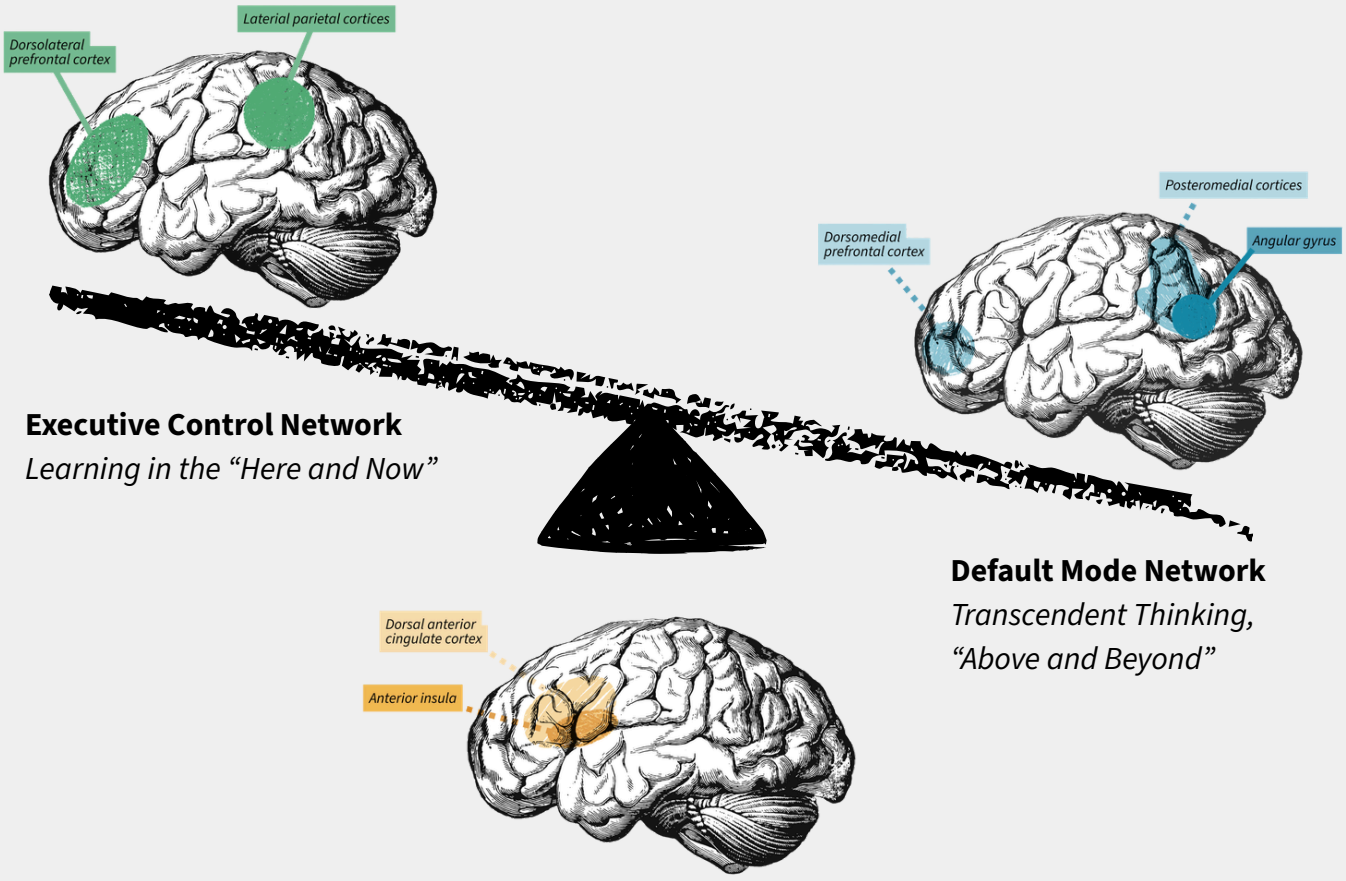


Default Mode Network

Transcendent Thinking, "Above and Beyond"

In the brain, transcendent thinking is largely driven by the **Default Mode Network**. This network is activated when looking inward, such as reflecting, imagining hypothetical or possible future scenarios, remembering the past, and processing morally relevant information. It is important for conceptual understanding, reading comprehension, creativity, nonlinear and "out-of-the-box" thinking, for constructing a sense of self, and for feeling inspired (Immordino-Yang, 2016). Building abstract narratives, bringing to bear broader interpretations and values and invoking systems-level explanations, is associated with increased activation in key regions of the Default Mode Network, especially when adolescents report feeling strongly emotional about the story or issue.

Source: Gotlieb, Yang & Immordino-Yang, 2024b. Figures created for this report.



Executive Control Network
Learning in the "Here and Now"

Default Mode Network
Transcendent Thinking, "Above and Beyond"

Salience Network
Deciding What Matters

Introduced in Chapter 2, the **Salience Network** is what allows a student to move between these two modes. It weighs the relevance, importance, and urgency of what a student encounters, and directs attention accordingly, either outward toward the task at hand or inward toward what that task means. Because it operates on what is emotionally salient, it is the mechanism through which emotion steers thinking toward or away from deeper meaning-making. Without it, the other two networks would have no basis for trading off.

Students engage all three networks to cycle between the concrete and the abstract, the "here and now" and the "above and beyond," driven by what is emotionally relevant.

Source: Gotlieb, Yang & Immordino-Yang, 2024b. Figures created for this report.

Long-Term Outcomes

Following participants for several years after the study began, researchers found that transcendent thinking didn't lead directly to better outcomes in adulthood. Instead, it set off a sequence.

Teens who engaged in more transcendent thinking early on showed greater brain growth over the following two years, measurable in gray matter volume, white matter integrity, and how well key brain networks worked together. That growth, in turn, predicted stronger identity development by around age 19, including a clearer sense of one's values and of the adult one is becoming. And that stronger sense of identity predicted, in the years that followed, greater satisfaction with one's relationships, education, and the person one had become (Gotlieb et al., 2024a).

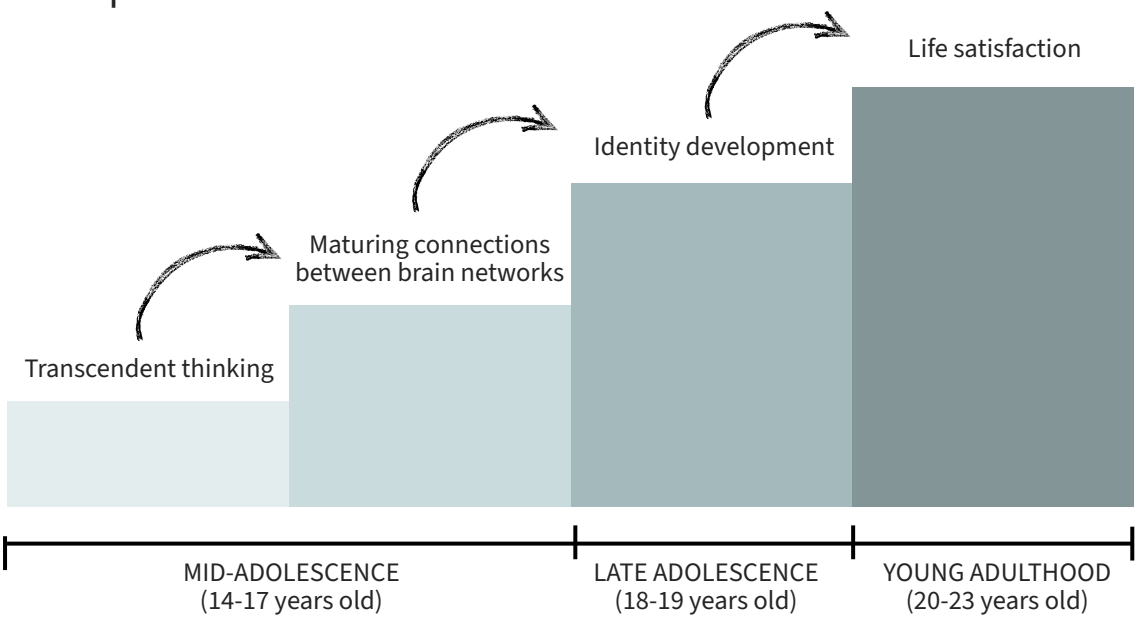
Notably, transcendent thinking at the outset did not predict these outcomes on its own; teens had to pass through each developmental stage along the way.

Teens who followed this developmental cascade reported *higher life satisfaction* as young adults.

Who Gets to Think This Way at School?

Every adolescent brain is wired for transcendent thinking, and all young people do it, often outside of school and often without anyone noticing. The opportunity

Transcendent Thinking and Well-Being:
A Developmental Cascade



Source: Gotlieb, Yang & Immordino-Yang, 2024a. Figure created for this report.

for educators is not to teach students a new capacity. It is to create the contexts and occasions in which students exercise the capacity they already have, more often, and in relation to academic content.

At first glance, we might view this kind of thinking as an extension opportunity for students who have already proven themselves on the basic academic skills. The research doesn't support that approach. All study participants demonstrated some level of transcendent thinking, and the longer-term outcomes held true regardless of a student's IQ or socioeconomic status. Transcendent thinking is not an add-on for students who have already proven themselves. It is a door that opens learning for every student.

In practice, though, access to it narrows for exactly the students who stand to gain most. Young people who have struggled academically are frequently placed in coursework built around discrete skill remediation that is sequenced, closed-ended, and paced for coverage. The logic is that they must master the basics before they can be trusted with bigger questions. The developmental evidence points the other way. **Meaning is not the reward for fluency; it is often what makes fluency worth acquiring.**

5. Redesigning Classrooms for Adolescent Development

Over the past several years, USC CANDLE and ASU's Center for Whole-Child Education have partnered with educators across the country, in classrooms, schools, and districts serving a wide range of student populations, to translate this science into everyday practice. What we've learned from that work falls into two categories: the conditions schools set, and the moves educators make day to day.

Create the Container: Relationships, Trust and Safety

> **"Most teachers just wait for people to raise their hands, but a lot of students are really shy, and a lot of those shy students are really smart. She will call on them... and I like it when teachers take it into their own hands to say, 'I want you here.'"**
>
> - Student Advisor

Building the container described earlier is more than just a classroom feeling, it is a set of deliberate actions. Drawing on the Center for Whole-Child Education's Blueprint, three actions turn the safety and relationships this report describes into everyday practice:

1. Build developmental relationships through socially-oriented structures and daily practices.

Don't leave getting to know students to chance. Create structured, recurring space for it, such as advisory periods, one-on-one conferencing, and goal-setting conversations, so adults come to know each student's background, interests, and goals directly, rather than relying on assumptions or stereotypes. Over time, these relationships should look less like an adult directing a student and more like a partnership: an enduring connection, built through repeated back-and-forth interaction, that grows more complex as trust deepens, with the student taking on increasing ownership of their own learning.



Try it out:
Tools for Student Relationship Structures

2. Co-create a physically, emotionally, and identity-safe environment.

Involve students in shaping classroom norms and culture from the start, and when conflict or harm occurs, prioritize repairing relationships and restoring trust, not just applying discipline. This matters most for students whose identities have too often been marginalized by school systems. For these students especially, safety has to be an explicit, shared commitment, not an assumption.



Try it out:
Tools for Co-Created Expectations, Norms and Routines

3. Design for co-regulation, not just calm.

A quiet classroom isn't automatically a safe one, and a safe classroom doesn't have to be quiet. What students need is predictable, consistent structure paired with adults who are attuned and responsive to what they need in the moment, adults who model and match the level of energy and engagement a task calls for. Built this way, a classroom can hold real challenge and productive discomfort without ever tipping into threat, which is what makes it possible for students to take the intellectual risks transcendent thinking requires.



Try it out:
Tools for Co-Regulating Practices

Center Meaning and Purpose: Transcendent Thinking

Adults can create opportunities for transcendent thinking through the three key moves described below. Educators we've partnered with tried different strategies and learned from what worked (and what didn't), and we've been gathering those insights to share more broadly. You don't need all three, and they aren't a sequence. Start wherever feels most relevant to your work.

4. Anchor in big ideas, compelling questions, and multiple perspectives.

Organize learning around questions, problems, and perspectives that are genuinely open-ended, unresolved, and connected to students' lives and the world. When students grapple with complex questions that don't have a single answer, they draw on memory, emotion, prior experience, and their relationships to construct what it all means to them, pushing thinking beyond the immediate task toward broader patterns, systems, and values.

5. Embed meaningful choice and voice.

Create space for students to make meaningful decisions about their learning, and treat their identities, perspectives, and experiences as legitimate intellectual contributions, not a warm-up before the “real” content. Personal connection isn't just a “nice to have” way to

build investment; it's a legitimate mode of meaning-making. When students connect content to their own lives, identities, communities, and prior knowledge, they're doing intellectual work that deepens understanding and contributes to a developing sense of purpose and identity.

6. Integrate constructive reflection prompts.

Reflection is too often treated as a superficial wrap-up, a chance to recall what was learned, rather than to make meaning of it. This move reframes reflection as an ongoing habit, in which students examine their own thinking by identifying patterns, asking deeper questions, considering implications, and engaging with their emotional responses to learning. Done consistently, these routines help students bridge personal insight, universal questions, and civic issues, asking both “What does this mean to me?” and “What does this mean for us?”



Try it out:
Key Instructional Moves: Strategies to Promote Transcendent Thinking
(See Appendix A)

See it in Action

What do all of these practices look like, sound like, and feel like in real classrooms? Through partnership with educators across California and the country, we have learned from and documented the work of educators who are creating the container for learning, and teaching for meaning and purpose.

Explore three examples from educators on the following pages, and hear directly from them and their students via the video links.

IN SUMMARY

Redesigning Classrooms for Adolescent Development

Create the Container: Relationships, Trust and Safety

1. Build developmental relationships through socially-oriented structures and daily practices
2. Co-create a physically, emotionally, and identity-safe environment.
3. Design for co-regulation, not just calm.

Center Meaning and Purpose: Transcendent Thinking

4. Anchor in big ideas, compelling questions, and multiple perspectives.
5. Embed meaningful choice and voice.
6. Integrate constructive reflection prompts.

Exploring Science Through Multiple Perspectives

LESSON/PROJECT

"The Ripple and Response"

SUBJECT

Earth Science

GRADE(S)

7

watch the video



In a science class covering natural hazards and mitigation, students move beyond a traditional prescribed project approach to instead choose an actual historical natural disaster and examine it through a specific analytical lens of their own choosing. Rather than following a set formula, **students decide for themselves how they will tell the story of their chosen disaster** and demonstrate their learning, with lenses ranging from a risk psychologist comparing statistical danger to public fear, to a time traveler placing a past event in conversation with a present-day parallel, to a systems analyst tracing cause and effect. Students choose a disaster that is of interest to them, including heat wave deaths in California, the eruption of Mount St. Helens, the Irish potato famine set against the Ethiopian famine, and the 1918 Spanish flu pandemic.

Voice and choice

Throughout the project, students pull from both curated articles and their own independent research, sending newly discovered sources back to their teacher so that the class builds its knowledge base together. **Journal prompts anchor their thinking along the way,** moving them from an initial reflection on what people are most afraid of, to who is actually affected by a given disaster and what often goes unseen, and finally to how their perspective shifted between the start and end of the project. Along the way, students uncover ideas that complicate their assumptions.

Constructive reflection prompts

(continued on the next page)

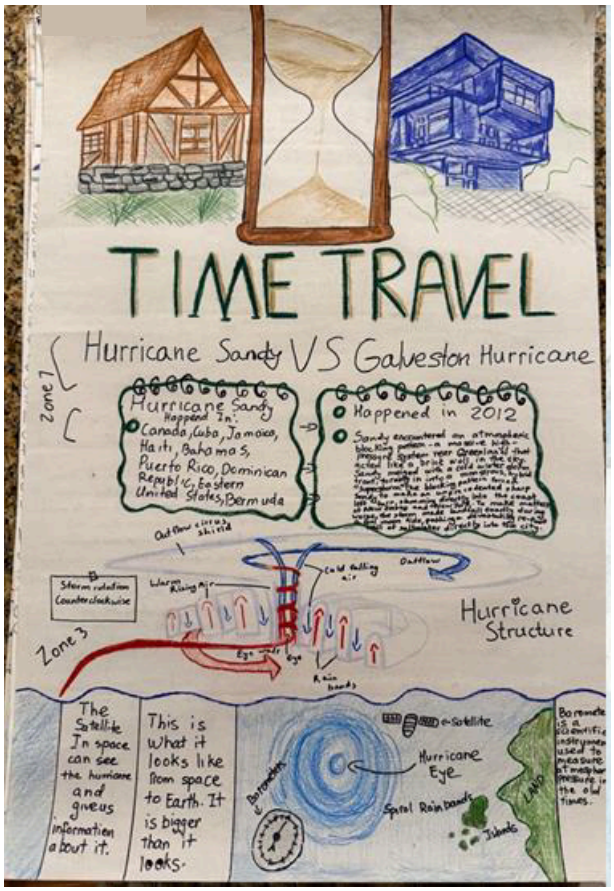
SEE IT IN ACTION: EXAMPLES FROM EDUCATORS

Multiple perspectives

Before presenting, students talk with classmates who studied the same disaster through a different lens, **discovering how much a shift in perspective changes the interpretation of the same event.** From these conversations and their own research, students arrive at a shared realization: that people across time and place are more connected than they initially assumed, and that comparing their own lives to those who lived through past crises, including drawing on their own memories of living through COVID, deepens their sense of that connection. The teacher frames the project's success not in terms of polished presentations or fact-gathering, but in the meaning-making itself. Letting go of a more rigid, teacher-directed structure allowed students to genuinely construct their own understanding, and it is that human connection, more than any particular content focus, that the teacher sees as the lasting thread running through the work.

Student Work

Final poster for the natural disaster project:



Student journal response #1:

"The natural disaster I am afraid of are earthquakes. This is because earthquakes can range from level 1 to 9.4. They can cause buildings to break, causing people to get crushed and injured. People will need to find new houses. Everything you belong will be crushed and lost."

Student journal response #4:

"Now, I feel more prepared. I know that now we have tools that can keep us safe from earthquakes. We can track them, predict them, and model them...We know what to expect and we can be prepared to keep ourselves safe...Yes, we do have many earthquakes in my area. So, it is dangerous. But thanks to modern houses...we are safer to earthquakes now than in the past. By seeing the data I feel much more relieved... "

Making Sense of Real-World Data in Math

LESSON/PROJECT

Mathematical Modeling for Climate Data

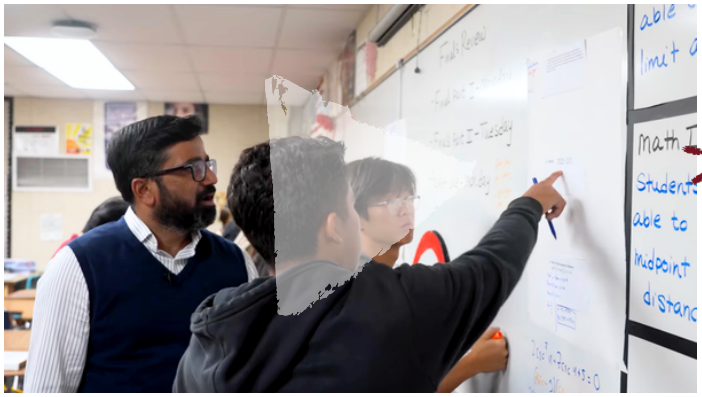
SUBJECT

Algebra

GRADE(S)

11

watch the video



In an 11th grade advanced algebra (precalculus) class, students complete a multi-week project focused on the application of functions for mathematical modeling with real-life data to address the debate about impacts of climate change.

Compelling questions, multiple perspectives

The students start by watching clips with differing views on the facts of issues at the heart of climate change, including reviewing substantiated claims from data trends. They write an initial reflection entry making meaning of what they are seeing, hearing, thinking and feeling. They then pursue various mathematical calculations using available datasets (e.g., global and local carbon dioxide emission and temperature trends) to build their own models. **The students reflect in another journal entry on how the math content they are learning is informing their view on the issue of climate change** before presenting their case to their teacher with evidence from their models. In parallel, they are also supported in engaging in a related community volunteer activity that affords them the chance to talk about these issues and what they are learning with people outside the school context. From these experiences, the students summarize their insights in **a letter to a local elected official** that is rooted in their math analysis as well as their volunteering and that offers some recommendations around approaching the climate change issue from a local perspective.

Constructive reflection

Meaningful voice

(continued on the next page)

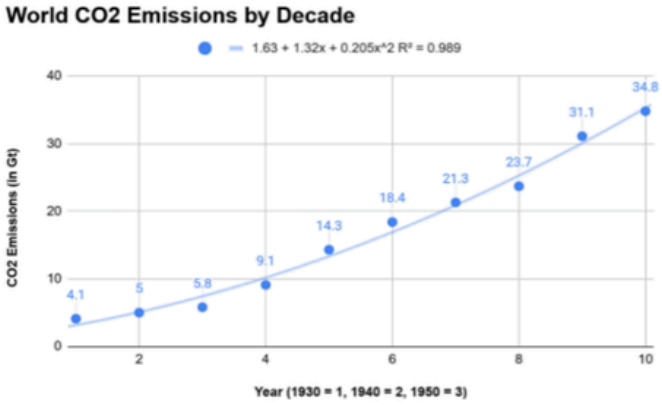
The project concludes with students writing a culminating reflection piece about what mattered to them about this project, how they think about the power of mathematical modeling, and what it felt like to engage in civic action.

Student Work

Mathematical evidence from a student's final report:

The CO_2 emissions scatterplot from 1940 to 2020 follows a quadratic model, represented by the equation: $y = 0.205x^2 + 1.32x + 1.63$.

A quadratic model is appropriate because CO_2 emissions are not increasing at a constant rate; instead, the rate of increase itself is accelerating. This reflects rapid industrialization, population growth, and increased energy consumption over time.



Quadratic Scatter Plot Used

2040
Y= 0.205x^2 + 1.32x + 1.63
Y= 0.205 (12)^2 + 1.32 (12) + 1.63
Y= 29.52 + 15.84 + 1.63
Y= 46.99 Gt

2060
Y = 0.205 (14)^2 + 1.32 (14) + 1.63
Y= 40.18 + 18.48 + 1.63
Y= 60.29 Gt

Conclusion from a student's final report, titled "Tipping Point"

After completing this project, my perspective on climate change has changed significantly. What once felt like a distant and abstract issue is now something I understand through real data, mathematical models, and firsthand experience. Seeing how population growth, CO_2 emissions, and temperature increases are mathematically connected helped me recognize the role humans play in shaping the planet's future. The service experience reinforced that individual actions, when combined, can make a real difference. This project encouraged me to think more critically about my own responsibilities and how informed choices can contribute to addressing climate change.

Understanding Ourselves and Others through Literature

LESSON/PROJECT	SUBJECT	GRADE(S)
Book Clubs	English Language Arts	9, 10

watch the video



In 9th and 10th grade English classes, students take part in book clubs that put them in charge of their own reading and learning process. They begin with a **"speed dating" style book selection,** previewing a range of titles and blurbs before choosing the book that speaks most to them, so that ownership starts from the very first decision. From there, students set their own reading schedules, deadlines, and tasks, **working with peers in their table group** while the teacher steps back into a supporting role, listening in and asking questions rather than directing the process.

Meaningful choice

As they read, students keep **dialectical journals, selecting passages and writing personal responses to them,** then bringing those reflections into small-group discussions where they **trade perspectives and work through anything they didn't fully understand together.** The books themselves surface **big ideas around identity, cultural expectations, and lived experience,** and students consistently connect these themes back to their own lives: a student reflecting on family expectations, a student linking a character's experience of police brutality in the media to her own family's immigration story, another recognizing herself as a people-pleaser and pushing back against that instinct within the book club setting. Throughout the process, students describe real shifts in how they see themselves: gaining confidence as leaders, stepping outside their comfort zones, developing a

Constructive reflection

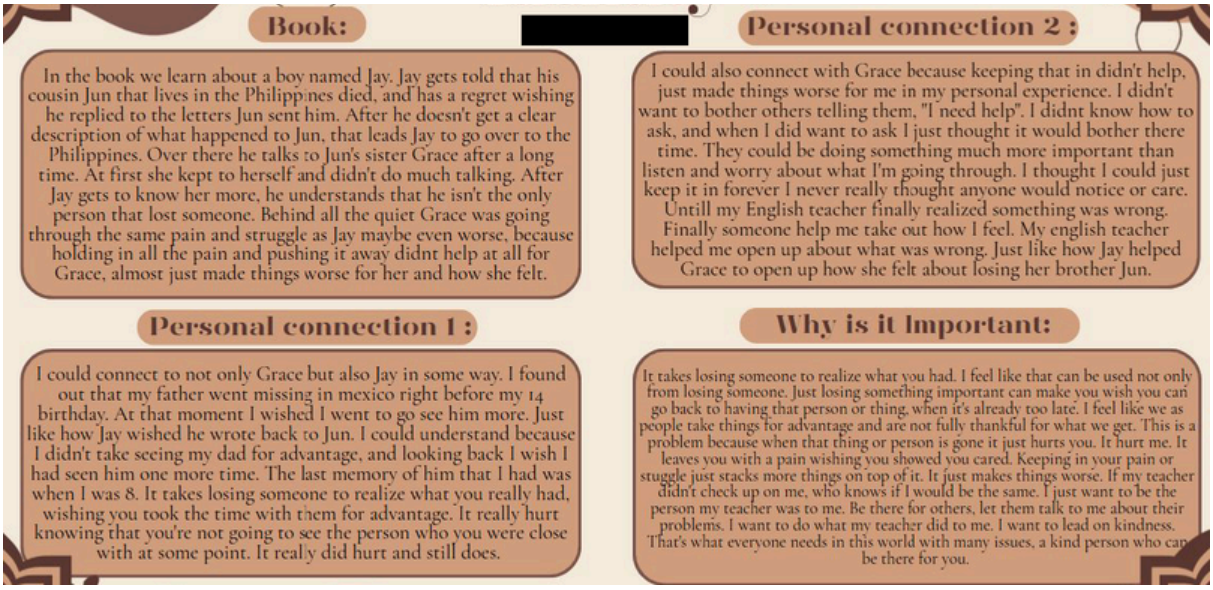
Meaningful voice and multiple perspectives

Anchored in big ideas

stronger sense of responsibility, and discovering an unexpected enjoyment of writing that some now pursue outside of class. The teacher frames the work as more than a reading exercise. Students are meeting reading and writing standards while analyzing text, synthesizing information, and communicating their comprehension, but they're doing it with intention and heart, bringing their full selves into the process rather than reading at a distance. The project underscores a belief that every student's voice and experience matters, and that a classroom culture built on shared stories, regardless of who is loudest or quietest in the room, can help students better understand both themselves and each other.

Student Work

Final Reflections on *Patron Saints of Nothing* by Randy Ribay:



Book:

In the book we learn about a boy named Jay. Jay gets told that his cousin Jun that lives in the Philippines died, and has a regret wishing he replied to the letters Jun sent him. After he doesn't get a clear description of what happened to Jun, that leads Jay to go over to the Philippines. Over there he talks to Jun's sister Grace after a long time. At first she kept to herself and didn't do much talking. After Jay gets to know her more, he understands that he isn't the only person that lost someone. Behind all the quiet Grace was going through the same pain and struggle as Jay maybe even worse, because holding in all the pain and pushing it away didnt help at all for Grace, almost just made things worse for her and how she felt.

Personal connection 1 :

I could connect to not only Grace but also Jay in some way. I found out that my father went missing in mexico right before my 14 birthday. At that moment I wished I went to go see him more. Just like how Jay wished he wrote back to Jun. I could understand because I didn't take seeing my dad for advantage, and looking back I wish I had seen him one more time. The last memory of him that I had was when I was 8. It takes losing someone to realize what you really had, wishing you took the time with them for advantage. It really hurt knowing that you're not going to see the person who you were close with at some point. It realy did hurt and still does.

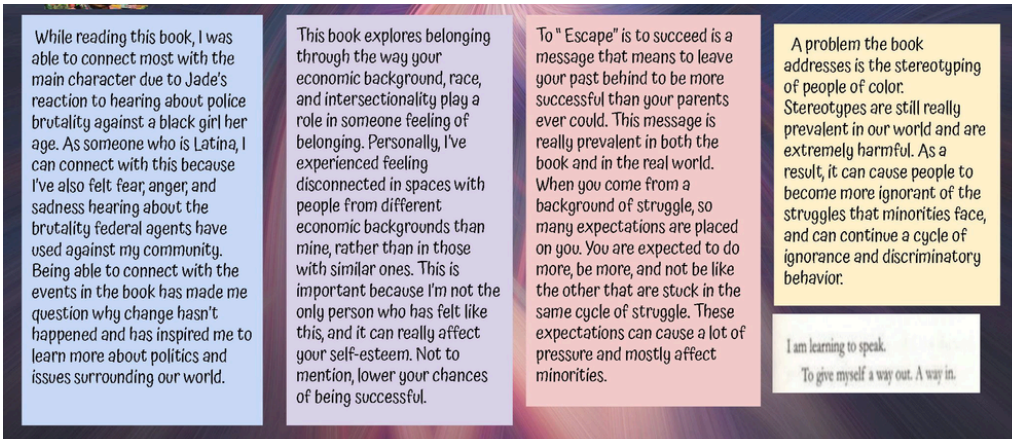
Personal connection 2 :

I could also connect with Grace because keeping that in didn't help, just made things worse for me in my personal experience. I didn't want to bother others telling them, "I need help". I didnt know how to ask, and when I did want to ask I just thought it would bother there time. They could be doing something much more important than listen and worry about what I'm going through. I thought I could just keep it in forever I never really thought anyone would notice or care. Untill my English teacher finally realized something was wrong. Finally someone help me take out how I feel. My english teacher helped me open up about what was wrong. Just like how Jay helped Grace to open up how she felt about losing her brother Jun.

Why is it Important:

It takes losing someone to realize what you had. I feel like that can be used not only from losing someone. Just losing something important can make you wish you can go back to having that person or thing, when it's already too late. I feel like we as people take things for advantage and are not fully thankful for what we get. This is a problem because when that thing or person is gone it just hurts you. It hurt me. It leaves you with a pain wishing you showed you cared. Keeping in your pain or stuggle just stacks more things on top of it. It just makes things worse. If my teacher didn't check up on me, who knows if I would be the same. I just want to be the person my teacher was to me. Be there for others, let them talk to me about their problems. I want to do what my teacher did to me. I want to lead on kindness. That's what everyone needs in this world with many issues, a kind person who can be there for you.

Final Reflections on *Piecing Me Together* by Renée Watson:



While reading this book, I was able to connect most with the main character due to Jade's reaction to hearing about police brutality against a black girl her age. As someone who is Latina, I can connect with this because I've also felt fear, anger, and sadness hearing about the brutality federal agents have used against my community. Being able to connect with the events in the book has made me question why change hasn't happened and has inspired me to learn more about politics and issues surrounding our world.

This book explores belonging through the way your economic background, race, and intersectionality play a role in someone feeling of belonging. Personally, I've experienced feeling disconnected in spaces with people from different economic backgrounds than mine, rather than in those with similar ones. This is important because I'm not the only person who has felt like this, and it can really affect your self-esteem. Not to mention, lower your chances of being successful.

To " Escape" is to succeed is a message that means to leave your past behind to be more successful than your parents ever could. This message is really prevalent in both the book and in the real world. When you come from a background of struggle, so many expectations are placed on you. You are expected to do more, be more, and not be like the other that are stuck in the same cycle of struggle. These expectations can cause a lot of pressure and mostly affect minorities.

A problem the book addresses is the stereotyping of people of color. Stereotypes are still really prevalent in our world and are extremely harmful. As a result, it can cause people to become more ignorant of the struggles that minorities face, and can continue a cycle of ignorance and discriminatory behavior.

I am learning to speak.
To give myself a way out. A way in.

6. Making It Last: What Sustains This Work

California has bet heavily on redesigning secondary education. Through the Golden State Pathways Program, the California Community Schools Partnership Program, and a set of related investments, the state has committed billions of dollars to career pathways, community schools, integrated student supports, and the broader project of making high school work better for young people. These are serious investments, and they rest on serious ideas.

The question that keeps surfacing is not whether they are worthwhile. It is why some take root and others quietly fade. A pathway that transforms a school under one principal can look, three years later, like a set of scheduling arrangements. A community school that changes the trajectory of a neighborhood can, after a funding cycle and a leadership change, become difficult to distinguish from the school it replaced. The pattern is familiar enough that experienced educators often greet a new initiative with a kind of practiced patience, waiting to see whether this one will be different.

Developmental science has something specific to say about why this happens, and about what it would take to change it.

The Active Ingredient

In 2012, researchers Li and Julian offered a way of thinking about programs for children and youth that has stayed useful. Looking across a wide range of interventions, they found that developmental relationships functioned as the active ingredient, in the way that fluoride is the active ingredient in toothpaste. Programs designed around a genuine understanding of what makes a relationship developmentally powerful were significantly more effective than programs that were not, and the effects showed up in outcomes as varied as academic achievement and physical growth. Everything else in a program, in this account, is the delivery mechanism. Necessary, but not the thing that works.

The analogy cuts in two directions, and both matter for sustainability.

Designed without its active ingredient, an initiative can look entirely plausible and accomplish very little. Every component is present. The pathway is articulated, the partnerships are signed, the master schedule is rebuilt. But if nothing in the design attends to what adolescents actually need in order to engage deeply, the initiative is toothpaste without fluoride. It performs the motions of the thing it resembles.

The second problem is subtler, and in our experience more common. An initiative that does work, that does contain its active ingredient, is nearly impossible to sustain if the people carrying it forward cannot name what that ingredient is. They will preserve the program's activities faithfully, because activities are what is visible. What they cannot do is tell which parts are load-bearing. So when budgets tighten, or the bell schedule has to change, or a new leader arrives with different priorities, decisions get made without anyone knowing what they cost. Sometimes the essential thing is cut and the incidental thing is protected, and afterward no one can explain why the results changed.

A program replicated on its activities alone is a program no one can defend, because no one can say which parts are doing the work.

This is the case for a shared developmental framework, and it is not primarily a case about scientific literacy. It is a case about what makes good work survivable. Leaders who can articulate why an approach works developmentally can protect it under pressure, adapt it without gutting it, and explain it to the people who arrive after them. Leaders who cannot are left defending a set of practices on faith.

What Gets In the Way

Over the course of this project we spoke with leaders working across California's major secondary redesign efforts, including career pathways, dual enrollment and community schools. We asked them what stands between a compelling body of science and changed practice at scale. Their answers, together with what teachers told us about their own working conditions, point to five obstacles. They compound one another.

The reasoning does not travel with the model.

When a promising design spreads, what spreads is the observable structure: the advisory period, the capstone, the partnership agreement, the integrated unit. The developmental reasoning that made those structures matter tends to live in conversations, in the judgment of the people who built the thing, and in institutional memory that was never written down. It stays behind. Leaders described watching sites adopt the form of a model without the thinking that gave the form its purpose, then struggle to explain why the outcomes did not follow. The work looks the same from the outside. Something essential has been left at the previous site.

New language creates distance from practice that is already strong.

California educators have spent decades working with frameworks that overlap substantially with what this report describes: deeper learning, essential questions, understanding by design, project-based learning, higher-order thinking, culturally responsive practice. When developmental science arrives as a new vocabulary rather than as an account of work already underway, it registers as one more initiative competing for finite attention.

The most common response is not disagreement. It is a version of "we already do this," which may be entirely true, partly true, or not true at all. Without language that connects the science to frameworks practitioners already hold, no one can tell which. Reviewers of this report told us plainly that terms like transcendent thinking need to be anchored to what came before, so educators can see both what is genuinely new and what is a deeper explanation of something they have been doing for years. That anchoring is not a communications nicety. It determines whether a practitioner can locate their own excellent work inside the science, or whether they conclude the science is describing someone else.

Much of what this report describes is already happening in California classrooms, built by educators who arrived at it through experience rather than through neuroscience.

Understanding is not the same as a delivery structure.

Educators are candid about the current reality: they do not have time to read, and they do not learn well from text alone. A resource that arrives without a professional learning structure attached to it will sit unread, however good it is. This is not a failure of will. It is an accurate response to conditions.

What educators told us they need is not more conviction that the science matters. It is permission and a next move. Knowing what to do on a Tuesday when a student is dysregulated, or when a discussion opens up further than the lesson plan anticipated, or when the curriculum leaves no obvious room for a reflection routine. Initiatives routinely fund the materials and not the facilitation that activates them, and then treat the resulting silence as evidence that educators were not interested.

The gap is often more basic than the conversation about developmental science assumes.

> "A huge number of our teachers in [our district] are on emergency credentials. I was doing backward planning with one of my colleagues and she said, 'Oh, I've never learned to do this.' And I was shocked. That makes it really hard for teachers to build classrooms where students are given high challenge and high support."
>
> - Educator Advisor

When the reasoning lives in people, it leaves when they do.

Staffing instability is not usually discussed as a threat to developmental design, but it is one of the most direct. Students feel it first and describe it most plainly. One student explained, *"What really sets me up for success was the strong set of staff and community that I had at first, which has slowly been depleting due to teacher turnover."*

The same student described a language navigator program at his school, in which students who had once been English learners supported newcomers. It was, in his account, one of the most successful things the school did. After the staff who ran it departed, it dwindled. He also described losing his math analysis teacher partway through the year and finishing the course with his classmates through Khan Academy.

From inside a student's experience, the loss of an adult and the loss of a program are the same event. And when the developmental reasoning behind a design lives in individuals rather than in the design itself, that reasoning walks out with them. This is the first obstacle again, seen from the ground.

The conditions of the job squeeze out the practice.

The first four obstacles concern how understanding travels. The fifth concerns whether there is room to act on it once it arrives.

Teachers describe a set of working conditions that make the practices in this report harder each year. Curricula mandated slide by slide and day by day. Compliance documentation, digital posting requirements, and case management that consume the hours in which planning and relationship-building used to happen. Class sizes that make individualized attention arithmetically impossible. And a credentialing pipeline that places adults in classrooms without the foundational preparation the job requires.

> **"There's a mandatory curriculum — a slide deck, a classwork, and a homework for every single day of the school year. What about what the teacher cares about? And what if the kids are stuck? I worry for new teachers to be told that this is what teaching is, when actually it's much more personal and messy."**
>
> — Educator Advisor

These conditions do more than crowd the calendar. They select against the people most able to do this work. Teacher turnover is usually discussed as though it were a matter of individual choice, but the teachers we spoke with described colleagues leaving because the job had been redefined into something they had not trained for and could not sustain. The instability students experience and the constraints teachers describe are the same phenomenon viewed from two sides.

The staff departures that students experience as abandonment are, from the other side of the desk, often people being squeezed out by a system built for coverage and compliance rather than for learning.

This is the report's own argument turned back on the adults in the building. A system designed around measurable outputs rather than around how people actually learn does not only fail adolescents. It also makes it progressively harder for the adults who understand them to stay. Any leader who intends to build developmentally-grounded practice has to reckon with the fact that the conditions currently in place are actively working against it.

What This Suggests for District and Initiative Leaders

Each of these obstacles has a counterpart worth acting on. None require new funding streams. Most require using existing ones differently.

Name the active ingredients, in writing.

Ask of any initiative already underway: what about this is developmentally load-bearing, and would a person arriving next year be able to tell? The answer belongs in design documents, onboarding materials, and coaching protocols, not only in the heads of the people who built it. This is the single most protective thing a leader can do for work they care about, and it costs a few hours.

Introduce the science as an account of existing work, not a replacement for it.

When developmental science is presented as a new framework, it competes. When it is presented as an explanation of why strong practice already succeeds, it reinforces. The second framing is both more accurate and more useful, because it gives excellent educators evidence and language to advocate upward for what they are already doing, rather than another standard to be measured against.

Fund the structure that delivers, not only the materials.

A modest investment in facilitated professional learning will do more than a substantially larger investment in resources that arrive without it. Where an initiative has a coaching or professional learning infrastructure already, the developmental reasoning should run through it rather than alongside it as a separate module.

Build the reasoning into structures, not individuals.

Where turnover is a known condition rather than an occasional disruption, and in most of the schools that need this work most it is a known condition, the developmental rationale has to be carried by something more durable than a person. Written design rationales, onboarding that explains why and not only what, and coaching structures that transfer reasoning rather than compliance are what make a design survive its founders.

Subtract before you add.

Before introducing anything new, audit what is currently consuming the time this work would require. Compliance tasks, duplicated documentation, and mandated pacing all

have defenders, but few have been examined recently against what they cost in planning time and relational capacity. An initiative introduced into a schedule with no slack will be implemented as paperwork. Making room is not a precondition for this work; it is part of it.

IN SUMMARY

Making it Last: What Sustains This Work

What Gets In the Way

- ✗ The reasoning does not travel with the model.
- ✗ New language creates distance from practice that is already strong.
- ✗ Understanding is not the same as a delivery structure.
- ✗ When the reasoning lives in people, it leaves when they do.
- ✗ The conditions of the job squeeze out the practice.

What This Suggests for District and Initiative Leaders

- ✓ Name the active ingredients, in writing.
- ✓ Introduce the science as an account of existing work, not a replacement for it.
- ✓ Fund the structure that delivers, not only the materials.
- ✓ Build the reasoning into structures, not individuals.
- ✓ Subtract before you add.

7. Conclusion

Our education system was not built around what we now know about adolescent development. But the science is unambiguous. Emotion and cognition are not separate systems in the brain; they are the same system. That means the first thing schools need to build is not a new curriculum or a new program, it is a container of safety, trust, and relationship, because without it the brain networks that support deep thinking simply do not come online. Inside that container, schools can center meaning and purpose through transcendent thinking, giving students real opportunities to ask why something matters, who it affects, and what kind of person they want to be in relation to it. And when they do, the outcomes are not abstract. Students who engage in this kind of thinking show measurable brain growth, clearer identity development, and greater satisfaction in their relationships, education, and sense of self years later.

None of this requires anything the field does not already have. It is visible in the classrooms described in this report, in a precalculus project built on climate data, a book club where students choose their own titles, a science unit that lets seventh graders decide which lens to look through. What it requires is that the reasoning behind that work be named, written down, and carried forward, so it survives the year, the funding cycle, and the person who started it.

None of this asks schools to add another program to an already crowded plate. It asks something more fundamental: that we design the school day, the classroom, and the systems around it based on what adolescents actually need to grow, rather than retrofitting new priorities onto a structure built for a different era and a different purpose.

What we hope for is not simply higher test scores, though we expect those to follow. We hope for young people who know who they are, what they value, and how they want to show up in their relationships, their communities, and their futures. Across every conversation with students in this report, one thread held steady: they want to feel that they matter, to their teachers, to their learning community, and to the work itself. When they do, they show up, take risks, persist, and remember what they learned. When they do not, they perform, comply, and forget.

Calls to Action

California educators are already doing so much right, often against real structural constraints, and this report is meant to affirm and strengthen that developmentally-oriented work and build upon it. The shifts can start small: find one place in your existing practice where you can build a real, sustained connection with students, one place where you can open up a question or task enough

that students have to bring their own thinking, values, and experience to it, rather than simply recalling what they were told. The tools and examples in this report offer starting points and ideas, but the underlying shift matters more than any single strategy. Critical change to a system this large can happen from the ground up, classroom by classroom, and educators should be positioned to be leaders in this redesign.

School leaders set the conditions that make this kind of teaching possible or impossible. Protect time on the schedule for relationship-building structures and for teachers to collaborate on big questions and reflection routines, and examine whether current courseloads and scheduling structures give any adult a real chance to know students well. Just as important, look at what gets rewarded in observation and evaluation. If pacing guides and compliance are what get noticed, that is what teachers will optimize for, regardless of what a mission statement says about the whole child.

District and county leaders hold the levers that determine whether this work survives past a single classroom or teacher. Align professional learning, curriculum adoption, and evaluation systems so they reward developmentally attuned teaching rather than measuring it as a side note to test scores, and invest in the structural conditions that make it possible, including manageable teaching loads. The classroom examples in this report are a starting point for local pilots; use them to build the evidence base your own system needs to expand this work with confidence.

Initiative leaders, whether you oversee community schools, pathways, social-emotional learning, or another effort already underway, will find that this report is not an argument for adding a program to the list. Chapter 6 makes the case in full: name what is developmentally load-bearing in the work you already run, and write it down where the next person will find it. Where possible, connect this work to coherence efforts already underway across your organization rather than standing it up as a separate initiative competing for the same time and attention.

Policymakers shape whether the structural conditions this report describes are possible at scale. That means funding and protecting the conditions schools need to build real relationships, particularly in schools serving communities that have been historically under-resourced. It also means expanding what accountability systems measure and reward. A system that tracks only test scores and graduation rates will continue to produce schools optimized for test scores and graduation rates. Indicators of relational safety and students' sense of meaning and purpose belong alongside them.

The students we spoke with understood this arithmetic clearly. One explained, *"If there's ever that moment where funding could possibly be lifted or increased, do not hesitate to do that, because more funding will help bring a lot more possibilities to high schools, especially in underserved areas. Funding is more than just the money — it really fixes problems that we face. A lot of things that we face could be fixed with some more funding."*

We opened this report with a question: **What does it look like to build schools and systems around what we now know about how adolescents grow and develop, and what might happen if we do?** We have offered a place to start, drawn from educators who are already answering that question in their own classrooms.

The science is clear. What remains is our collective work to build learning experiences around it.

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Appendix

A. Key Instructional Moves: Strategies to Promote Transcendent Thinking

Key Instructional Moves:
Strategies to Promote Transcendent Thinking

As our educator partners across the country have grappled with how to promote transcendent thinking in their classrooms, tried new things, and learned from them, we have been gathering those insights to share more broadly. **You might take inspiration from these educator moves, or come up with your own strategies to test!** You don't need to use all three moves, and they are also not necessarily a sequence. You can start with whatever feels most relevant to your work.



Anchor in Big Ideas, Compelling Questions & Multiple Perspectives p.2

Educator Move
Organize learning around questions, problems, and perspectives that are genuinely open-ended, unresolved, and connected to students' lives and the world.

Student Experience
Students engage deeply because the questions feel both real and relevant. This emotional and intellectual investment pushes thinking beyond the immediate task toward broader patterns, systems, and values, which is a hallmark of transcendent thinking.



Embed Meaningful Choice & Voice p.5

Educator Move
Create space for students to make meaningful decisions about their learning and treat students' identities, perspectives, and experiences as legitimate intellectual contributions.

Student Experience
Students feel agency and ownership over their learning. Bringing who they are to academic content is itself a form of intellectual work, and it is precisely this kind of identity-connecting thinking that transcendent thinking asks students to practice.



Integrate Constructive Reflection Prompts p.8

Educator Move
Build in regular, structured opportunities for students to make meaning, connecting what they are learning to their values, identities, and the world beyond the classroom.

Student Experience
Students develop a habit of meaning-making that bridges personal insight, universal questions, and civic issues. Over time, this habit becomes internalized, and students begin asking transcendent questions on their own, without needing to be prompted.

Anchor in Big Ideas, Compelling Questions & Multiple Perspectives

Organizing curriculum around enduring, open-ended questions connects academic work to larger human concerns and students' own values and experiences, fostering sustained interest rooted in both emotional and intellectual engagement. When students grapple with complex questions without single answers, they draw on memory, emotion, prior experience, and their relationships to construct what it all means to them.

EXAMPLE

Choose one core question you'll revisit throughout the learning arc

Use open-ended questions that anchor student inquiry in big ideas. Effective questions have no single correct answer, create productive tension, and require evidence, reasoning, and perspective-taking.

That might sound like:

"To what extent...?" *"Is it fair...?"* *"How does ___ affect...?"*
"What matters more...?" *"How should we decide...?"* *"What is our responsibility to...?"*

Arts	Who decides what a work of art means: the artist or the audience?
Humanities	What can stories teach us about how we should live? Should we trust them?
Math	How do we decide which math model best represents a real-world situation?
Sciences	To what extent should humans change the environment to meet our needs?

EXAMPLE

Introduce conflicting perspectives

Begin with a "tension hook," presenting students with two or more credible sources or viewpoints that genuinely disagree. The conflict should be authentic — exposing students to the real complexity, uncertainty, and competing values that make an issue worth investigating.

That might look like:

A forced-choice dilemma

"Would you rather have maximum freedom or maximum safety?"

A visual or data contradiction

Two graphs showing opposite conclusions from similar data.

An artifact or object prompt

Show a historical artifact and ask: "Progress or exploitation?"

Arts	Emotional vs. technical evaluation; Artist intent vs. audience interpretation
Humanities	Different fictional character perspectives; Primary sources from different groups
Math	Data as objective vs. subjective; Accuracy and limitations of models
Sciences	Different research theories; Economic implications vs. ethical responsibility

EDUCATOR EXAMPLE

LEARNING PLAN

How Free Should We Be?

SUBJECT

U.S. Government

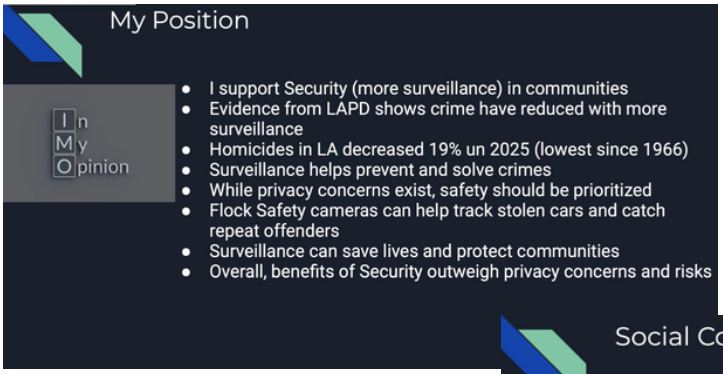
In a high school government class, an extended project is anchored in the big idea of the social contract through this enduring philosophical question: How free should we be? In other words, how do we balance personal freedom with collective security?

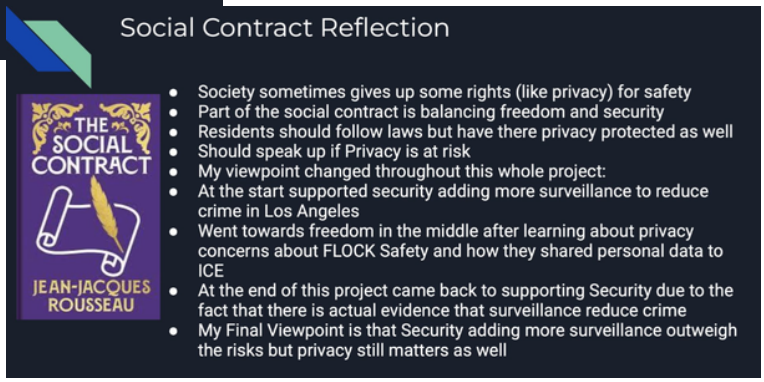
Rather than introducing the concept of a social contract simply by providing students with the differing socio-political thoughts of historical figures like Locke, Hobbes, and Rousseau, students first engage in a brief, fun, self-reflective survey activity that connects this central tension of individualism vs. collectivism to real scenarios in their own lives (e.g., airport security, COVID-19 pandemic controls). Then, after they have established meaningful questions to examine, they are provided ideas from Enlightenment thinkers and relevant legal case studies of the U.S. Supreme Court. They digest and debate the differing viewpoints on the issues of each case they study, reflecting on their own evolving perspective in light of the readings and their peers. Then, students thoughtfully choose an issue that interests them to further research and present as a case study for the final culminating activity of this unit.

This sequence allows them to build knowledge while developing evidence-based positions informed by debate and grounded in a personally meaningful inquiry.

STUDENT WORK

"Should The Government Increase Surveillance in High-Crime Areas?"





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EDUCATOR EXAMPLE (contd.)

STUDENT WORK

"Financial Censorship & How Payment Processors Affect Online Speech"

In today's digital world, many people use online payment systems to support businesses, creators, journalists, and organizations. Financial institutions and payment processors sometimes restrict accounts or block transactions. This is often called financial censorship, and it raises an important debate about the balance between security and freedom of speech online.

Payment processors argue that restricting accounts can be necessary because companies must follow laws that prevent fraud, illegal activity, and funding for harmful organizations. Payment services often monitor transactions to make sure their platforms are not used for money laundering, scams, or criminal activity.

People on the other hand argue that financial censorship can threaten their free speech. Online creators, businesses and organizations often depend on digital payments to fund their work. When a payment processor blocks access to funds, it can stop these groups from making money and posting the content they want. The Foundation for Individual Rights and Expression (FIRE) says that when payment companies decide who can receive money, they may also influence what ideas people can share online. If a group cannot accept donations or payments, it may not be able to continue its work, even if what it is saying is legal. This can make it harder for these voices to stay active online.

I think payment processors should be allowed to restrict accounts when there is clear evidence of illegal activity or fraud. Rules are important to protect users and prevent financial crimes. However, these companies shouldn't be able to restrict accounts simply because they disagree with someone's opinions or viewpoints. Financial censorship is a hard issue to write about because it involves both safety and freedom. Payment processors play a powerful role in the digital economy, and their decisions affect whether organizations and individuals can continue their work online. Finding a balance between protecting security and protecting free expression will be important as the internet continues to grow.

Embed Meaningful Choice & Voice

Meaningful choice and voice give students real ownership over what they study, the questions they pursue, and how they demonstrate their learning. When students' perspectives, questions, and experiences are treated as legitimate intellectual contributions, they are positioned as active participants rather than passive recipients.

EXAMPLE

Creating space for personal connections as intellectual work

As we understand from the research on Transcendent Thinking, personal connection can be much more than a "nice to have" way to build investment. It can be a legitimate mode of meaning-making. When students connect content to their own lives, identities, communities, and prior knowledge, they are doing intellectual work that deepens and broadens understanding and contributes to creating purpose and identity.

That might look like:

- **Class time reserved** for generating and discussing personal connections (not saved for "if we have time").
- **Participation grades** that include personal contributions.
- **Assessments** and **rubrics** that explicitly include personal connections.
- **Your own personal connections,** shared to model and create a safe space.
- **Validation** and **feedback** (respond to students, encourage them to respond to each other).

Prompts for eliciting personal connections might sound like:

Entry Invitations	Begin class with a question that draws on lived experience before introducing content. E.g., "When have you been asked to follow a rule you thought was unjust?"
Where I Stand	Have students physically locate themselves on a spectrum in relation to a debate or issue. After the learning, revisit their positions.
Who Taught You That?	When a student shares a belief or assumption, ask them to trace where it came from: a family member, community, personal experience, or previous teacher.
Connection Logs	Ask students to track moments where the content reminds them of something from their life, community, or culture. Then use those connections in discussion.

EDUCATOR EXAMPLE

LEARNING PLAN

Short Story Comparison + Connections

SUBJECT

English Language Arts

In a 10th grade ELA class, students complete a culminating project that includes a comparative literary analysis, a personal reflection, and a creative representation with an artist statement. The class is an integrated general education and special education setting, and students are provided a variety of structures and concrete graphic organizers to scaffold, as needed, the different pieces of this project.

Across the unit, the students read at least six stories, and they discuss and debate in small groups and whole class formats the themes of each along the way. They are also asked to reflect on how these stories connect to their own thinking and lives. For the culminating essay, students choose which two stories they want to compare, and are provided latitude in the kind of artistic representation they make, from writing a skit or making a visual art piece (drawing, painting, collage), to creating a poem or musical song. In writing their reflective journals and artist statements, the students are given the options of articulating a connection with the themes of the stories to something personal about who they are, and/or to a larger issue or societal pattern that is important to them.

This structured flexibility and the opportunities for choice allow students to meet appropriately rigorous expectations while shaping the intellectual and expressive direction of their work.

STUDENT WORK

Reflective Journal:

In September of 2014, I moved from Kosovo to the United States. At this point in my life, I consider myself extremely assimilated and Americanized. I feel American before Kosovar Albanian... I felt deeply represented and understood by The Spaces Between Stars by Geeta Kothari... My family had left behind Islam, left behind speaking Albanian at home, left behind friends and family, and adapted to doing things like watching the Super Bowl, celebrating Christmas and Thanksgiving, and so much more. I think it's fair to say that no one was completely comfortable with this newfound culture, but we felt forced to adapt to it, and fit in...we stopped celebrating Eid, and Ramadan. From my experience, I wish I kept more of my culture, and I think more representation of other cultures is necessary. People like Maya and my parents shouldn't be forced to do things their not used to. A country created out of Western colonization shouldn't enforce these same Western values on less privileged groups of people.

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EDUCATOR EXAMPLE (contd.)

STUDENT WORK

Artist Statement:

My creative element is a drawing of a figure angrily looking at, and judging animals in a cage it's holding... The animals, all being native to China, are representative of Chinese culture... The figure has an element of fear in its face, where it obviously has power over the caged animals, but it also seems scared of them. This is significant because it expresses how American assimilation is prominent because Americans have a lack of understanding of other cultures. This element of fear is inspired by the statement "We fear what we don't understand".



Integrate Constructive Reflection Prompts

Reflection is often treated as a superficial wrap-up, focused on recalling what was learned rather than making meaning. This move reframes reflection as an ongoing habit in which students examine their own thinking by identifying patterns, asking deeper questions, considering implications, and engaging with their emotional responses to learning. When embedded across lessons and units, these activities help students bridge personal insights, universal questions, and civic issues, encouraging them to consider both "What does this mean to me?" and "What does this mean for us?"

EXAMPLE

Use Transcendent Thinking Routines

Transcendent Thinking Routines are brief, repeatable prompts that students use consistently, not as a one-time debrief but as a regular cognitive habit. Over time, students stop needing to be prompted and begin asking transcendent questions on their own.

- **Keep them short and frequent:** 2–5 minutes, used across subjects, visually displayed so students internalize the structure.
- **Model responses out loud:** Teachers should share their own responses first, demonstrating that transcendent thinking is an adult practice, not just a student exercise.
- **Use across formats:** Responses don't always need to be shared publicly; private journaling is often where the most honest transcendent thinking happens.

That might look like:

The Ladder *Moves students from concrete to abstract in three steps.*	1. Here and Now: "What happened / what did we learn?" 2. Stepping Up: "Why does this matter? Who is affected?" 3. Above and Beyond: "What does this reveal about how the world works? What does it mean for who I want to be?"
Head, Heart, World *A short three-part prompt at the end of any lesson.*	1. Head: "What is the most important idea from today?" 2. Heart: "What did you feel strongly about (positively or negatively)?" 3. World: "Where do you see this idea playing out beyond this classroom?"
Emotional Barometer *Prompts feeling as a form of cognitive engagement.*	1. The Emotion: "Name an emotion the content brought up." 2. The Why: "Say one sentence about why you felt that way." 3. The Connection: "Based on that, what would you next ask, act on, investigate, or express?"
Process Perspective *Students reflect on the experience of their own learning.*	1. Recall: "What did you do in today's class?" 2. Reflect: "What was that like for you? How did it feel?" 3. React: "What might that tell you about yourself as a learner? As a person?"

EDUCATOR EXAMPLE

LEARNING PLAN

Mathematical Modeling for Climate Data

SUBJECT

Algebra

In an 11th grade advanced algebra (pre-calculus) class, students complete a multi-week project focused on the application of functions for mathematical modeling with real-life data to address the debate about impacts of climate change.

The students start by watching clips with differing views on the facts of issues at the heart of climate change, including reviewing substantiated claims from data trends. They write an initial reflection entry making meaning of what they are seeing, hearing, thinking and feeling. They then pursue various mathematical calculations using available datasets (e.g., global and local carbon dioxide emission and temperature trends) to build their own models. The students reflect in another journal entry on how the math content they are learning is informing their view on the issue of climate change before presenting their case to their teacher with evidence from their models. In parallel, they are also supported in engaging in a related community volunteer activity that affords them the chance to talk about these issues and what they are learning with people outside the school context. From these experiences, the students summarize their insights in a letter to a local elected official that is rooted in their math analysis as well as their volunteering and that offers some recommendations around approaching the climate change issue from a local perspective.

The project concludes with students writing a culminating reflection piece about what mattered to them about this project, how they think about the power of mathematical modeling, and what it felt like to engage in civic action.

STUDENT WORK

Initial Reflection:

- This experience teaches me how the circumstances can influence people to believe what they feel is true. **Emotions can create bias and lead people to cherry-picking sources that support their beliefs.** Even if objective evidence is presented, not everybody will accept it as the cold truth.

- We all have a responsibility to do **thorough research to break down overwhelming issues. With research, we can move on to appropriate actions to tackle the issue** sihce we now have a better understandi understanding of it.

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EDUCATOR EXAMPLE (contd.)

STUDENT WORK

Climate Change Report:

- After examining all three scatter plots, I see clear connections: as technology advanced and industries thrived, the global population increased rapidly, leading to higher CO2 emissions. **The data sets support this narrative. The rising trendlines in the scatter plots correspond closely**, and the accompanying bar graph further reinforces this correlation.
- I completed after each documentary or scatterplot. While doing them, I had to ponder about climate change in general, how the documentaries emotionally affected me, and how the math I did connected to the issue. **Taking the time to pause and reflect helped me organize my thoughts and process my feelings about climate change,** especially now that I had a deeper understanding of its severity

Final Reflection:

- **If numbers cannot easily sway them, then other methods are needed to convince them, such as allowing these people to see the consequences for themselves, or hear anecdotes of other people in the crisis.**

- **My understanding of my own voice and power in society changed after writing to a real decision-maker when I realized that even if I am just one single voice, I went from being a silent and passive citizen to an active and participating one that raised concern over an issue that matters to my community**