International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

From "I Can't" to "I Get It!": Unlocking Conceptual Clarity in Every Adolescent Mind A Global, Evidence-Based Framework for Schools Serving Learners of Every Mindset

Narender Kumar

Principal, Hindu Vidyapeeth, Sonepat, Haryana, India

Abstract

Purpose: Adolescence, roughly the years from 10 to 19, is when young people first meet complex, abstract problems. Classrooms at this stage hold learners with very different mindsets: some believe ability is fixed, some are anxious, some are disengaged, some think differently because of neurodiversity, and some learn in a second language. This paper asks which school practices build genuine conceptual clarity for all of these learners, and how schools anywhere in the world can put those practices to work.

Design/methodology/approach: The study combines secondary analysis of international and national data with a structured synthesis of research evidence. The international sources are UNESCO's out-of-school estimates, OECD PISA 2022 and WHO data on adolescent mental health. India serves as a national case study, drawing on UDISE+ 2024-25, PARAKH Rashtriya Sarvekshan 2024, ASER 2023 and the NCERT survey of student well-being. The research evidence covers meta-analyses and controlled studies of instruction, motivation, mindset and belonging.

Findings: Globally, 31% of upper-secondary-age youth (130 million) are out of school. Across OECD countries, mathematics performance fell by 15 points between 2018 and 2022, and 31% of 15-year-olds did not reach baseline proficiency. One in seven adolescents aged 10 to 19 experiences a mental health condition. In India, the average mathematics score falls from 60% at Grade 3 to 37% at Grade 9, and 81% of students in Classes 6 to 12 cite studies, examinations and results as their main source of anxiety. The research shows that the practices with the strongest evidence for conceptual understanding are active sense-making, explicit bridging of prior knowledge, and retrieval with feedback. They work best when students feel safe to think and when instruction is designed for different kinds of minds. These findings are organised into the SPARK framework, with profiles of six common learner mindsets and matched strategies for each.

Originality/value: The paper joins three bodies of evidence that are usually treated apart: research on how concepts are learned, research on adolescent motivation and mindset, and research on well-being. It argues that conceptual clarity cannot be achieved for all adolescents unless all three are addressed together.

Practical implications: The paper offers a framework, mindset-matched strategies, age-band guidance and a whole-school implementation plan that can be adapted to any curriculum and require no special funding.

Keywords: adolescent learning; conceptual understanding; complex problem solving; growth mindset;

inclusive education; Universal Design for Learning; student well-being; PISA; NEP 2020

1. Introduction

"I just can't do maths." Teachers everywhere hear some version of this sentence from adolescents. It is rarely a statement about ability. More often, it signals a gap in an earlier concept, a belief that intelligence is fixed, fear of being seen to fail, or a way of thinking the lesson did not allow for. This paper is about moving every adolescent from "I can't" to "I get it", in any school system in the world.

The World Health Organization defines adolescents as people aged 10 to 19, and one in six people worldwide falls in this age group (WHO, 2025). These are the years of secondary schooling in most countries. They are also the years in which school subjects become abstract and multi-layered. Algebra replaces arithmetic, chemistry introduces particles no one can see, and history asks students to weigh conflicting sources. Success depends on *conceptual clarity*: understanding the principles beneath a subject well enough to recognise them in unfamiliar problems, explain them in one's own words and apply them flexibly. Memorised procedures, by contrast, tend to break down as soon as a problem changes form (Hiebert & Lefevre, 1986; Rittle-Johnson, Siegler, & Alibali, 2001).

Assessment systems worldwide are moving in the same direction. The OECD's Programme for International Student Assessment (PISA) has long measured whether 15-year-olds can apply knowledge to unfamiliar, real-world situations (OECD, 2023). National systems are following. In India, the National Education Policy 2020 calls for a shift from rote learning to competency-based learning (Ministry of Human Resource Development [MHRD], 2020), and CBSE has raised competency-focused questions in senior secondary examinations to 50% of the theory paper (CBSE, 2024).

Yet adolescent classrooms are diverse in ways that a single teaching approach cannot serve. Students differ in their prior knowledge, in their beliefs about whether ability can grow, in how anxious they are, in how motivated they feel, in how their brains process information, and in the language they think in. Practices that suit the confident, well-prepared student can leave others further behind.

This paper addresses three research questions:

1. **RQ1:** What do international and national data reveal about adolescents' learning, participation and well-being?
2. **RQ2:** Which school practices have the strongest evidence for building conceptual understanding of complex problems among adolescents, and how do learner mindsets shape their effect?
3. **RQ3:** How can these practices be organised into a framework that schools in different countries can use to reach every kind of learner?

2. The Global Picture

2.1 Who is in school

UNESCO estimates that 272 million children and youth were out of school in 2023. The share rises sharply with age: 11% of primary-age children (78 million), 15% of lower-secondary-age adolescents (64 million) and 31% of upper-secondary-age youth (130 million) were not in school (UNESCO Institute for Statistics [UIS] & Global Education Monitoring [GEM] Report, 2025). The 2026 Global Education Monitoring Report put the total at 273 million and found that only about two in three young people complete secondary school (UNESCO, 2026). Adolescence is therefore the stage at which education systems lose the most learners (Figure 1).

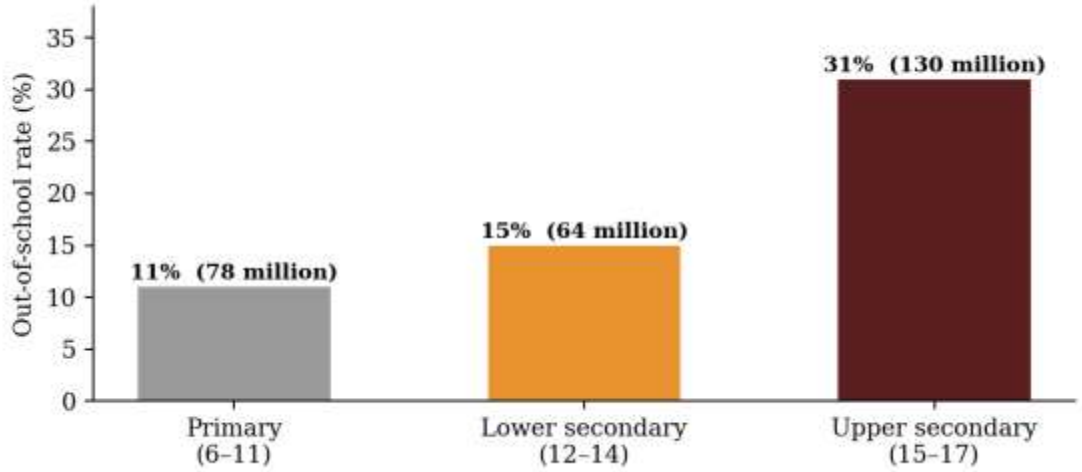


Figure 1. Out-of-school rate and number by level of education, world, 2023. Source: UIS and GEM Report (2025).

2.2 What adolescents can do

PISA 2022 assessed 15-year-olds in 81 countries and economies. Across OECD countries, the mean score was 472 in mathematics, 476 in reading and 485 in science. Mathematics fell by almost 15 points and reading by about 10 points compared with 2018, declines the OECD described as unprecedented, while science showed no significant change. The OECD equates the fall in mathematics to about three-quarters of a year of learning (OECD, 2023). On average across OECD countries, 69% of students reached at least Level 2, the baseline of proficiency in mathematics, meaning that 31% did not, while 9% reached the top levels 5 or 6 (Figure 2 and Table 1).

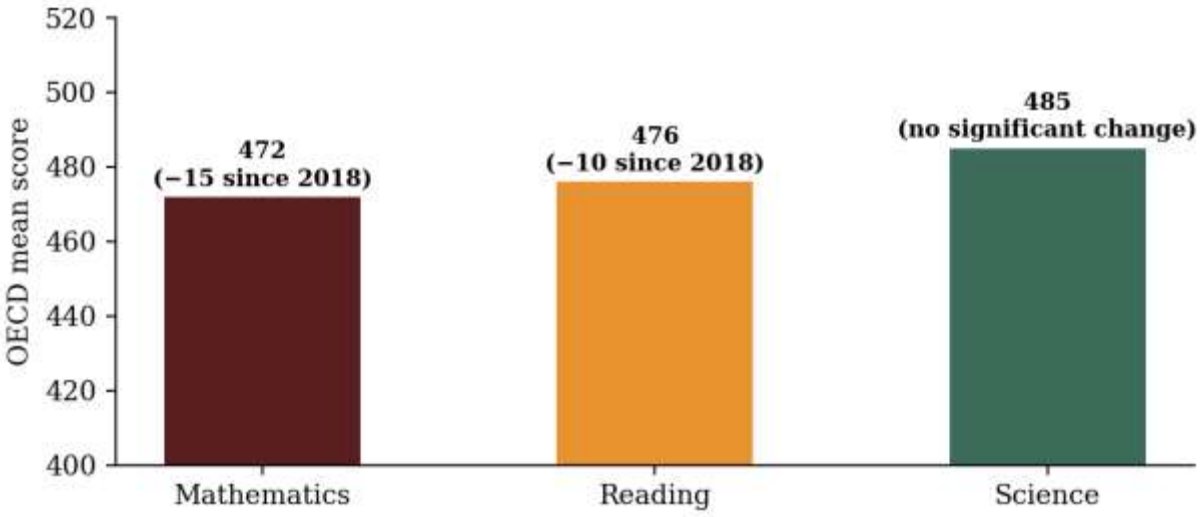


Figure 2. OECD mean scores in PISA 2022 and change since 2018. Source: OECD (2023).

The problem begins earlier. The World Bank estimates that about 70% of 10-year-olds in low- and middle-income countries cannot read and understand a simple text, a condition it calls learning poverty (World Bank, 2022). These children enter adolescence without the tools that abstract learning requires.

Table 1. Selected global indicators on adolescents' education and well-being

Indicator	Value	Source
Out-of-school children and youth, primary to upper secondary (2023)	272 million	UIS & GEM (2025)
Out-of-school rate, lower secondary age (12–14)	15% (64 million)	UIS & GEM (2025)
Out-of-school rate, upper secondary age (15–17)	31% (130 million)	UIS & GEM (2025)
OECD mean score in mathematics, PISA 2022	472 (−15 since 2018)	OECD (2023)
OECD mean score in reading, PISA 2022	476 (−10 since 2018)	OECD (2023)
15-year-olds reaching baseline Level 2 in mathematics, OECD average	69%	OECD (2023)
15-year-olds reaching Level 5 or 6 in mathematics, OECD average	9%	OECD (2023)
Learning poverty, 10-year-olds in low- and middle-income countries	about 70%	World Bank (2022)
Adolescents aged 10–19 with a mental health condition	1 in 7 (about 14%)	WHO (2025)
Share of the world's population aged 10–19	1 in 6	WHO (2025)

Source: Compiled by the author from the sources shown.

2.3 How adolescents feel

The WHO estimates that one in seven adolescents aged 10 to 19 experiences a mental health condition, accounting for 15% of the global burden of disease in this age group. Anxiety disorders are the most common, affecting an estimated 4.4% of 10 to 14-year-olds and 5.5% of 15 to 19-year-olds, and depression affects 1.4% and 3.5% respectively (Figure 3). The WHO notes that anxiety and depression can profoundly affect school attendance and schoolwork, and that suicide is the third leading cause of death among people aged 15 to 29 (WHO, 2025).

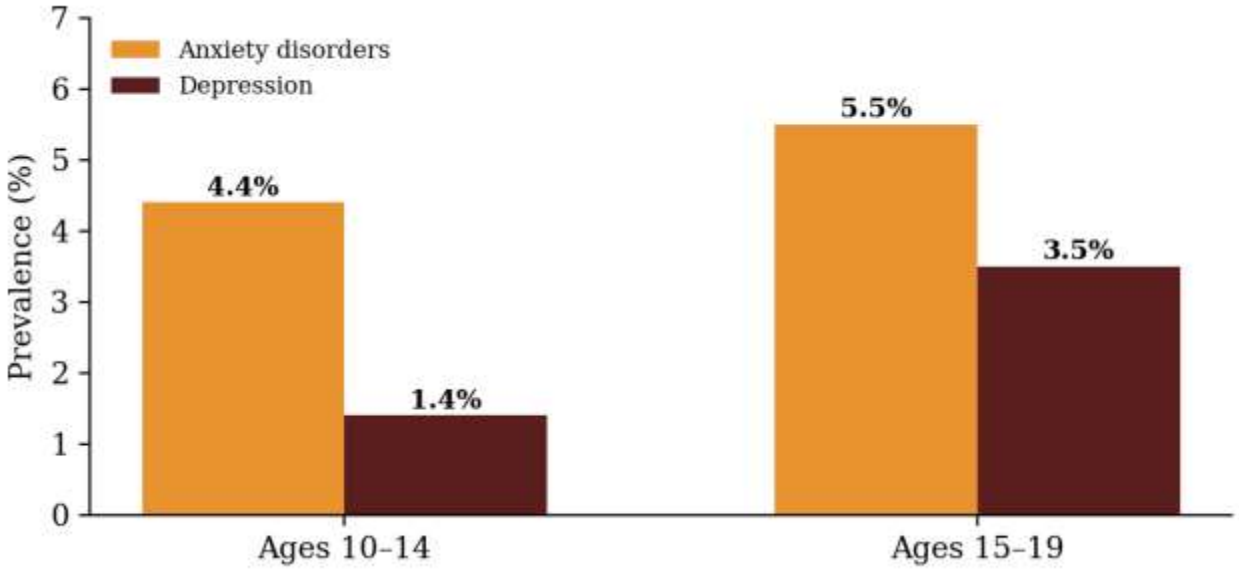


Figure 3. Prevalence of anxiety disorders and depression among adolescents by age group, world. Source: WHO (2025).

These figures cover diagnosable conditions only. Everyday stress, fear of failure and low confidence affect many more students, and they matter for learning because worry occupies the working memory that complex problems need (Ashcraft, 2002; Eysenck, Derakshan, Santos, & Calvo, 2007).

3. A National Case Study: India

India has the world's largest population of adolescents, and its data illustrate how the global patterns appear inside one system. The figures below come from official national sources.

3.1 Participation

UDISE+ 2024-25 shows that retention falls from 92.4% at Class 5 to 82.8% at Class 8, 62.9% at Class 10 and 47.2% at Class 12 (Figure 4). The secondary dropout rate is 11.5%, higher for boys (13.3%) than girls (9.6%), and the gross enrolment ratio at the higher secondary stage is 58.4% (Ministry of Education [MoE], 2025; Mehta, 2025).

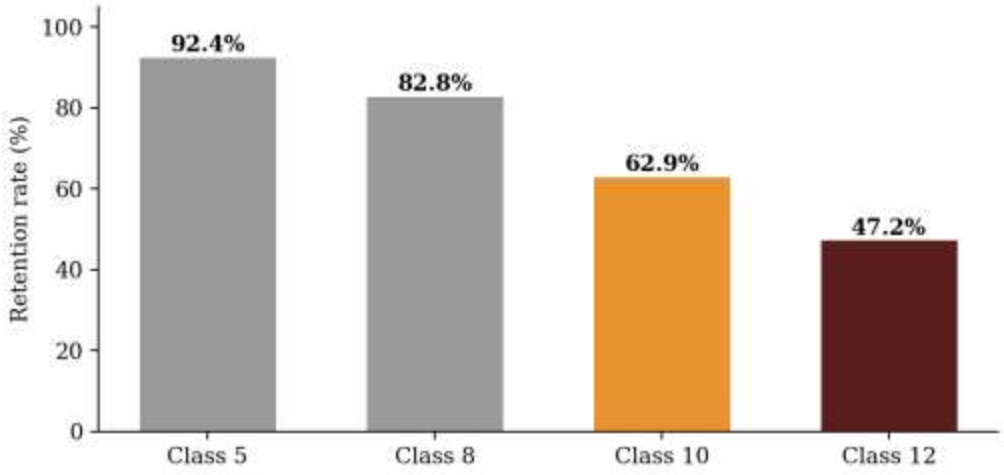


Figure 4. Retention rate by stage, India, 2024-25. Source: UDISE+ 2024-25 (MoE, 2025).

3.2 Learning through the adolescent years

PARAKH Rashtriya Sarvekshan 2024 assessed 21,15,022 students in 74,229 schools, including 8,52,801 students in Grade 9 (NCERT, 2025). The national mathematics average falls from 60% at Grade 3 to 46% at Grade 6 and 37% at Grade 9, the years in which children enter adolescence (Figure 5a). At Grade 9, Scheduled Tribe students score lowest in every subject, and students in Central Government schools score 15 points higher in mathematics than those in State Government schools (Table 2 and Figure 6). Commentary on the results notes that items requiring multi-step reasoning or abstraction score much lower than recall items, and that fewer than half of mathematics teachers regularly connected lessons to students' own experiences (Shivani, 2025).

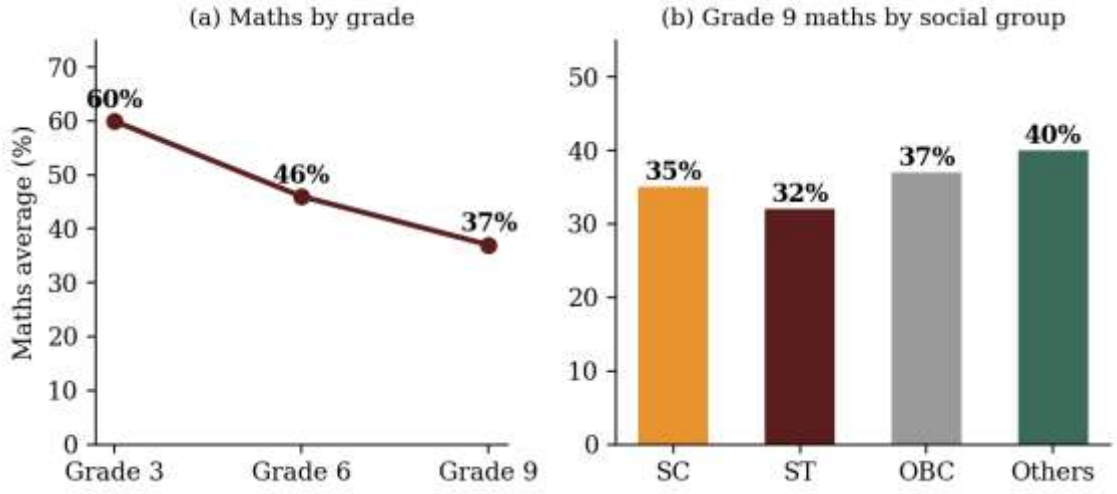


Figure 5. (a) National average mathematics score by grade; (b) Grade 9 mathematics score by social group, India. Source: PARAKH Rashtriya Sarvekshan 2024 (NCERT, 2025).

Table 2. Grade 9 average scores (%) by subject and student group, India, PARAKH Rashtriya Sarvekshan 2024

Category	Language	Mathematics	Science	Social Science
India average	54	37	40	40
Boys	52	37	41	39
Girls	56	36	40	41
State Government schools	48	33	37	37
Private recognised schools	59	39	44	42
Central Government schools	69	48	51	49
Scheduled Castes	50	35	39	38
Scheduled Tribes	47	32	36	36
Other Backward Classes	53	37	40	39
Others	60	40	44	43

Source: PARAKH Rashtriya Sarvekshan 2024 (NCERT, 2025), as reported by Shivani (2025).

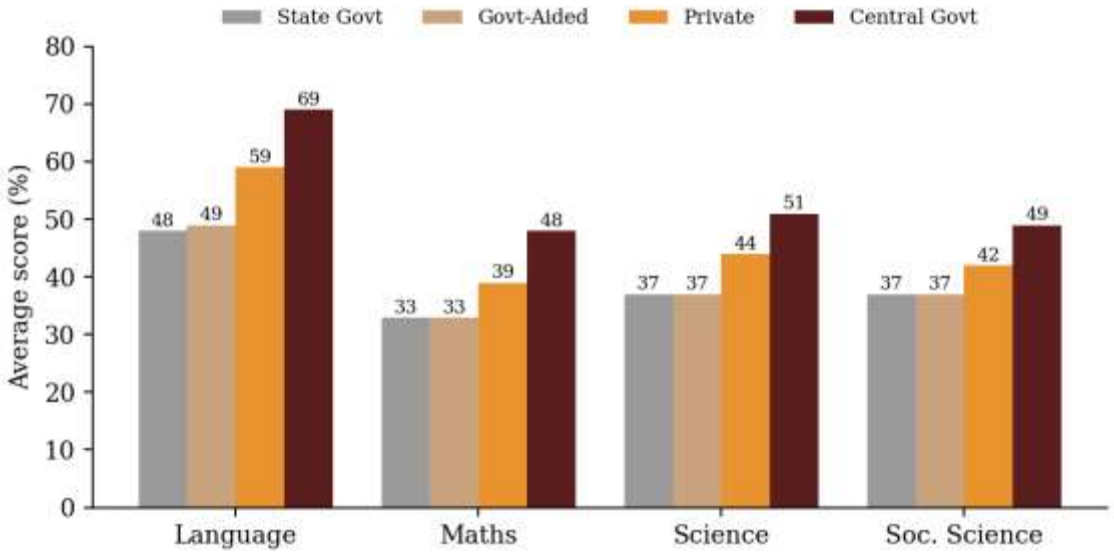


Figure 6. Grade 9 average scores by subject and school management, India. Source: PARAKH Rashtriya Sarvekshan 2024 (NCERT, 2025).

ASER 2023 surveyed 34,745 rural youth aged 14 to 18 in 28 districts. Although 86.8% were enrolled in education, only 73.6% could read a Standard II level text in their regional language and only 43.3% could do a three-digit by one-digit division (ASER Centre, 2024). Many adolescents are therefore asked to solve abstract problems while still missing tools from the primary years.

3.3 Well-being

The NCERT survey of 3,79,842 students in Classes 6 to 12, carried out by the Manodarpan cell in 2022, found that 81% cited studies, examinations and results as major causes of anxiety. Further, 43% reported mood swings, 29% a lack of concentration and 28% hesitation in asking questions. Satisfaction with school and personal life declined from the middle to the secondary stage (NCERT, 2022).

Table 3. Selected findings on student well-being, Classes 6–12, India, NCERT survey 2022

Indicator	Value
Students surveyed (36 states and union territories)	3,79,842
Citing studies, examinations and results as major causes of anxiety	81%
Reporting mood swings	43%
Reporting lack of concentration	29%
Hesitant to ask questions	28%
Satisfied with school life	73%

Source: NCERT (2022), as reported by the Press Trust of India and Down To Earth (2022).

The Indian case confirms the global pattern. Conceptual learning weakens through adolescence, it weakens most for disadvantaged groups, and anxiety about studies is widespread. A student who hesitates to ask a question cannot have a misconception corrected.

4. Review of Research

4.1 How concepts are learned

Studies of expertise show that experts organise knowledge around deep principles, while novices are guided by surface features (Chi, Feltovich, & Glaser, 1981). This is why a student who can solve every textbook example may fail when the same principle appears in a new setting. Cognitive load theory adds that working memory is limited, so a learner who must search for a method while holding many details in mind has little capacity left to grasp the structure of a problem (Sweller, 1988). Worked examples followed by gradually faded guidance reduce this load and help learners see structure (Sweller & Cooper, 1985).

4.2 Practices with strong evidence

A meta-analysis of 225 studies found that active learning raised examination performance by about 6% and lowered failure rates from 33.8% under lecturing to 21.8% (Freeman et al., 2014). Hake (1998), surveying 6,542 physics students in 62 courses, found that interactive-engagement courses achieved an average normalised conceptual gain of 0.48, about twice the 0.23 of traditional courses. Peer instruction produced sustained gains in conceptual and quantitative problem solving over ten years (Crouch & Mazur, 2001). When students first attempt a well-designed problem and then receive instruction that builds on their attempts, conceptual understanding improves (Sinha & Kapur, 2021). Practice testing and spaced practice outperform re-reading and highlighting for long-term learning (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Roediger & Karpicke, 2006). Formative assessment produces gains with effect sizes of 0.4 to 0.7, largest for lower-achieving students (Black & Wiliam, 1998).

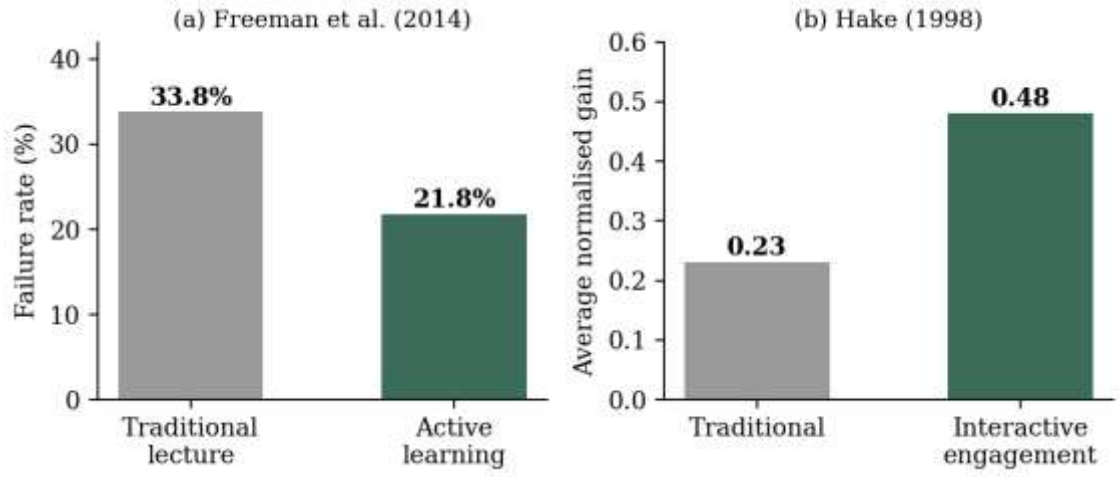


Figure 7. International evidence on active learning: (a) failure rates under lecturing and active learning; (b) conceptual gains in traditional and interactive-engagement courses. Sources: Freeman et al. (2014); Hake (1998).

4.3 The adolescent mind

Adolescence is a period of heightened sensitivity to the social environment, when the views of peers and the risk of social rejection weigh heavily (Blakemore & Mills, 2014). In the classroom, this means the fear of looking foolish in front of classmates can outweigh the wish to understand. Practices that make thinking public must therefore be designed to feel safe.

4.4 Mindsets and motivation

Self-determination theory holds that motivation grows when three needs are met: autonomy, competence

and relatedness (Ryan & Deci, 2000). Mindset research asks whether students believe intellectual ability can be developed. In a nationally representative experiment with more than 12,000 United States ninth-grade students, a short online growth mindset programme of under an hour improved the grades of lower-achieving students and increased enrolment in advanced mathematics. Effects were largest in schools whose peer norms supported challenge (Yeager et al., 2019). A critical meta-analysis found that average effects of mindset interventions across studies are small (Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018). The balanced reading is that mindset messages help most for struggling students in supportive environments, and that they must be backed by teaching that actually lets students experience growth. A brief intervention that framed worries about belonging as common and temporary improved the grades of students from under-represented groups (Walton & Cohen, 2011). Belonging, like mindset, is something schools can shape.

4.5 Anxiety and learning

Mathematics anxiety disrupts performance by consuming working memory (Ashcraft, 2002). Anxiety more generally reduces attentional control (Eysenck et al., 2007). The implication is direct: reducing fear of failure is not separate from teaching concepts but one of the conditions for it.

4.6 Learners who think differently

Universal Design for Learning proposes that teachers plan from the start for variability by offering multiple means of engagement, representation and action and expression (CAST, 2018). This serves students with ADHD, dyslexia or autism, second-language learners and gifted learners without separate lessons for each.

Table 4. Summary of research evidence on conceptual learning, mindset and well-being

Area	Key study	Reported finding
Active learning	Freeman et al. (2014), 225 studies	Examination scores about 6% higher; failure 21.8% against 33.8% under lecturing
Interactive engagement	Hake (1998), 6,542 students	Conceptual gain 0.48 against 0.23 in traditional courses
Peer instruction	Crouch & Mazur (2001)	Sustained gains in conceptual and quantitative problem solving over ten years
Productive failure	Sinha & Kapur (2021), meta-analysis	Advantage for conceptual knowledge over instruction-first approaches
Retrieval and spacing	Roediger & Karpicke (2006); Dunlosky et al. (2013)	Better long-term retention than re-study; rated high utility
Formative assessment	Black & Wiliam (1998)	Effect sizes 0.4–0.7; largest gains for lower achievers
Growth mindset	Yeager et al. (2019), 12,000+ students	Higher grades for lower achievers; more advanced mathematics enrolment; strongest where peer norms support challenge

Area	Key study	Reported finding
Mindset critique	Sisk et al. (2018), meta-analysis	Small average effects; benefits concentrated in at-risk groups
Belonging	Walton & Cohen (2011)	Brief belonging intervention improved grades of under-represented students
Anxiety	Ashcraft (2002); Eysenck et al. (2007)	Anxiety consumes working memory and reduces attentional control
Adolescent social sensitivity	Blakemore & Mills (2014)	Adolescents are highly sensitive to peer evaluation

Source: Author's synthesis of the cited studies.

5. Methodology

The study has two parts. The first is a secondary analysis of published international and national data on participation, learning and well-being (RQ1). The second is a structured synthesis of research on instruction, mindset, motivation, belonging and well-being, followed by the design of a framework (RQ2 and RQ3). No primary data were collected.

Table 5. Data sources used in the study

Source	Agency	Coverage	Used for
Out-of-school estimates, 2025 SDG 4 Scorecard	UNESCO Institute for Statistics and GEM Report	All countries, 2023	Participation by age
PISA 2022	OECD	15-year-olds in 81 countries and economies	Learning outcomes and trends
Adolescent mental health fact sheet	WHO	Global, ages 10–19	Prevalence of mental health conditions
State of Global Learning Poverty	World Bank	Low- and middle-income countries	Foundational learning
UDISE+ 2024-25	Ministry of Education, India	All recognised schools in India	Retention and dropout
PARAKH Rashtriya Sarvekshan 2024	NCERT, India	21,15,022 students, Grades 3, 6, 9	Learning by grade and group
ASER 2023 "Beyond Basics"	ASER Centre, India	34,745 rural youth aged 14–18	Foundational skills of adolescents
Mental Health and Well-being of School Students	NCERT Manodarpan, India	3,79,842 students, Classes 6–12	Anxiety and help-seeking

Source: Compiled by the author.

Practices were included in the synthesis if they met three criteria: support from at least one meta-analysis, large multi-site study or controlled experiment; a demonstrated effect on understanding, problem solving, motivation or well-being; and feasibility in ordinary schools with existing staff. Each practice was then examined for its fit with different learner mindsets. The main limitations are that national data are used as illustrations rather than for causal inference, that India is the only national case examined in depth, and that some figures are drawn from official data as reported by reputable news services.

6. Findings

The analysis supports five findings.

1. **Conceptual learning weakens through adolescence, worldwide.** Mathematics declined sharply in PISA 2022, almost a third of 15-year-olds in OECD countries are below baseline proficiency, and in India mathematics scores fall from 60% at Grade 3 to 37% at Grade 9.
2. **The decline is unequal.** Gaps by social group and school type in India, and by socio-economic status internationally, mean that one-size-fits-all teaching widens differences.
3. **Exclusion peaks in adolescence.** Thirty-one per cent of upper-secondary-age youth worldwide are out of school, and in India fewer than half of students are retained to Class 12. Each student who loses confidence in learning is at risk of leaving.
4. **Emotion and cognition are linked.** One in seven adolescents has a mental health condition, and 81% of Indian secondary students cite studies and examinations as major sources of anxiety. Anxiety consumes the working memory that complex problems require.
5. **The most effective practices share a pattern.** They make student thinking visible, correct it early, build on what students already know and let students experience growth. They help lower-achieving and anxious students most, but only when classrooms feel safe and when mindset messages are matched by real opportunities to succeed.

7. The SPARK Framework

The findings are organised into the SPARK framework. Three instructional components (Prior-knowledge bridges, Active sense-making and Retrieval and feedback) rest on two foundations: Kinds of minds, which designs teaching for different mindsets, and Safe to think, which creates the emotional conditions for learning (Figure 8).

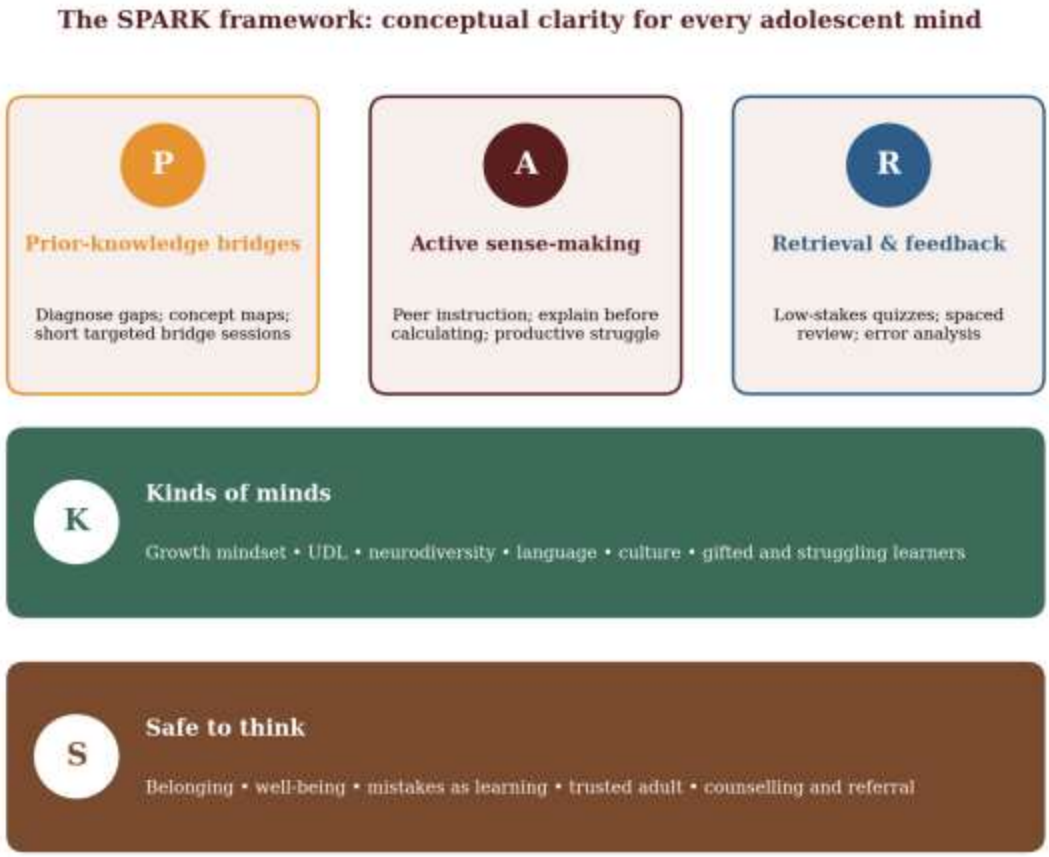


Figure 8. The SPARK framework for conceptual clarity among adolescents. Source: Developed by the author.

Table 6. SPARK components, classroom practices and evidence

Component	Classroom practice	Evidence base
S – Safe to think	Normalise mistakes as information; anonymous response systems; regular check-ins; a named trusted adult for every student; clear referral to counsellors	Blakemore & Mills (2014); Walton & Cohen (2011); WHO (2025)
P – Prior-knowledge bridges	Short diagnostic at the start of each unit; concept maps linking new and old ideas; 10–15 minute bridge sessions on gaps found	Black & Wiliam (1998); Chi et al. (1981)
A – Active sense-making	Conceptual question, individual answer, pair discussion, re-answer; explain before calculating; attempt-first problems; worked examples with faded steps	Freeman et al. (2014); Hake (1998); Crouch & Mazur (2001); Sinha & Kapur (2021); Sweller & Cooper (1985)
R – Retrieval and feedback	Weekly ungraded quizzes; spaced review of earlier units; error analysis in which students classify their own mistakes	Roediger & Karpicke (2006); Dunlosky et al. (2013)

Component	Classroom practice	Evidence base
K – Kinds of minds	Growth mindset language backed by visible progress; UDL planning; choice in how to show understanding; bilingual support	Yeager et al. (2019); Ryan & Deci (2000); CAST (2018)

Source: Developed by the author from the evidence in Section 4.

7.1 Matching strategies to learner mindsets

Every classroom holds learners with different mindsets. Table 7 describes six common profiles, the signs teachers can observe, and the strategies the evidence supports for each. A student may show more than one profile, and profiles change with context. They are guides for teaching, never labels for students.

Table 7. Six learner mindset profiles and matched strategies

Mindset profile	Signs teachers may observe	Matched strategies
"I'm just not a maths person" (fixed mindset)	Gives up quickly; avoids challenge; attributes failure to lack of ability	Teach that the brain grows with effort; praise strategy and persistence rather than talent; show students their own progress over time
Anxious learner	Freezes in tests; avoids answering aloud; knows more than they show	Ungraded retrieval quizzes; anonymous responses; breathing or settling routines before tests; quiet access to a counsellor
Disengaged learner	Low effort; sees no point in the subject	Connect problems to real local issues; offer choice in tasks; build competence through achievable early successes
Learner with foundational gaps	Understands the idea but stumbles on prerequisites such as fractions or reading	Diagnostic checks; short targeted bridge sessions; worked examples with step cards
Neurodivergent learner (for example ADHD, dyslexia, autism)	Uneven performance; difficulty with long text or sustained attention; strong in particular areas	UDL: visual and spoken explanations, chunked tasks, movement breaks, extra time and alternative ways to show understanding
Advanced or gifted learner	Finishes early; may become bored or careless	Extension problems requiring transfer; peer-teaching roles; open-ended investigations

Source: Developed by the author from Yeager et al. (2019), Ryan & Deci (2000), Ashcraft (2002), CAST (2018) and Black & Wiliam (1998).

7.2 Early and late adolescence

Adolescents aged 10 to 14 and those aged 15 to 19 need different emphases. Table 8 sets out how SPARK applies to each.

Table 8. Applying SPARK across early and late adolescence

Component	Early adolescence (10–14)	Late adolescence (15–19)
Safe to think	Strong classroom routines; teacher as consistent trusted adult	Respect for autonomy; open discussion of examination stress and future plans
Prior-knowledge bridges	Secure arithmetic, reading and proportional reasoning before abstraction	Rapid diagnosis of gaps from earlier grades before advanced topics
Active sense-making	Concrete materials and visual models before symbols	Multi-step, cross-topic problems; case-based and source-based questions
Retrieval and feedback	Short, frequent, playful quizzes	Spaced review aligned with examination cycles; self-assessment
Kinds of minds	Growth mindset introduced explicitly; choice of output	Student-led goal-setting; mentoring; career-linked purpose

Source: Developed by the author.

7.3 Examples across subjects

Table 9. SPARK applied to complex problems across subjects

Subject	Complex problem	SPARK in action
Mathematics	Choosing the best mobile data plan using linear functions	Bridge on rates and graphs; students first attempt the problem in pairs; teacher builds the general method from their attempts
Science	Explaining why a metal spoon feels colder than a wooden one at the same temperature	Anonymous prediction vote; peer discussion; demonstration; retrieval quiz a week later on heat transfer
Language	Interpreting an argument with an implicit assumption	Worked example of finding an assumption; students annotate in their own language before writing in the target language
Social science	Weighing two conflicting historical sources	Claim–evidence–reasoning frame; choice of written, spoken or visual answer
Economics and commerce	Predicting the effect of a price change on a local market	Real local data; pair predictions before graphing; error analysis of common misreadings

Source: Developed by the author.

8. Whole-School Implementation

The framework is designed for any school year and curriculum. Table 10 sets out a three-term plan.

Table 10. Whole-school implementation plan for SPARK

Phase	School actions	Indicators to monitor
Term 1: Foundations	Staff orientation on SPARK and learner mindsets; diagnostic tests in core subjects; well-being screening through counsellors; growth mindset and belonging sessions for all students	Share of students tested; gap profile by subject; students linked to a trusted adult
Term 2: Classroom routines	Weekly subject meetings to plan active and retrieval routines; bridge sessions; UDL adjustments; peer-teaching roles for advanced learners	Lessons using the routines; quiz participation; progress of the lowest-scoring quarter
Term 3: Consolidation	Spaced review; examinations with application-based items; individual feedback conferences; stress-literacy sessions; review of data by school leaders	Scores on application items compared with recall items; attendance and retention; students reporting high anxiety

Source: Developed by the author.

Three conditions matter most. School leaders must protect time for teachers to plan together, because the routines are learned collectively. Assessment data must be used to change teaching, not only to rank students. And counsellors, special educators and subject teachers must work as one team, because a student's mindset, well-being and understanding develop together.

9. Discussion

The international and national data point to the same conclusion. Adolescence is when learning becomes abstract, when gaps from earlier years surface, when anxiety rises and when systems lose the most students. The research shows that the practices which best build conceptual understanding are the same ones that most help struggling, anxious and disadvantaged learners, provided classrooms feel safe and teaching is designed for different kinds of minds.

The growth mindset evidence deserves a careful reading. The strongest study found real benefits for lower-achieving students, but only where peer norms supported challenge (Yeager et al., 2019), and average effects across studies are small (Sisk et al., 2018). Telling students that "the brain grows" is not enough. Students must experience growth through teaching that lets them succeed at something they once found hard. SPARK places mindset inside the instructional cycle for this reason, rather than treating it as a separate lesson.

The framework is also designed to travel. It does not depend on a particular curriculum, examination system or level of technology. It can be applied in a well-resourced urban school or a rural government school, in English or in a regional language. Its components are drawn from studies on several continents, and the Indian case shows how they map onto one national system.

10. Limitations and Future Research

The study relies on secondary data and published research and does not test SPARK directly. India is the only national case examined in depth, and the transfer of evidence from one context to another is never automatic. Future research should test the framework through school-based action research and controlled

comparisons in different countries. Results should be reported separately for gender, socio-economic and minority groups, students with disabilities and second-language learners. Validated, culturally adapted measures of learner mindset and classroom safety would also strengthen this work.

11. Conclusion

Every adolescent mind can reach conceptual clarity, but not every adolescent will reach it through the same door. The evidence shows what opens those doors: classrooms where it is safe to think, bridges from what students already know, active sense-making, frequent retrieval with feedback, and teaching that respects different kinds of minds. The SPARK framework brings these together in a form any school can adopt. The goal is simple to state and demanding to achieve: to turn "I can't" into "I get it" for every learner in the room.

References

1. Ashcraft, M. H. (2002). Math anxiety: Personal, educational, and cognitive consequences. *Current Directions in Psychological Science, 11*(5), 181–185.
2. ASER Centre. (2024). *Annual Status of Education Report (Rural) 2023: Beyond basics*. Pratham. https://asercentre.org
3. Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7–74.
4. Blakemore, S.-J., & Mills, K. L. (2014). Is adolescence a sensitive period for sociocultural processing? *Annual Review of Psychology, 65*, 187–207.
5. CAST. (2018). *Universal Design for Learning guidelines version 2.2*. http://udlguidelines.cast.org
6. Central Board of Secondary Education. (2024). *Assessment and evaluation practices of the Board for the session 2024-25* (Circular No. Acad-30/2024). https://cbseacademic.nic.in
7. Chi, M. T. H., Feltovich, P. J., & Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. *Cognitive Science, 5*(2), 121–152.
8. Crouch, C. H., & Mazur, E. (2001). Peer instruction: Ten years of experience and results. *American Journal of Physics, 69*(9), 970–977.
9. Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques. *Psychological Science in the Public Interest, 14*(1), 4–58.
10. Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion, 7*(2), 336–353.
11. Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410–8415.
12. Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics, 66*(1), 64–74.
13. Hiebert, J., & Lefevre, P. (1986). Conceptual and procedural knowledge in mathematics: An introductory analysis. In J. Hiebert (Ed.), *Conceptual and procedural knowledge: The case of mathematics* (pp. 1–27). Lawrence Erlbaum.
14. Mehta, A. C. (2025). *School education in India: Where do we stand? Analysis of UDISE+ 2024-25 data*. Education for All in India. https://educationforallinindia.com

15. Ministry of Education. (2025). *UDISE+ 2024-25: Unified District Information System for Education Plus*. Department of School Education and Literacy, Government of India.
16. Ministry of Human Resource Development. (2020). *National Education Policy 2020*. Government of India.
17. National Council of Educational Research and Training. (2022). *Mental health and well-being of school students: A survey*. Manodarpan, NCERT.
18. National Council of Educational Research and Training. (2025). *PARAKH Rashtriya Sarvekshan 2024: National report*. PARAKH, NCERT. https://parakh.ncert.gov.in
19. OECD. (2023). *PISA 2022 results (Volume I): The state of learning and equity in education*. OECD Publishing.
20. Rittle-Johnson, B., Siegler, R. S., & Alibali, M. W. (2001). Developing conceptual understanding and procedural skill in mathematics: An iterative process. *Journal of Educational Psychology, 93*(2), 346–362.
21. Roediger, H. L., & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science, 17*(3), 249–255.
22. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78.
23. Shivani, K. N. (2025, July 8). *Parakh Rashtriya Sarvekshan: State govt schools fall far behind; SC, ST students lag in Classes 6, 9*. Careers360. https://news.careers360.com
24. Sinha, T., & Kapur, M. (2021). When problem solving followed by instruction works: Evidence for productive failure. *Review of Educational Research, 91*(5), 761–798.
25. Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science, 29*(4), 549–571.
26. Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*(2), 257–285.
27. Sweller, J., & Cooper, G. A. (1985). The use of worked examples as a substitute for problem solving in learning algebra. *Cognition and Instruction, 2*(1), 59–89.
28. UNESCO. (2026). *Global education monitoring report 2026*. UNESCO.
29. UNESCO Institute for Statistics & Global Education Monitoring Report. (2025). *SDG 4 scorecard: Progress report on national benchmarks — Focus on the out-of-school rate*. UNESCO.
30. Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science, 331*(6023), 1447–1451.
31. World Bank. (2022). *The state of global learning poverty: 2022 update*. World Bank.
32. World Health Organization. (2025). *Mental health of adolescents* [Fact sheet]. https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health
33. Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., ... Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature, 573*(7774), 364–369.