

Math Literacy of Neurodiverse Children in the Bay Area: Quantifying Challenges and Opportunities for Intervention

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Abstract

Neurodiverse students, including those with autism spectrum disorder, ADHD, dyslexia, and related learning differences, continue to face persistent challenges in mathematics education. Recent research shows that these challenges are not limited to academic skill gaps, but are closely tied to learning conditions such as anxiety, access to instructional support, and the extent to which students feel understood by teachers. Studies examining inclusion and special education outcomes suggest that placement alone does not reliably improve academic achievement or socioemotional outcomes, and that student experiences vary widely depending on the type and quality of support provided. This variability highlights the need to move beyond broad policy goals toward understanding how specific supports influence students' learning experiences.

Mathematics represents a particularly critical domain, as difficulties in math can compound over time and affect students' confidence, course placement, and future academic opportunities. Prior work has documented heterogeneous math profiles among neurodiverse students, with some demonstrating strong computational skills but struggling with problem solving, language-heavy tasks, or sustained attention. Intervention research indicates that structured instruction, targeted tutoring, and well-designed virtual or home-based supports can improve outcomes for some students, while other studies emphasize the role of affective factors such as math anxiety and self-perception in shaping engagement and persistence. Despite this growing body of research, less is known about how different forms of support relate specifically to students' confidence in learning mathematics, particularly across neurodiverse subgroups and school contexts.

In regions such as Silicon Valley, where educational resources are often assumed to be abundant, disparities in access to effective learning support remain evident for students with special educational needs. Understanding how home tutoring, perceived teacher understanding, and anxiety relate to math confidence can help clarify which supports may be most impactful and for whom. By examining these relationships, this study seeks to contribute to a more nuanced understanding of math learning experiences among neurodiverse students and to inform more targeted and equitable educational practices.

Keywords: neurodiverse children, math literacy, education, challenges and opportunities

1. Introduction

The study is guided by the following research questions:

1. What are the levels of math literacy among children with special needs in Silicon Valley today?
2. What challenges do educators and families face in supporting math literacy for these students?
3. In what ways are the region's public schools and educational policy responding to the mathematical needs of students with special needs?

The scope of this research is focused on public school districts in Silicon Valley (e.g., San Jose Unified, Palo Alto Unified, Santa Clara County Office of Education) in the present time. The target group comprises children under 18 with diagnosed special needs, with key stakeholders including students, parents, special education teachers, school administrators, and policy makers. While centered on mathematical literacy among special needs children in this innovative region, the findings are not limited to Silicon Valley but could be applied to a wider scope, as similar education disparities exist in other developed areas. By exploring this local illustration, the research aims to inform more universally applicable, inclusive policies.

2. Research Method

This study employs a mixed-methods approach, combining quantitative and qualitative techniques to provide a comprehensive understanding of mathematical literacy among children with special needs (neurodiverse students) in the Bay Area, focusing on the Silicon Valley.

2.1 Survey

This study employed a quantitative survey to gather systematically measured data on the mathematics learning experiences of neurodiverse students. The participants were middle-school and high-school students from Silicon Valley, who were reached through online communities for families of children with special needs. Participants were recruited through online parent communities and local neurodiversity networks using a voluntary (non-random) sample. Eligible respondents were middle- or high-school students who self-identified as neurodiverse (e.g., autism, ADHD, dyslexia, or anxiety/depression). Responses were excluded if the student did not meet this definition or if key analysis items were missing. Because the survey was anonymous, neurodiversity status was based on self-report rather than verified IEP/504 or clinical documentation. The survey was created and distributed through Google Form, and included questions about demographic background, learning challenges, confidence in math, emotional reactions to math, preferred learning tools, access to support at home and at school, and interest in technology-based approaches such as VR (see Appendix for full questionnaire). Questions were developed based on the PISA framework for measuring math literacy to structure assessment categories. This study used a structured, self-designed questionnaire consisting of demographic items, single-choice questions, and Likert-type items. Because the instrument was not adapted from a previously validated survey, we assessed internal consistency for the primary multi-item composite capturing students' overall mathematics learning experience. This composite combined items measuring confidence in math, perceived inclusion and support, perceived teacher understanding, discouragement or anxiety (reverse-scored), interest in math class, and perceived difficulty (reverse-scored). The composite showed good reliability (Cronbach's $\alpha = 0.85$, $n = 54$).

The procedure involved contacting several parent groups, regional disability networks, and autism-focused community forums, and inviting families to have their children complete the survey voluntarily.

Table 1. Demographic profile of survey sample

	Categories	Percentage
Gender	Male	73.1%
	Female	26.9%
Age	10-18	
Mental condition	ADHD	18
	Depression	14
	Autism Spectrum Disorder	62
	Dyslexia	12

Data were collected using a structured questionnaire designed to capture both demographic information and measures related to the study constructs, collected during July and October, 2025. The instrument consisted of single/ multiple choices, Likert-scale measurements, and open-ended prompts. Key variables were operationalized using established measurement scales when available, and newly developed items were formulated to align closely with the conceptual framework. Prior to full deployment, the survey underwent a brief pilot test to ensure clarity, ease of comprehension, and reliability, resulting in minor wording adjustments.

Analysis of the survey responses combined single-variable descriptive and bivariate inferential statistical techniques (cross-tabulation).

2.2 Literature Review

To complement and cross-check with the quantitative analysis, this study incorporates a comprehensive literature review to establish the contextual foundation for understanding mathematical literacy among children with special needs in Silicon Valley's public schools. The review draws on a range of secondary sources, including news articles, educational reports, district-specific documents, and official state assessment data portals. These sources provide insights into national and regional trends in math disabilities, performance disparities, emerging interventions, and data availability, without delving into detailed content analysis here (See the Reference section for a complete list).

2.3 Limitations

While the survey method provides strengths in scalability and comparability through standardized Likert-scale questions, it has several limitations that affect the interpretation and generalizability of findings.

- The study used non-probability convenience sampling, introducing selection bias. The sample may over-represent engaged or accessible participants while under-representing others, limiting its reflection of diverse experiences across Silicon Valley districts.
- The sample size of 108 respondents is modest, reducing statistical power, representativeness, and the ability to detect subgroup differences, thus constraining broader generalizability.
- As self-reported data, responses may be influenced by subjective perceptions, recall inaccuracies, or social desirability bias, potentially affecting the reliability of assessments of math skills, resources, and curriculum satisfaction.
- Social desirability bias may have influenced responses, particularly if parents completed the survey on behalf of students or with students present. In those cases, parents may unintentionally overreport a child's math interest, confidence, or satisfaction in ways that reflect well on the family or align with what they believe the researcher expects.

These limitations are acknowledged and considered in interpreting results. Findings are treated as indicative, complemented by qualitative data and secondary sources in this mixed-methods study. Future research with larger, probability-based samples and objective measures could mitigate these constraints.

3. Literature Review

Recent work frames math learning for neurodiverse students as an inclusion issue where outcomes are real but not uniform across students or settings. Dalgaard, Bondebjerg, Viinholt, and Filges synthesize evidence on how inclusion relates to academic achievement and socioemotional wellbeing for students with special needs, showing that effects vary across contexts rather than following a single pattern. Ediyanto and colleagues similarly emphasize that mathematics instruction for students with special needs is most effective when it is adapted to learner characteristics and delivered with appropriate supports. Within autism spectrum disorder research, Bullen, Zajic, McIntyre, Solari, and Mundy describe uneven profiles in math and reading achievement and note subgroup differences, supporting the view that autism does not imply one single mathematics profile. Polo-Blanco and colleagues also report higher rates of problem-solving difficulty among autistic children relative to peers and connect performance differences to cognitive domains, suggesting that math outcomes are intertwined with broader learning processes rather than isolated skills.

Intervention studies offer evidence that structured supports can improve mathematical problem solving for learners with autism, though methods and effect sizes differ across studies. Root, Ingelin, and Cox synthesize research on teaching mathematical word-problem solving to students with autism spectrum disorder and highlight explicit, strategy-based instruction as a promising direction, while also noting variation in study designs and evidence strength. Polo-Blanco, Van Vaerenbergh, Bruno, and González test a conceptual model-based approach for teaching word-problem solving, aligning with a broader emphasis on clear representations and consistent routines as mechanisms for improvement. Yakubova, Baer, Chen, Al-Dubayan, and Gupta review virtual instruction for teaching mathematics to students with autism and report positive effects for approaches such as video modeling and structured virtual supports, suggesting that instructional delivery mode can matter when it changes structure and feedback rather than simply changing location.

Affective and cognitive factors help explain why mathematics outcomes differ even under similar instructional conditions. Tonizzi and Usai examine relationships among mathematics anxiety, working memory, and math skills in autistic children, supporting the view that anxiety and cognitive load can interfere with math performance and learning behaviors. Fauziyah, Budayasa, and Juniati analyze cognitive processes in ASD students across different intelligence levels and argue that intervention needs vary across learners, reinforcing heterogeneity within diagnostic groups. Esqueda-Elizondo and colleagues contribute a neurocognitive perspective by using EEG and machine learning to distinguish attention-related patterns across groups such as ADHD and ASD, highlighting that attention and processing differences can shape how students engage with math tasks and support.

3.1 Theoretical Framework

This study is grounded in the Universal Design for Learning (UDL) framework, which emphasizes that learner variability is the norm and that effective instruction should be designed to accommodate diverse cognitive, emotional, and attentional needs from the outset. UDL highlights the importance of providing multiple means of

engagement, representation, and action or expression to reduce barriers to learning. The observed relationships between tutoring, reduced anxiety, and higher math confidence align with UDL principles, as tutoring and self-paced or technology-supported learning environments offer flexible pacing, individualized explanations, and alternative representations of mathematical concepts. These features help lower cognitive load and emotional stress, making math more accessible to neurodiverse learners. The differing strength of effects across disability groups further supports the UDL perspective that supports must be intentionally designed and differentiated rather than uniformly applied. Overall, the findings suggest that math confidence improves when instructional environments are flexible, supportive, and responsive to individual learner needs, consistent with the core principles of Universal Design for Learning.

4. Survey Analysis

The results of this study show several clear patterns in how children with special needs experience math learning. Many students reported frequent anxiety or discouragement, which supports the finding that emotional well-being is one of the most common barriers to math success. Students who marked themselves as having attention or processing difficulties often described math as confusing or hard to follow, especially when lessons relied mainly on verbal explanation, which matches past evidence that these learners benefit from visual models and step-by-step instruction. A strong preference for private, self-paced learning appeared among students with high anxiety, while those with ADHD-like attention patterns showed the greatest interest in VR, games, and other interactive tools. These trends highlight a difference between current instructional approaches and the ways these students learn best. Low confidence also played a central role as many students who were capable of average performance still viewed themselves as “not good at math,” suggesting that self-belief influences the outcome as much as the skill level. The consistent call for predictable routines, more teacher check-ins, and clearer explanation points to a need for classroom environments that reduce uncertainty and support emotional regulation. These results indicate that effective math instruction for neurodiverse learners must address both cognitive and emotional needs, and should include structured teaching, predictable routines, individual support, and interactive tools that increase engagement.

Analysis of the survey results have yielded several important conclusions:

4.1 How Does Parental Mentoring Influence Students' Confidence in Math Learning, Across Different Mental Disorder Types?

Among students without home tutoring, lower confidence levels are more common, especially among those with ADHD or autism spectrum disorder. Students who receive tutoring have higher percentages in the “somewhat confident” to “very confident” range. However, this pattern is only strongest among students with ADHD, Dyslexia, or anxiety and depression compared to autism. This suggests that tutoring has an overall positive effect on confidence in mathematics, but the nuanced effect differs across neurodiversity groups, with the most pronounced improvement observed among students with ADHD.

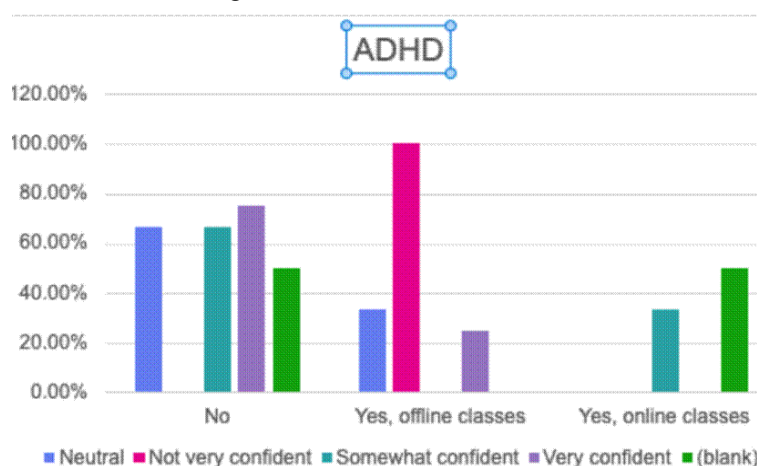


Figure 1. Math Confidence by Home Tutoring Type for Students with ADHD

ADHD students without tutoring tend to cluster in lower-confidence categories, especially “not very confident” or “neutral”. However, for students with tutoring, there is a dramatic jump into the “very confident” category, showing how additional support improves confidence in this group. Specifically, 77.8% of ADHD students report

high confidence with no tutoring, compared with 100.0% with online/home tutoring (and 33.3% with offline tutoring).

The evidence indicates that online/home tutoring is associated with a noticeable confidence gain among ADHD students, while offline tutoring does not show the same benefit in this sample.

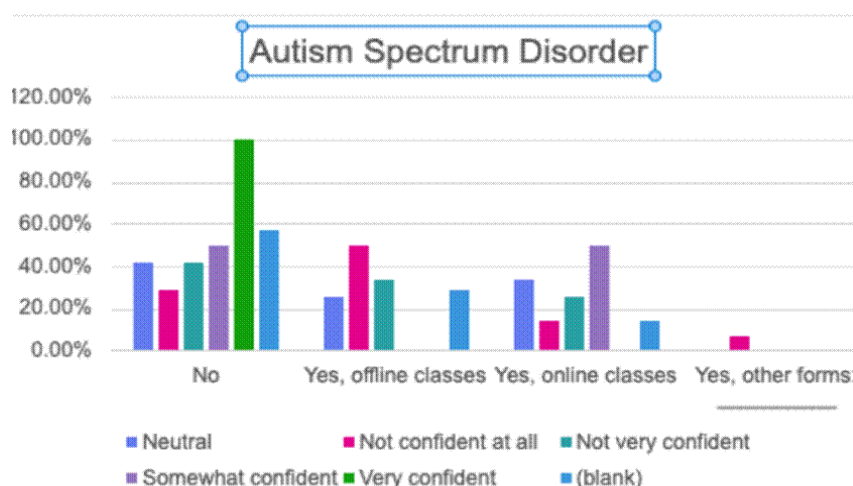


Figure 2. Math Confidence by Home Tutoring Type for Students with Autism Spectrum Disorder

For students with autism, confidence increases with tutoring. A large share of students without tutoring experience low confidence, while tutoring helps shift some of the students upwards. However, compared to ADHD, the effect is smaller, signaling additional specialized support might be needed for learning math. 30% of students with autism report high confidence with no tutoring, compared with 30.8% with online/home tutoring (and none with offline tutoring).

The evidence indicates that online/home tutoring is associated with little to no confidence change for students with autism, and that offline tutoring is linked to lower confidence in this dataset.

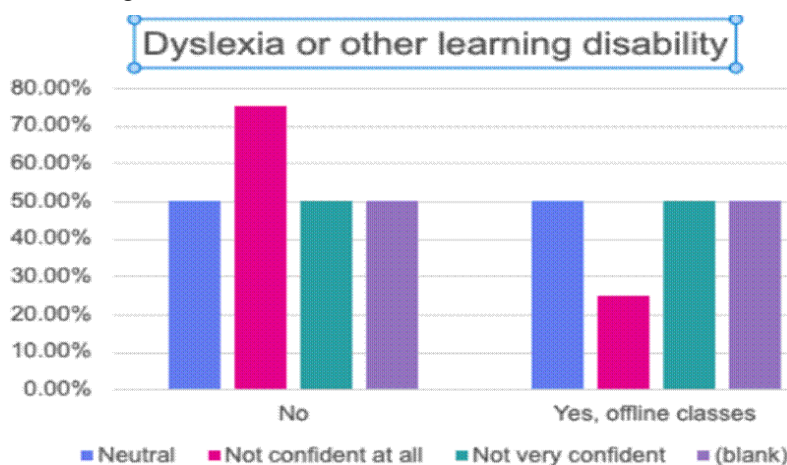


Figure 3. Math Confidence by Home Tutoring Type for Students with Dyslexia

Students with dyslexia show very low confidence when there is no tutoring, with a heavy concentration in “neutral” and “not confident”. With tutoring, these students move into the “somewhat confident” and “very confident” range. None of dyslexic students report high confidence with no tutoring, and this remains 0.0% with offline tutoring. However, the share who are “not confident at all” drops from 60.0% to 33.3% with tutoring.

The evidence indicates that tutoring does not meaningfully raise high confidence for dyslexic students in this sample, but it may reduce the most severe lack of confidence.

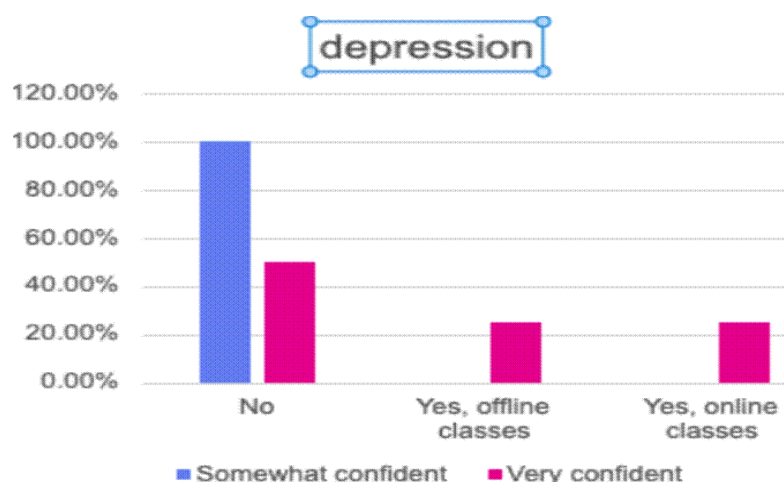


Figure 4. Math Confidence by Home Tutoring Type for Students with Depression

Though there is a lack of data for this group, the data still indicates that tutoring helps students establish confidence. 33.3% of students in this group report high confidence with no tutoring, compared with 66.7% with online/home tutoring and none with offline tutoring.

The evidence indicates that online/home tutoring is associated with higher confidence for students who report anxiety/mental-health conditions, though the offline result is too small to interpret confidently.

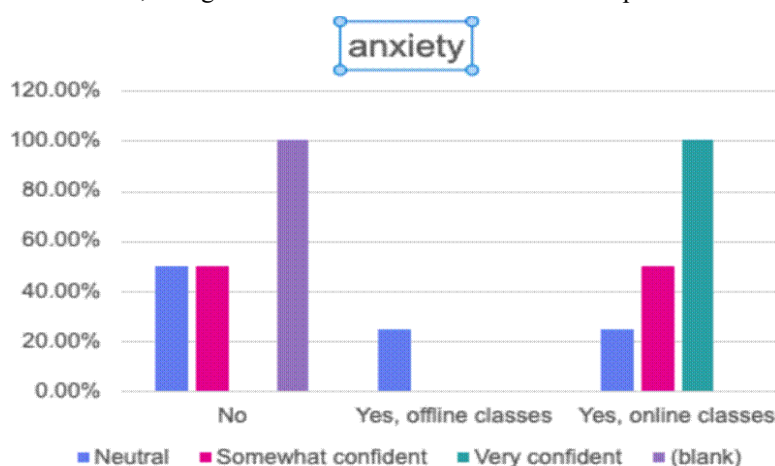


Figure 5. Math Confidence by Home Tutoring Type for Students with Anxiety or Other Mental Health Conditions

The anxiety chart shows students without tutoring having very low confidence, but with tutoring having noticeable results. These results are most prominent in the online classes portion, signaling that low-pressure, online tutoring might be best for this group. 100% of students in this group report high confidence with no tutoring, and this remains 100% with both online and offline tutoring.

The evidence indicates no observable confidence gain from tutoring for this subgroup, likely because confidence is already high (and the sample size is very small).

4.2 How Does Teachers' Understanding Affect Students' Confidence, Across Genders?

Survey responses indicate that teachers who understand their needs have overall higher confidence. This pattern appears for both male and female students, though female students show slightly more improvement in the "slightly confident category."

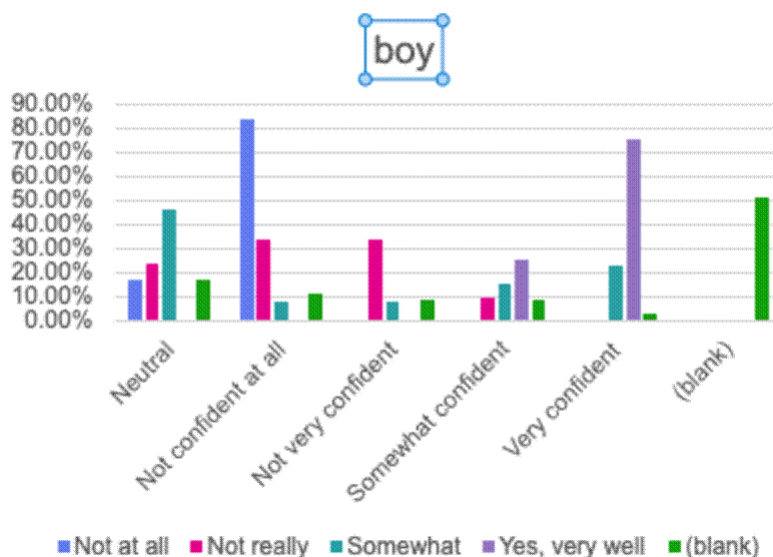


Figure 6. Math Confidence by Perceived Teacher Understanding for Male Students

For boys, teacher understanding strongly reduces the lowest-confidence responses and shifts the students into the “very confident” category. Among them, high confidence rises from 9.5% (“Not really” understood) to 38.5% (“Somewhat” understood) to 100% (“Yes, very well” understood). It is evident that boys have benefited from teachers who understand their learning needs.

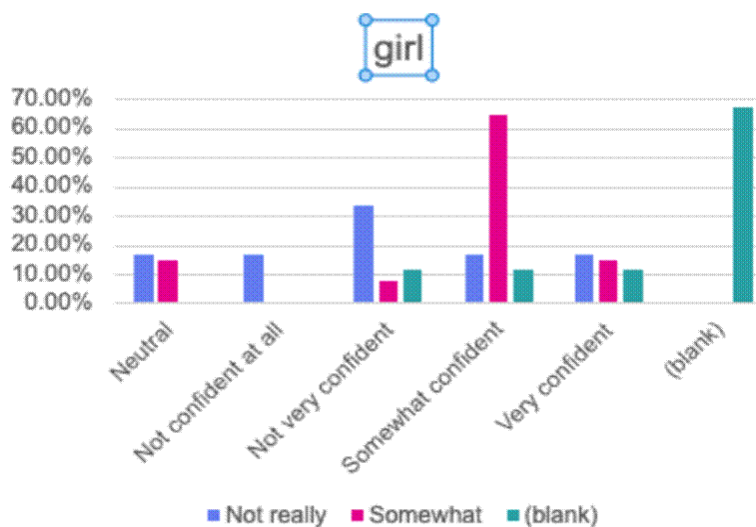


Figure 7. Math Confidence by Perceived Teacher Understanding for Female Students

For girls, there is also a noticeable increase in confidence when teacher understanding is high. Among girls, high confidence increases from 33.3% (“Not really” understood) to 78.6% (“Somewhat” understood). The increase is even greater than boys in the middle categories, suggesting that girls might be more sensitive to support from teachers in mathematics.

4.3 How Does Students' Anxiety Level Affect Self-Perception, Across Public and Private Schools?

Students who report high math-related anxiety mostly fall into the “not confident” or “not very confident” categories. Across school types, this pattern was consistent.

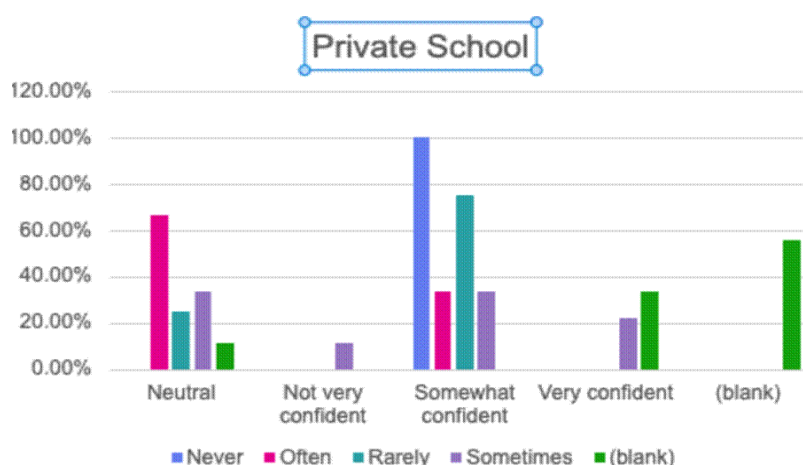


Figure 8. Math Confidence by Frequency of Math Anxiety in Public Schools

In private schools, students with high anxiety almost never report strong self perception in math. In comparison, in public schools, high confidence rises from 7.7% (“Often” anxious) to 27.6% (“Sometimes” anxious) to 85.7% (“Rarely” anxious).

The evidence indicates that math anxiety is strongly associated with lower confidence in public-school students, and that reducing anxiety frequency aligns with much higher confidence.

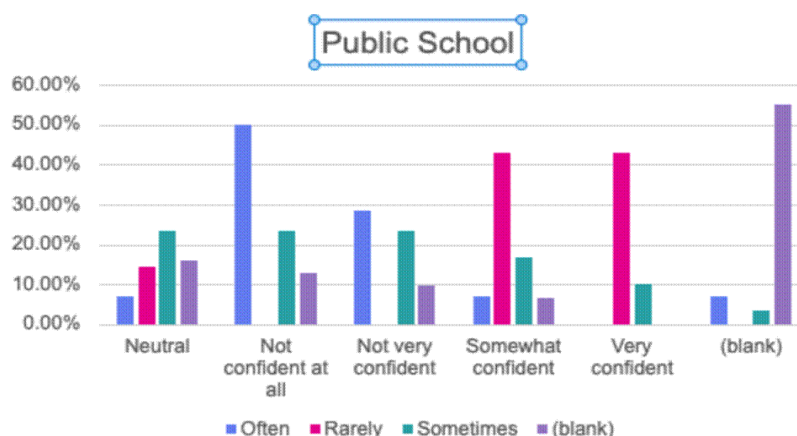


Figure 9. Math Confidence by Frequency of Math Anxiety in Private Schools

In public schools, the data mirrors that of private ones, with students with high anxiety having low self-confidence. This suggests that factors other than the school setting affect the students’ confidence. Private schools students demonstrated a different pattern: high confidence rises from 33.3% (“Often” anxious) to 55.6% (“Sometimes” anxious) to 75.0% (“Rarely” anxious) to 100% (“Never” anxious).

The evidence indicates that the anxiety–confidence relationship appears in private schools as well, though results should be interpreted cautiously because some groups have very small counts (especially “Never”).

4.4 Implications Beyond Silicon Valley

Although Silicon Valley is often assumed to offer exceptional educational resources, this study suggests a Silicon Valley paradox. Even in a high-resource and technology-saturated environment, neurodiverse students report substantial math anxiety, low confidence, and uneven access to effective support. This indicates that regional wealth and innovation do not automatically translate into inclusive mathematics learning conditions.

These implications extend to other global technology hubs where competitive schooling, high parental expectations, and rapid educational change shape student experiences. The Silicon Valley case suggests that improving outcomes depends on how supports are designed and implemented, including teacher capacity to recognize neurodiverse needs, opportunities for individualized feedback, and classroom routines that reduce

uncertainty and anxiety. In this sense, Silicon Valley functions as a transferable case that clarifies which conditions matter for inclusion, independent of local affluence or technological intensity.

5. Recommendations and Actions

5.1 Summary of Results

This study presents quantitative findings to guide evidence-based interventions tailored to the realities of special education in the Bay Area. The following interventions can be introduced to enhance the inclusivity and effectiveness of teaching for neurodiverse students.

Table 2. Study Results and Recommended Interventions

Empirical results	Prospective intervention
Survey results indicate that only 1.6% of students reported never feeling discouraged or anxious about learning math due to their disability, showing that math-related anxiety and self-doubt are nearly universal among students with special learning needs.	The long-term goal of this intervention is to achieve inclusion and mathematical confidence among students with disabilities, ensuring that neurodiverse learners not only participate equally in math education but also believe in their ability in quantitative fields.
Despite perceiving math as an important subject, most students find math learning somewhat difficult and the courses boring. Textbook explanations and teachers' pedagogical methods were commonly cited as barriers.	Train teachers to deliver math in a more engaging and interactive way.
Although mathematics provides many challenges for children with disabilities, the greater barrier often lies in its social stigma. Stigma fosters self-doubt and negative self-concept, leading students to believe that their disability limits their mathematical ability.	Promote awareness, normalize math anxiety, create discussions about diverse learning experiences, and establish frameworks that celebrate neurodiversity in mathematics learning.
Parents help, but mostly less than an hour.	More home support and tutoring.
Students with mental-health challenges (anxiety, attention difficulties, or low confidence) were 2–3× more likely to report math as “stressful” or “hard to focus on.” These students reported frequent discouragement and difficulty concentrating even when they enjoy school.	Incorporate emotional-regulation strategies in math class. Make low-stakes mocks before major assessments.
Students with ADHD-like attention profiles expressed the highest enthusiasm for VR-based math and hands-on or interactive learning methods. Over 85% reported they learn better with movement or immersive tools.	Use multisensory and active learning approaches: VR for spatial concepts, movement-based math games, and real-time feedback systems.
Students with anxiety prefer private, self-paced math practice and often avoid asking teachers for help due to fear of embarrassment or judgment.	Provide self-paced learning options with 1 on 1 meetings for teacher feedback rather than public questions.
Students with reading/writing or processing challenges were far more likely to describe math instructions as “confusing” or “too fast,” especially when verbal explanations were the only method used.	Adopt visual models combined with audio or text instructions to reduce difficulty
Students who reported both anxiety and low confidence were the least likely to see themselves as capable in math, even when their performance was average.	Aim to highlight and praise students for accomplishments frequently. Assign easy small tasks that help build a positive interpretation of math

Students with disabilities wanted more teacher check-ins and expressed that teachers do not always notice when they are struggling emotionally or academically	Create weekly check-ins to monitor stress and provide emotional and academic support.
Students with learning disabilities reported that unexpected changes in math class routines cause stress and reduce their ability to learn effectively.	Provide predictable, routine classroom structures, clear agendas and checklists for multi-stage takss

5.2 Theory of Change (ToC) -based Roadmap

- Ultimate goal (impact): Improve math learning outcome for students with mental conditions by making math learning easy to follow, engaging, and fun
- Outcome:
 - Improved class learning efficacy, supplemented by home tutoring
 - Higher student-reported perceptions of teachers' support
 - Increased rates of student participation during math lessons
 - Improvement in student math confidence scales.
- Output:
 - Policy interventions aimed at destigmatizing mathematics in educational environments. Specifically, policies should mandate teacher training programs for disability
 - The effectiveness of these policies can be measured through Some of the wider benefits include improved academic performance, enhanced classroom climate, and higher neurodiversity in STEM-related fields.
- Activities:
 - Teacher training on delivering math in a more engaging/ interactive way
- Input:
 - Creative teaching method
 - Funding

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Appendix: Survey questionnaire

Math Literacy Education Survey

This survey is designed for students. Please answer truthfully based on your actual situation. Your answers will be kept confidential and used only for educational research purposes.

Part 1: Personal Information and Family Background

1. You are: (Single choice – required)

- Boy
- Girl

2. The city you are in: (Single choice – required)

San Jose

Palo Alto

Mountain View

Sunnyvale

Santa Clara

Cupertino

Menlo Park

Redwood City

San Mateo

Milpitas

Fremont

Campbell

Los Altos

Los Altos Hills

Saratoga

Los Gatos

Morgan Hill

Atherton

Portola Valley

San Carlos

Belmont

Half Moon Bay (occasionally included in business maps)

Gilroy

3. How old are you this year? (Short answer – required)

Please enter an integer (e.g., “7” for 7 years and 3 months or 7 and a half years).

4. Do you usually live with your parents? (Single choice – required)

- Yes, I live with at least one parent
- No, I live with my grandparents / grandparents take care of me
- No, I live with other relatives / other relatives take care of me
- Other: _____

5. Do you have siblings? (Single choice – required)

- No
- Yes, 1 sibling
- Yes, 2 siblings
- Yes, 3 or more siblings

6. What grade are you currently in? (Single choice – required)

- Grade 3
- Grade 4
- Grade 5
- Grade 6 – Grade 12

7. Do you have disability/ learning difficulty?

Yes or no

If yes, then the following questions 8 -14:

8. What type(s) of disability do you identify with? (*Check all that apply*)

- ☐ Physical disability
- ☐ Autism Spectrum Disorder
- ☐ ADHD
- ☐ Dyslexia or other learning disability
- ☐ Mental health condition (e.g., anxiety, depression)
- ☐ Other (please specify): _____

9. Do you currently receive any accommodations or support services for math learning?

- ☐ Yes ☐ No ☐ Not sure

10. How confident do you feel when learning math in school?

- ☐ Very confident ☐ Somewhat confident ☐ Neutral ☐ Not very confident ☐ Not confident at all

11. How often do you feel included and supported in math class?

- ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never

12. Do you feel your math teacher understands your learning needs?

- ☐ Yes, very well ☐ Somewhat ☐ Not really ☐ Not at all

13. What teaching methods help you learn math best? (*Check all that apply*)

- ☐ Visual aids (charts, diagrams)
- ☐ Hands-on activities
- ☐ Step-by-step instructions
- ☐ Digital tools or apps
- ☐ One-on-one support
- ☐ Other (please specify): _____

14. Have you ever felt discouraged or anxious about math because of your disability?

☐ Often ☐ Sometimes ☐ Rarely ☐ Never

Part 2: Math Learning

15. What is your general rank in math in your class? (Single choice – required)

- Top 10
- Rank 10–20
- Rank 20–30
- After rank 30

16. How much time do you spend on math homework each day? (Single choice – required)

- Less than 1 hour
- 1–3 hours
- More than 3 hours

17. Do your father, mother, or other family members help you with math homework? (Single choice – required)

- Yes
- No

18. If yes, how long do they help each day? (Conditional question)

- Less than 1 hour
- 1–3 hours
- More than 3 hours

Part 3: Learning Attitudes and Feelings

19. Do you find your current school math classes interesting? (Single choice – required)

- Very boring
- Somewhat boring
- Average
- Somewhat interesting
- Very interesting

20. Do you find your current school math classes difficult? (Single choice – required)

- Very easy
- Somewhat easy
- Average
- Somewhat difficult
- Very difficult

21. Why do you find math classes difficult? (Conditional question)

- Textbook content is too abstract and cannot be applied to real life
- Lesson content is too difficult
- Teacher's lectures are too theoretical, no guidance on application
- Teacher teaches too fast, explanations not clear enough
- Class content and homework/exams are not well connected, making homework hard
- Teacher assigns too much math homework, can't finish it
- Family rarely helps with math homework, can't complete it independently
- Other: _____

22. How important do you think math knowledge is in daily life? (Single choice – required)

- Very unimportant
- Somewhat unimportant
- Average importance
- Fairly important
- Very important

23. Can the math knowledge you are learning now help you solve problems in daily life? (Single choice – required)

- Cannot be applied at all
- Rarely applicable
- Sometimes applicable
- Often applicable

Part 4: accessibility and support in classroom

24. Are classroom materials (e.g., textbooks, worksheets, digital platforms) accessible to you?

- ☐ Yes ☐ Somewhat ☐ No

25. Do you receive math accommodations such as extra time, alternative formats, or assistive technology?

- ☐ Yes ☐ No ☐ Not applicable

26. How effective are the accommodations you receive in helping you succeed in math?

- ☐ Very effective ☐ Somewhat effective ☐ Not effective ☐ I don't receive accommodations

Part 5: Math Tutoring and Activities Outside Class

27. Do you take any other math tutoring classes outside of school? (Single choice – required)

- No
- Yes, offline classes
- Yes, online classes
- Yes, other forms: _____

28. What is the format of the tutoring class? (Conditional question)

- One-on-one tutoring
- Small group class (fewer than 10 students)
- Large class (more than 10 students)

29. Which of the following ways would you prefer to make math class more interesting? (Matrix scale – required)

Rate each activity from Dislike to Strongly like:

- a) More fun games (e.g., poker, Sudoku)
- b) More hands-on activities (drawing, puzzles, blocks, robotics)
- c) More group discussions/activities
- d) Teacher uses technology (computer/tablet) in class
- e) Combine theory with real-life examples
- f) Use examples from other regions/countries
- g) Explain problem-solving steps in more detail

30. If the school adds more math courses or activities, which would you prefer? (Multiple choice – required)

- Add fun modules to regular math class (games, group activities, etc.)
- Math homework tutoring
- Math competition class
- Math interest club
- Field trips/study tours

- School-level fun math games/activities

- Other: _____

31. Name of your school (Short answer – required)

Format: Province + City + County + School Name

32. Is your school a private or public school? (Single choice – required)

[Same list as Question 2 with 'Other: ____' option]

33. If your math teacher uses virtual reality (VR) games to teach you math, do you think it's interesting?

Yes, or no

34. Are you interested in using virtual reality (VR) games for math practice at home?

Yes or no

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