Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

CCST5037 Mathematics: A Cultural Heritage

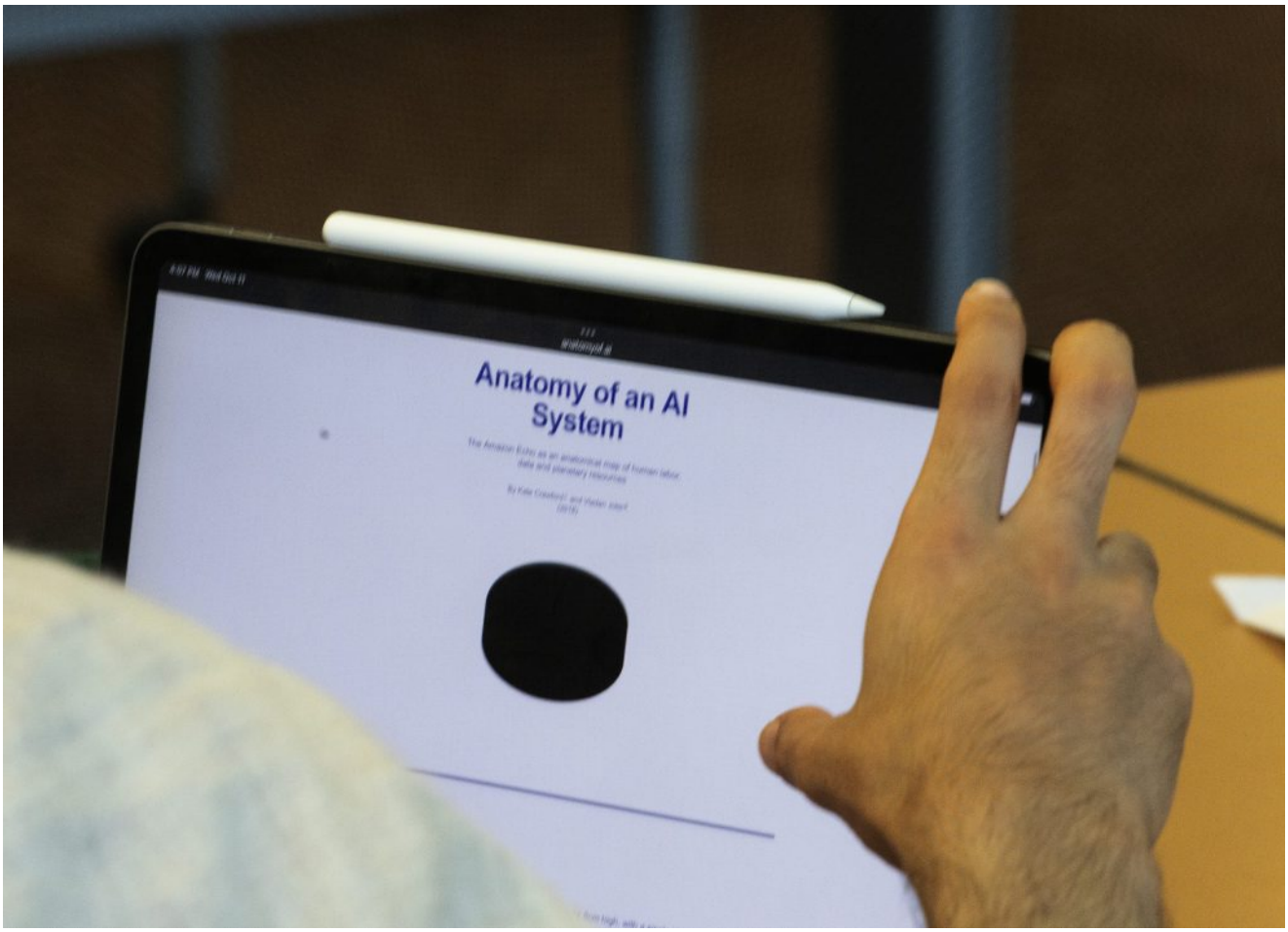
Assignment 2

Item 1
Source: **THE HECHINGER REPORT, October 24, 2023** **URL:** **https://hechingerreport.org/ai-might-disrupt-math-and-computer-science-classes-in-a-good-way/**
Note to explain how this news clipping is related to mathematics: In the articles, the author focuses on how mathematics education relates to AI-based tools in today's society. Some educators perceive AI as a threat while some perceive AI as a great help to mathematics education arguing that it provides student instant support and feedback (like Photomath), besides, it can also help in lesson planning, feedback provision and math question development tailored to different teaching grades among teachers.

AI might disrupt math and computer science classes – in a good way

hechingerreport.org/ai-might-disrupt-math-and-computer-science-classes-in-a-good-way

By Claire Bryan October 24, 2023



For as long as Jake Price has been a teacher, Wolfram Alpha — a website that solves algebraic problems online — has threatened to make algebra homework obsolete.

Teachers learned to work around and with it, said Price, assistant professor of mathematics and computer science at the University of Puget Sound, in Tacoma, Washington. But now, they have a new homework helper to contend with: generative artificial intelligence tools, such as ChatGPT.

Price doesn't see ChatGPT as a threat,and he's not alone. Some math professors believe AI, when used correctly, could help strengthen math instruction. And it's arriving on the scene at a time when math scores are at a national historic low and educators are questioning if math should be taught differently.

> **“Computers are really good at doing tedious things. We don’t have to do all the tedious stuff. We can let the computer do it. And then we can interpret the answer and think about what it tells us about the decisions we need to make.”**
>
> *Jake Price, assistant professor of mathematics and computer science at the University of Puget Sound, in Tacoma, Washington*

AI can serve as a tutor, giving a student who is floundering with a problem immediate feedback. It can help a teacher plan math lessons, or write a variety of math problems geared toward different levels of instruction. It can even show new computer programmers sample code, allowing them to skip over the boring chore of learning how to write basic code.

As schools across the country debate banning AI tools, some math and computer science teachers are embracing the change because of the nature of their discipline.

“Math has always been evolving as technology evolves,” said Price. A hundred years ago, people were using slide rules and doing all of their multiplication with logarithmic tables. Then, along came calculators.

The Math Problem

Sluggish growth in math scores for U.S. students began long before the pandemic, but the problem has snowballed into an education crisis. This back-to-school season, the Education Reporting Collaborative, a coalition of eight newsrooms, will be documenting the enormous challenge facing our schools and highlighting examples of progress. The three-year-old Reporting Collaborative includes AL.com, The Associated Press, The Christian Science Monitor, The Dallas Morning News, The Hechinger Report, Idaho Education News, The Post and Courier in South Carolina, and The Seattle Times.

READ THE SERIES

Price teaches with human-capable technologies in mind, making sure to give students the skills in class by hand. Then, he discusses with them the limitations of the technologies they might be tempted to use when they get home.

“Computers are really good at doing tedious things,” Price said. “We don’t have to do all the tedious stuff. We can let the computer do it. And then we can interpret the answer and think about what it tells us about the decisions we need to make.”

He wants his students to enjoy looking for patterns, seeing how different methods can give different or the same answers and how to translate those answers into decisions about the world.

“ChatGPT, just like the calculator and just like the slide rule and all the technology before, just helps us get at that core, real part of math,” Price said.

Conversely, ChatGPT has its limits. It can show the right steps to solving a math problem — and then give the wrong answer.

This is because it’s “not actually doing the math,” Price said. It’s just pulling together pieces of the sentences where other people have described how to solve similar problems.

Min Sun, a University of Washington education professor, thinks students should use ChatGPT like a personal tutor. If students get lost in class and don’t understand a mathematical operation, they can ask ChatGPT to explain it and give them a few examples.

The Khan Academy, an educational nonprofit that provides a collection of online learning tools and videos and has long been a go-to for math homework, has created exactly that.

The tutor is called Khanmigo. Students can open it while completing math problems and tell it that they are stuck.

They can have a conversation with the AI tutor, telling it what they don’t understand, and the AI tutor helps to explain, said Kristen DiCerbo, the chief learning officer at Khan Academy.

“Instead of saying, ‘Here’s the answer for you,’ it says things like, ‘What’s the next step?’ or ‘What do you think might be the next thing to do?’” DiCerbo said.

Sun, the UW education professor, wants teachers to use ChatGPT as their own assistant: to plan math lessons, give students good feedback and communicate with parents.

Teachers can ask AI, “What is the best way to teach this concept?” Or “What are the kinds of mistakes students tend to make when learning this math concept?” Or, “What kinds of questions will students have about this concept?”

Teachers can also ask ChatGPT to recommend different levels of math problems for students with different mastery of the concept, she said. This is particularly helpful for teachers who are new to the profession or have students with diverse needs — special education or English language learners, Sun said.

“I’m amazed by the details that sometimes ChatGPT can offer,” Sun said. “It gives you some initial ideas and possible problem areas for students so I can get myself more prepared before walking into the classroom.”

And, if a teacher already has a high-quality lesson plan, they could feed that to ChatGPT and ask it to create another lesson in a similar teaching style, but for a different concept.

Sun hopes ChatGPT can also help teachers write more culturally appropriate word-problem questions to make all their students feel included.

“The current technology is really a technical assistant to support them, empower them, amplify their creative abilities,” Sun said. “It is really not a substitute to their own agency, their own creativity, their own professionalism. They really need to keep that in mind.”

A year ago, if you asked Daniel Zingaro how he assesses his introductory computer science students, he would say: “We ask them to write code.”

But if you ask him today, the answer would be far more complex, said Zingaro, an associate professor at the University of Toronto.

Zingaro and Leo Porter, a computer science professor at University of California San Diego, authored the book Learn AI-Assisted Python Programming with GitHub Copilot and ChatGPT. They believe AI will allow introductory computer science classes to tackle big-picture concepts.

A lot of beginner students get stuck writing very simple code, Porter and Zingaro said. They never move on to more advanced questions — and many still can’t write simple code after they complete the course.

“It’s not just uninteresting, it is frustrating,” Porter added. “They are trying to build something and they forgot a semicolon and they’ll lose three hours trying to find that missing semicolon” or some other bit of syntax that prevents a code from running properly.

AI doesn’t make those mistakes, and allows computer science professors to spend more of their time teaching higher-level skills.

The professors now ask their students to take a big problem and break it down to smaller questions or tasks the code needs to do. They also ask students to test and debug code once it is already written.

“If we think bigger picture about what we want our students to do, we want them to write software that is meaningful to them,” Porter said. “And this process of writing software is taking this fairly big, often not-well-defined problem and figuring out, how do I break them into pieces?”

Magdalena Balazinska, director of the University of Washington’s Paul G. Allen School of Computer Science and Engineering, embraces the progress AI has made.

“With the support of AI, human software engineers get to focus on the most interesting part of computer science: answering big software design questions,” Balazinska said. “AI allows humans to focus on the creative work.”

Not all professors in the field think AI should be integrated into the curriculum. Some interviewed for a UC San Diego research paper and in an Education Week survey prefer blocking or negating the use of ChatGPT or similar tools like Photomath, at least in the short term.

Zingaro and Porter argue that reading a lot of code generated by AI doesn’t feel like cheating. Rather, it’s how a student is going to learn.

“I think a lot of programmers read a lot of code, just like how I believe the best writers read a lot of writing,” Zingaro said. “I think that is a very powerful way to learn.”

This story about AI and math was produced by The Seattle Times in cooperation with the Education Reporting Collaborative, a coalition of eight newsrooms that is documenting the math crisis facing schools and highlighting progress. Members of the Collaborative are AL.com, The Associated Press, The Christian Science Monitor, The Dallas Morning News, The Hechinger Report, Idaho Education News, The Post and Courier in South Carolina, and The Seattle Times.

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Item 2
Source: **Education Week, October 16, 2023** **URL:** **https://www.edweek.org/technology/opinion-im-a-math-teacher-graphing-calculators-taught-me-a-thing-or-two-about-ai/2023/10**
Note to explain how this news clipping is related to mathematics: The article offers a concise viewpoint on the inevitability and significance of integrating AI technology in Mathematics education, thereby urging a reevaluation of the content and pedagogy of Mathematics education in the AI era.

I’m a Math Teacher. Graphing Calculators Taught Me a Thing or Two About AI

edweek.org/technology/opinion-im-a-math-teacher-graphing-calculators-taught-me-a-thing-or-two-about-ai/2023/10

2023年10月16日

Stacie A. Marvin

Stacie Marvin is a math educator in Howard County, Md. A national-board-certified teacher, she was a 2019 recipient of the Presidential Award for Excellence in Mathematics and Science Teaching. She is currently serving as an Albert Einstein Distinguished Educator Fellow in the office of U.S. Rep. David Trone, D-Md.

There is no avoiding the constant chatter about AI these days. Really, it’s been months. As a math teacher, this struggle over new technology feels oddly familiar.

More than 30 years ago, the National Council of Teachers of Mathematics released standards about how to teach with the “newly emerging” calculator technology. Charmingly, this was a physical book that you had to buy, but I digress.

I remember watching, as an intern teacher, transfixed and amazed as my former high school teacher, and now my mentor, used nascent TI-80 graphing calculators to make connections I’d never seen between tables, graphs, and equations of polynomials. When I say “never seen,” I mean I had *never even thought about this*. I had mastered her class five years before. I had mastered calculus and other higher-order math on my way to earning my college math degree. And yet I sat there and learned everything from my high school pre-calc course all over again. As my brain rewired itself, creating new connections, I swear I actually felt my fingers tingle as I made notes.

A month later, my understanding of trigonometric functions likewise deepened as I took over the class to learn to teach students using those same graphing calculators. Suddenly, as I watched the sine and cosine waves unspool from the unit circle on the calculator’s screen, I grasped for the first time why they were called “cyclic functions.”

That was 1992, and the math teaching community has struggled ever since, productively most of the time, to integrate calculators of increasing complexity and ability into all levels of instruction. For a while, we could discourage calculator use with pithy statements like, “You’re not always going to have a calculator with you!” (Insert iPhone here.) I still run into students who’ve been taught trigonometry or ratio and proportion facts in isolation and through procedures, but we continue, as a community of math educators, to generally move in the direction of capitalizing on the calculator’s ability to enhance conceptual understanding.

We came to view calculators as tools, like protractors or straight edges, which students must be taught to use. We coached students on how to determine if an answer is reasonable—or garbage. We modeled strategic use, pointing out both when calculators can enlighten and when they can hinder progress.

> As I learn more about AI, as I think about how kids will and are already using it, this feels like déjà vu.

Over time, some of the content we teach has changed. We've worked to define what computational "fluency" means over and above precision of calculations. Fluency includes drawing on mathematical understanding to find flexible and efficient pathways to correct answers. Knowing most students will pull out their phones to perform even the smallest of calculations, we've had to rely on our relationships of trust to teach them to have confidence in their own abilities. We help them understand that they are more capable without the technology than they believe.

The scariest part of this journey was that at all levels of math education, we had to ask ourselves, "What do we teach? What does it mean to do *math?"* As I learn more about AI, as I think about how kids will and are already using it, this feels like déjà vu. Except this time I'm joined by my English/language arts, science, social studies—actually *all*—my teaching colleagues. Welcome to my world!

I have a message for you, and you may not be ready to hear it. AI is here. AI is not going away, not ever, and you cannot ban it. It will continue to evolve and become more powerful. Those online tools you used in the spring of 2023 to help you determine if a chatbot had "written" something? Even some of the developers of those tools, such as OpenAI, which came up with ChatGPT, no longer think they are reliable. That's how fast things are changing.

This will, literally, change everything about how you teach in ways that nobody can predict, not even the "experts." After two months of reading about AI, listening to podcasts, and even attending hearings and briefings about AI on Capitol Hill, I've come away with a great big "who knows?" shrug of the shoulders.

AI will frustrate you and make you question what it means to "learn" content. But, if you let it, this creates an opportunity to make your teaching better, to make your content more relevant. We have been thrust into the top four levels of Bloom's taxonomy of educational objectives together, and it's a pretty exciting place to be. When our students have access to all the information that they once spent much brain power memorizing, they are able to apply, analyze, evaluate, and create. The miracle here is that brain research tells us that when they are doing these magical things, they remember and understand *at the same time and more permanently.*

Make no mistake, public school teaching is at a crossroads. We change and become relevant, or more and more parents will join those clamoring for “choice” in educating their children. They are right to want what’s best for their children. What they want, ultimately, should be what we want as well—for their kids to grow into adults who can be productive members of a technologically savvy world.

If we open ourselves to the technology as it develops, always with a mind to protecting our students while teaching them how to use it, surprising things will happen. We will prepare our students to thrive in a world that has AI embedded into nearly everything they are going to be asked to do. In a very basic sense, teaching students to thrive in a future we can’t completely predict is what we’re supposed to be doing anyway.

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Item 3
Source: **ZDNET, November 16, 2023** **URL:** **https://www.zdnet.com/article/math-and-business-development-why-the-2-divergents-skills-matter-in-an-ai-world/**
Note to explain how this news clipping is related to mathematics: The article emphasizes the need for basic math skills for those building AI-based applications, to understand the underlying technology, data science, and statistics that drive AI innovation and productivity.

Math and business development: Why the 2 divergents skills matter in an AI world

zdnet.com/article/math-and-business-development-why-the-2-divergents-skills-matter-in-an-ai-world

For roles heavily immersed in building AI applications, it's time to shore up basic math skills. And for more right-brained roles, business development skills are the top requirement.

Artificial intelligence (AI) keeps upending our ideas about future skill requisites in interesting ways. On one level, AI requires a deep understanding of underlying technology, data science, and statistics.

At the same time, AI also calls for less immersion in underlying technicalities and an ability to keep an eye on business advantage.

With the rise of AI, technology managers, and professionals face some critical decisions regarding which of these two seemingly divergent skill demands they ought to pursue.

Tools built on generative AI offer compelling productivity advantages for developers and other technology professionals -- but it also means rethinking their roles. For those seeking to get heavily immersed in building AI applications, this may be the time to shore up one's basic math skills.

For others seeking more right-brained roles, business development skills are the top requirement.

That's the word from Maxwell Wessel, chief learning officer at SAP and venture capitalist, who shares his observations on the impact of AI on the technology profession. It may be time to revisit math skills, he advocates.

"Most technical pros are going to need to go back to the basics: math," he says. "Problems that were defined when I was coming up were defined in code. Limitations of coding languages, operating systems, and hardware were often the most foundational to understand. In a world of AI, those same systemic issues are going to be best defined in statistics. The more understanding people have of the math, the easier it will be to understand the usefulness of the models."

Math may be at the forefront for a lot of AI work, but for those not directly building or architecting AI applications, "the skills that will come into question are less technical," Wessel continues. "They may not need to code as much, but they'll need even more product management, design, and user research capabilities to get the most out of their new tools."

Expect more changes to IT roles. "The function of IT talent will continue to evolve as technology does, and this means that the roles and expectations of IT professionals will change simultaneously," Wessel predicts. "We have seen time-consuming, repetitive tasks become more and more automated over the past 40 years, and that will certainly continue to progress as AI becomes smarter and more capable of integrating into the processes of app development and deployment."

Wessel is optimistic about the potential impact of this emerging technology. "Overall, gen AI is going to unleash a wave of workforce innovation, helping to address a lot of the skill shortages we face," he states.

"Generative AI offers an incredible tool to help developers accomplish tasks better," he continues. "It can help with debugging. It can provide short statements summarizing unknown code snippets. It can offer suggestions on how to tackle a problem. All of these help devs save time and shift into more strategic thinking."

IT professionals will continue to see their roles enriched as they move closer to the needs of the business. "By getting out of the monotonous day-to-day automations, there will be more opportunity to partner with business leaders to leverage creativity, an understanding of the technology, and newfound capacity to solve some big problems," says Wessel.

Arthur Clarke said, any sufficiently advanced technology is indistinguishable from magic."

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Item 4
Source: **The Post-Journal, September 24, 2023** **URL:** **https://www.post-journal.com/news/top-stories/2023/09/what-about-math/**
Note to explain how this news clipping is related to mathematics: In the article, the author writes about how "science of math" is important in mathematic education and how it improves mathematic education in American schools by emphasizing systematic and explicit instruction, like the phonics-based approach used in reading instruction. In addition, the articles also emphasize the science of math movement is still in its early stages and has not received as much attention or funding as the science of reading.

What About Math? | News, Sports, Jobs

post-journal.com/news/top-stories/2023/09/what-about-math

Elementary math teacher Margie Howells teaches a fifth grade class at Wheeling Country Day School in Wheeling, W.Va., on Tuesday, Sept. 5, 2023. Howells said that she turned to the science of math after wondering why there weren't as many resources for dyscalculia as there were for dyslexia. Reading the research helped her become more explicit about things that she assumed students understood, like the fact that the horizontal line in a fraction means the same thing as a division sign. "I'm doing a lot more instruction in vocabulary and symbol explanations so that the students have that built-in understanding," said Howells. (AP Photo/Gene J. Puskar)

For much of her teaching career, Carrie Stark relied on math games to engage her students, assuming they would pick up concepts like multiplication by seeing them in action. The kids had fun, but the lessons never stuck.

A few years ago she shifted her approach, turning to more direct explanation after finding a website on a set of evidence-based practices known as the science of math.

“I could see how the game related to multiplication, but the kids weren’t making those connections,” said Stark, a math teacher in the suburbs of Kansas City. “You have to explicitly teach the content.”

As American schools work to turn around math scores that plunged during the pandemic, some researchers are pushing for more attention to a set of research-based practices for teaching math. The movement has passionate backers, but is still in its infancy, especially compared with the phonics-based “science of reading” that has inspired changes in how classrooms across the country approach literacy.

Experts say math research hasn’t gotten as much funding or attention, especially beyond the elementary level. Meanwhile, the math instruction schools are currently using doesn’t work all that well. The U.S. trails other high-income countries in math performance, and lately more students graduate high school with deficits in basic math skills.

Elementary math teacher Margie Howells teaches a fifth grade class at Wheeling Country Day School in Wheeling, W.Va., on Tuesday, Sept. 5, 2023. Howells said that she turned to the science of math after wondering why there weren’t as many resources for dyscalculia as there were for dyslexia. Reading the research helped her become more explicit about things that she assumed students understood, like the fact that the horizontal line in a fraction means the same thing as a division sign. “I’m doing a lot more instruction in vocabulary and symbol explanations so that the students have that built-in understanding,” said Howells. AP photos

Advocates say teaching practices supported by quantitative research could help, but they are still coming into focus.

“I don’t think the movement has caught on yet. I think it’s an idea,” said Matthew Burns, a professor of special education at the University of Florida who was among researchers who helped create a Science of Math website as a resource for teachers.

WHAT IS THE SCIENCE OF MATH?

There’s a debate over which evidence-based practices belong under the banner of the science of math, but researchers agree on some core ideas.

The foremost principle: Math instruction must be systematic and explicit. Teachers need to give clear and precise instructions and introduce new concepts in small chunks while building on older concepts. Such approaches have been endorsed by dozens of studies highlighted by the Institute of Education Sciences, an arm of the U.S. Education Department that evaluates teaching practices.

That guidance contrasts with exploratory or inquiry-based models of education, where students explore and discover concepts on their own, with the teacher nudging them along. It’s unclear which approaches are used most widely in schools.

In some ways, the best practices for math parallel the science of reading, which emphasizes detailed, explicit instruction in phonics, instead of letting kids guess how to read a word based on pictures or context clues. After the science of reading gained prominence, 18 states in just three years have passed legislation mandating that classroom teachers use evidence-backed methods to teach reading.

Margie Howells, an elementary math teacher in Wheeling, West Virginia, first went researching best practices because there weren’t as many resources for dyscalculia, a math learning disability, as there were for dyslexia. After reading about the science of math movement, she became more explicit about things that she assumed students understood, like how the horizontal line in a fraction means the same thing as a division sign.

“I’m doing a lot more instruction in vocabulary and symbol explanations so that the students have that built-in understanding,” said Howells, who is working on developing a science-based tutoring program for students with dyscalculia and other learning differences.

THE SO-CALLED MATH WARS

Some elements of math instruction emphasize big-picture concepts. Others involve learning how to do calculations. Over the decades, clashes between schools of thought favoring one or another have been labeled the “math wars.” A key principle of the science of math movement is that both are important, and teachers need to foster procedural as well as conceptual understanding.

“We need to be doing all those simultaneously,” Stark said.

When Stark demonstrates a long division problem, she writes out the steps for calculating the answer while students use a chart or blocks to understand the problem conceptually.

Stark helps coach fellow teachers at her school to support struggling students — something she used to feel unequipped to do, despite 20 years of teaching experience. Most of the resources she found online just suggested different math games. So she did research online and signed up for special trainings, and started focusing more on fundamentals.

For one fifth grader who was struggling with fractions, she explicitly re-taught equivalent fractions from third grade — why two-fourths are the same as one-half, for instance. He had been working with her for three years, but this was the first time she heard him say, “I totally get it now!”

“He was really feeling success. He was super proud of himself,” Stark said.

Still, skeptics of the science of math question the emphasis placed on learning algorithms, the step-by-step procedures for calculation. Proponents say they are necessary along with memorization of math facts (basic operations like 3×5 or 7+9) and regular timed practice — approaches often associated with mind-numbing drills and worksheets.

Math is “a creative, artistic, playful, reasoning-rich activity. And it’s very different than algorithms,” said Nick Wasserman, a professor of math education at Columbia University’s Teachers College.

Supporters argue mastering math facts unlocks creative problem-solving by freeing up working memory — and that inquiry, creativity and collaboration are still all crucial to student success.

“When we have this dichotomy, it creates an unnecessary divide and it creates a dangerous divide,” said Elizabeth Hughes, a professor of special education at Penn State and a leader in the science of math movement. People feel the need to choose sides between “Team Algorithms” and “Team Exploratory,” but “we really need both.”

A HIGHER IMPORTANCE ON READING?

Best practices are one thing. But some disagree such a thing as a “science of math” exists in the way it does for reading. There just isn’t the same volume of research, education researcher Tom Loveless said.

“Reading is a topic where we have a much larger amount of good, solid, causal research that can link instruction to student achievement,” he said.

To some, the less advanced state of research on math reflects societal values, and how many teachers themselves feel more invested in reading. Many elementary school teachers doubt their own math ability and struggle with anxiety around teaching it.

“Many of us will readily admit that we weren’t good at math,” said Daniel Ansari, a professor of cognitive neuroscience at Western University in Canada. “If I was illiterate, I wouldn’t tell a soul.”

Still, Ansari said, there is enough research out there to make a difference in the classroom.

“We do understand some of the things that really work,” he said, “and we know some of the things that are not worth spending time on.”

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Item 5
Source: **NBCUniversal Media, October 3, 2023** **URL:** **https://www.nbcdfw.com/news/local/texas-news/which-students-get-into-advanced-math-texas-is-using-test-scores-to-limit-bias/3351570/**
Note to explain how this news clipping is related to mathematics: The article reports a update to the mathematic education in the Texas, and investigate the Opt-out policy for advanced mathematics in different point of view.

Texas law uses test scores to limit bias in student placement – NBC 5 Dallas-Fort Worth

nbcdfw.com/news/local/texas-news/which-students-get-into-advanced-math-texas-is-using-test-scores-to-limit-bias/3351570

Talia Richman

When Tha Cung looked over his sixth-grade class schedule, he took notice of the math block. He had been placed in an advanced class.

“I didn’t know ‘honors’ even existed,” he said.

Tha was little when his family immigrated from Myanmar and, for much of his time in Dallas schools, he took courses designed for children who are learning English. In fifth grade, his standardized test scores showed he was a strong math student — someone who should be challenged with honors classes in middle school.

Under the Dallas school system's policy, Tha’s parents didn’t need to sign him up for advanced math. A teacher or counselor didn’t have to recommend him, either. In many schools, those are the hoops a student must get through to join honors classes. But Tha was automatically placed in the advanced course because of his scores on Texas’ STAAR test.

A version of this approach will soon be replicated statewide as part of an effort to remove barriers that can stand between bright students and rigorous courses. Instead of having families opt in to advanced math, they are instead given the choice to opt out.

The Education Reporting Collaborative, a coalition of eight newsrooms, is documenting the math crisis facing schools and highlighting progress. Members of the Collaborative are AL.com, The Associated Press, The Christian Science Monitor, The Dallas Morning News, The Hechinger Report, Idaho Education News, The Post and Courier in South Carolina, and The Seattle Times.

A new Texas law calls for every student who performs in the top 40% on a fifth-grade math assessment to be enrolled automatically in advanced math for sixth grade.

The rollout could provide lessons for other states. Leaders across the country are confronting the need to prepare a new, diverse generation of workers in science, technology, engineering and math, or STEM. Heightening the alarm: Students nationally have been struggling to bounce back from widespread learning loss in math.

Before the pandemic, Black and Hispanic students in Texas were routinely left out of advanced classes — even if they earned high test scores, according to research by the E3 Alliance, an Austin-based education collaborative that advocated for the law.

Enrolling in advanced math in sixth grade clears the way for a student to take Algebra I in eighth grade. That leads to courses such as calculus and statistics during high school. And that can set a foundation for a STEM major in college and a high-paying career.

Advocates for the new policy say it's a workforce issue in addition to an equity issue.

"Especially in today's rapidly changing and technology-driven economy, math matters more than ever — for individual students and for the larger Texas workforce to remain competitive," said Jonathan Feinstein, a state director at The Education Trust, a national nonprofit promoting equity.

One recent morning at Sam Tasby Middle School, dozens of students in Room 304 were calculating the area of parallelograms and trapezoids. One of them, Alexis Grant, 11, thinks her year in sixth-grade honors math will pave the way for achieving one of her goals: studying at Harvard.

"I knew it would be challenging," Alexis said of her math class. "We push each other to get the work done."

More Dallas students have been enrolling in advanced math, and the classrooms have been more diverse.

In 2018, prior to the opt-out policy, about 17% of Black students in sixth grade and one-third of Hispanic students were in honors math, compared to half of white students. Now, 43% of Black students are in honors math when they enter middle school and nearly six in 10 Hispanic students are. The percentage of white sixth graders in honors math has also gone up, to roughly 82%.

Texas is home to more than 1,000 school districts, which means vastly different ways students could end up in advanced courses. The decisions were often subjective.

Teacher recommendations are a big factor in some districts. But those decisions can be swayed by implicit biases around what an "honors student" looks or acts like, education advocates say.

In other places, parents must request advanced classes for their children — but that can leave out students whose parents may not be aware of the option.

Some Central Texas districts also already have an opt-out policy. Those schools have seen far more Black and Hispanic students complete Algebra I in eighth grade, as well as jumps among children who are learning English.

In the Hays school district, curriculum officer Derek McDaniel has seen the number of students in advanced math balloon over the past three years since implementing the new policy.

As more districts move in this direction, McDaniel urges school administrators to prioritize parent communication. Explaining to families why their child is placed into honors math is critical, he said, adding that parents should know the benefit of this more challenging course load.

Communication with teachers is also key, McDaniel said. Some honors-level teachers expect limited behavior problems and for students to always complete homework assignments on time. With an opt-out policy, he said, some students will be new to the advanced track and will not have developed uniform study skills.

“The easy solution is to give up,” McDaniel said. “We’re gonna stick with the kid.”

A handful of other states have embraced opt-out or automatic enrollment policies. Texas’ strategy is unique in its focus on sixth-grade math as a gateway for more advanced courses.

The Texas Education Agency has given administrators until the 2024 school year to comply with the law in recognition of potential challenges. Schools may need to hire more advanced math teachers. Administrators may also have to find more time for tutoring.

Dallas chief academic officer Shannon Trejo said some students might begin middle school fuzzy on various math ideas. Or, because of the COVID-19 disruption, they may have some gaps in their understanding of foundational concepts.

“We need to be ready to build those little gaps and not make that be the cause for students to say, ‘I don’t think I want to do this anymore,’” she said.

The payoff may be years away, when current Dallas students win high-paying jobs in STEM fields.

Tha Cung was placed in that sixth-grade honors math class two years ago. Now he’s an eighth grader enrolled in Algebra I. He thinks that will give him a leg up.

“My mom told me that I could be anything,” said Tha, now 13. “So I chose engineer.”

Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

Item 6
Source: **PBSO NEWS HOUR, October 17, 2023** **URL:** **https://www.pbs.org/newshour/nation/math-disabilities-hamper-student-success-yet-schools-rarely-screen-for-them**
Note to explain how this news clipping is related to mathematics: The article highlights the awareness of Math disability in the U.S. Mathematic Education and discusses the resulting challenges of this issue.

Math disabilities hamper student success, yet schools rarely screen for them

pbs.org/newshour/nation/math-disabilities-hamper-student-success-yet-schools-rarely-screen-for-them

Jackie Mader, The Hechinger Report October 17, 2023

Laura Jackson became seriously concerned about her daughter and math when the girl was in third grade. While many of her classmates flew through multiplication tests, Jackson's daughter relied on her fingers to count, had difficulty reading clocks and burst into tears when asked at home to practice math flashcards.

At school, the 9-year-old had been receiving help from a math specialist for two years, with little improvement.

One day, when having lunch with a friend, Jackson heard about a disorder known as dyscalculia. She later looked up a description of the learning disability that impacts a child's ability to process numbers and retain math knowledge. "I was like, 'Oh my gosh, this is my kid,'" Jackson said.

Nationwide, hundreds of thousands of students face challenges learning math due to disabilities like dyscalculia, a neurodevelopmental learning disorder caused by differences in parts of the brain that are involved with numbers and calculations. There are often obstacles to getting help.

America's schools have long struggled to identify and support students with learning disabilities of all kinds. Kids often languish while waiting to receive a diagnosis; families frequently have to turn to private providers to get one; and even with a diagnosis, some schools are unable to provide children the help they need.

That's slowly changing — for some disabilities. Most states have passed laws that mandate screening early elementary students for the most common reading disability, dyslexia, and countless districts train teachers to recognize struggling readers. Meanwhile, parents and experts say schools neglect students with math disabilities like dyscalculia, which affects up to 7% of the population and often coexists with dyslexia.

"There's not as much research on math disorders or dyscalculia," as there is on reading disabilities, said Karen Wilson, a clinical neuropsychologist who specializes in the assessment of children with learning differences. "That also trickles down into schools."

Math scores in the U.S. have remained dismal for years and only worsened during the COVID-19 pandemic. Learning struggles for some may be due to dyscalculia or other math learning disabilities, yet few teachers report their students have been screened for dyscalculia.

“If it works for the students with the most severe disconnections and slower processing speeds, it’s still going to work for the kids that are in the ‘middle’ with math difficulties,” said Sandra Elliott, a former special education teacher and current chief academic officer at TouchMath, a multisensory math program.

Some signs of dyscalculia are obvious at an early age, if parents and educators know what to look for. Young children might have difficulty recognizing numbers or patterns. In elementary school, students may have trouble with math functions like addition and subtraction, word problems, counting money or remembering directions.

Even after Jackson learned about dyscalculia on her own, her daughter’s Seattle-area public school was doubtful the third grader had a learning disability because she was performing well in other areas. Teachers suggested Jackson spend extra time on math at home.

“For so many parents, they assume the school would let them know there’s an issue, but that’s just not how it works,” said Jackson, who ultimately wrote a book, “Discovering Dyscalculia,” about her family’s journey.

Students with dyscalculia often need a more structured approach to learning math that involves “systematic and explicit” instruction, said Lynn Fuchs, a research professor in special education and human development at Vanderbilt University.

Part of the problem is that teachers don’t receive the training needed to work with children with math disabilities. At least one state, Virginia, requires dyslexia awareness training for teacher licensure renewal, but has no similar requirement for math disability training.

“It’s pretty rare for undergraduate degrees or even master’s degrees to focus on math learning disabilities with any level of breadth, depth, quality or rigor,” said Amelia Malone, director of research and innovation at the National Center for Learning Disabilities.

Without more widespread knowledge of and support for dyscalculia, many parents have had to look for specialists and tutors on their own, which they say can be particularly challenging for math, and costly. In 2019, Jackson started pulling her daughter out of school for part of each day to teach her math at home.

“I am not a math teacher, but I was so desperate,” Jackson said. “There’s no one who knows anything, and we have to figure this out.”

At the tutoring organization Made for Math, specialists have found children with dyscalculia need repetition, especially to understand math facts. Some students attend tutoring up to four days a week, at a cost of up to $1,000 a month.

“It’s hard because it’s not something schools are offering, and kids deserve it,” said Heather Brand, a math specialist and operations manager for the organization.

There are pockets of progress around the country in screening more children for math disabilities, but movement at the federal level — and in most states — is “nonexistent,” said Malone, of the National Center for Learning Disabilities.

New York City is one district that has prioritized math disability screening and math instruction in the early years. In 2015 and 2016, the city spent $6 million to roll out a math curriculum featuring games, building blocks, art projects and songs. The district has also introduced universal math and reading screeners to try to identify students who may be behind.

There are ways that all schools can make math instruction more accessible, experts say. In elementary schools, activities that involve more senses should be used more widely, including whole-body motions and songs for teaching numbers and hands-on materials for math operations.

Jackson said her daughter could have benefited from a wider variety of methods at school. When the teen returned to school-based math classes in high school, after several years of learning math at home, she achieved an A in algebra.

“When you really understand what it is to be dyscalculic, then you can look around and decide what this person needs to succeed,” Jackson said. “It’s not just that you’re ‘bad at math’ and need to buckle down and try harder.”

Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

Item 7
Source: **BUSINESS INSIDER, October 5, 2023** **URL:** **https://www.businessinsider.com/bill-gates-math-education-school-suggestions-foundation-2023-10**
Note to explain how this news clipping is related to mathematics: The article offers a viewpoint from Bill Gates about the intrinsic values of mathematic, mathematic education problem, and sample of solution.

How to Make Kids Like Math

businessinsider.com/bill-gates-math-education-school-suggestions-foundation-2023-10

Lakshmi Varanasi

Bill Gates talked about how the Gates Foundation was approaching math education to better suit the needs of students today in a blog post.

- Bill Gates wrote a blog post suggesting three ways to improve math education.
- He says he believes math skills are a "powerful indicator" of future success.
- Gates, once criticized by a teacher for being "lazy" at math, now says he loves the subject.

When Bill Gates was in eighth grade, a teacher asked him why he was "so lazy" in math class. He responded, rather boldly, that the class was "not doing anything interesting."

It turns out the Microsoft cofounder and philanthropist actually loves math — and is very good at it — but he also acknowledges that it's "America's least favorite subject."

In essence, Gates says math education hasn't kept up with how the world has evolved.

"The way that algebra, geometry, and calculus are taught has barely changed — despite tremendous transformation in the labor market," he wrote, adding that tools such as calculators, computers, and AI chatbots had made it "harder and harder to explain to students why they should learn how to do long division or find the area of a trapezoid by hand."

The billionaire returned to eighth grade for a day to gain insight into the math classes of today. He detailed the experience on his blog, and proposed three ways to fix America's problem with math:

1. Math should be tailored to students' interests, capabilities, and goals
2. Math shouldn't be a solo expedition but a class that prioritizes communication and problem-solving as a group
3. Lessons should be applied to real-world problems, such as coming up with a budget or "estimating population growth"

Gates experienced this three-pronged strategy being implemented at Chula Vista Middle School in Southern California, he wrote. The school is a part of the Networks for School Improvement, a Gates Foundation initiative.

In a lesson about measuring the volume of a pyramid, Amilcar Fernandez — who runs the math department at Chula Vista — gave students popcorn containers. One was shaped like a pyramid, and the other was shaped like a rectangular prism. Fernandez asked the eighth-

grade students to talk through which one they would buy at a movie theater to get the best deal.

"Mr. Fernandez gave his students a real-world application that they've likely already encountered—and an incentive to learn the answer. After all, who *doesn't* want to get the most bang for their buck?" Gates wrote.

The new approach to math seems to be working at Chula Vista: Math proficiency rates have increased 18% during the past three years at the school, Gates wrote.

Nationwide math scores, in comparison, have been falling for several years. The pandemic decelerated many students' learning progress, and recent data on math scores for eighth graders and fourth graders across the country indicated there had been a significant setback since 2019.

Even before the pandemic, though, scores were declining. A study published in June by the Nation's Report Card found that math scores for 13-year-olds in seventh and eighth grade had dropped 14 percentage points during the past decade, to levels not seen since the 1990s.

In his post, Gates said math skills were a "powerful indicator" of future success and shared how the Gates Foundation — the philanthropic organization he founded with his ex-wife Melinda — was approaching math education to better suit students' needs.

College grads who land high-earning jobs often major in fields that require strong math skills. Many of the highest-earning college graduates majored in some form of engineering — which relies on skills ranging from basic arithmetic to calculus — a report from the New York Federal Reserve found.

The Gates Foundation and Chula Vista Middle School did not immediately respond to a request for comment from Insider.

Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

Item 8
Source: **Redbrick, October 25, 2023** **URL:** **https://www.redbrick.me/a-feminist-analysis-of-girl-math/**
Note to explain how this news clipping is related to mathematics: The article discusses the difference of mathematic performance between female and male, explores the concept of "Girl Math," which refers to the label of poor financial decision-making and mathematical awareness and examines whether this label as exclusively feminine traits is misogynistic.

A feminist analysis of ‘Girl Math’

redbrick.me/a-feminist-analysis-of-girl-math

25 October 2023

‘Girl Math’, ‘Girl Ethics’, the gastronomical ‘Girl Dinner’. On TikTok and X, formerly known as Twitter, you are never far from this new and popular term. An allegedly innate, deeply insightful understanding of finance possessed by the female population, Girl Math describes the ways in which women justify spending money.

According to Girl Math, cheaper, exchanged and refunded items are essentially free, free shipping is enough to justify any purchase, and money doesn’t mean anything. However, Girl Math may now, have evolved beyond a questionable interpretation of the spending economy. Arguably, it implies an underlying ditzy nature – perhaps a failure to understand mathematical concepts, or at least, a willingness to misinterpret them. Should it be considered misogynistic to identify poor financial decision-making and/or poor mathematical awareness as an exclusively feminine trait?

> “
> Clearly, as a species, we are keen to neatly categorise behaviours along gendered lines.

Searching ‘Girl Math feminism’ on Google mostly produces journal articles in which researchers are investigating the mathematical ability of schoolgirls. It seems that from as early as primary school, there is a significant research focus on examining a woman’s grasp of mathematical concepts. “Maths is a feminist issue,” declares Shirley Conran in The Guardian, as girls less likely than their male counterparts to study A-level maths. Even the use of the term ‘Girl Math’ instead of ‘woman math’ could be viewed as infantilising when describing women aged over 18.

In the mere weeks since the birth of Girl Math, the online world has heralded the arrival of its inevitable counterpart: ‘Boy Math’. Boy Math is less focused on finances and more on general behaviour; an accessible meme format used as a vehicle to discuss misogyny, such as men who try to justify dating underage girls. The meme is self-explanatory; women adhere to the guiding principles of Girl Math, while men are driven by a biological inclination towards Boy Math. Clearly, as a species, we are keen to neatly categorise behaviours along gendered lines.

Could this reflect a collective attempt to return to a rigid gender binary and its traditions, often observed in industrialised, post-feminist societies such as the UK and the US? After all, suspicion of those who defy traditional gender expectations is currently rife, as social

conservatives seek to promote and cling to the old-fashioned hallmarks of gender segregation. Could this all be a rejection of complex ideas, an attempt to simplify? In other words, is it Girl Math?

> “
> …it would appear that the typically ‘girly’ ideals of the colour pink, friendship, success and kindness are in vogue

There is, however, an alternative take on the term. Girl Math advocates on TikTok would argue that its use is rooted in fun, and its popularity is emblematic of women not taking themselves too seriously online. Is the word being reclaimed by women who wish to take control of feminine connotations, which historically, are often viewed negatively? Does ‘girl’ need to suggest weakness? Of course not.

With this summer’s ‘Barbie’ charging through the box office, directed by Greta Gerwig and her female-led team, it would appear that the typically ‘girly’ ideals of the colour pink, friendship, success and kindness are in vogue. At least, superficially; analysing the motivations behind the ‘Barbie’ film is another discussion entirely. But if we can take away one positive, it is the idea that there is nothing wrong with championing women’s interests, whether this involves working in STEM, or spending ‘frivolous’ money.

Perhaps most importantly, do the differences between girl and boy math highlight feminist conversations that need to take place, notably the issues of misogyny jokingly framed as Boy Math? Perhaps the wide-ranging response to the term is feminist in itself, as it brings important topics to light. Ultimately, there are a dozen interpretations of Girl Math, and it is likely that many of them coexist with each other. A statement which could, itself, be considered Girl Math.

Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

Item 9
Source: **The Guardian, September 28, 2023** **URL:** **https://www.theguardian.com/lifeandstyle/2023/sep/28/girl-math-tiktok-joke-women-sexism**
Note to explain how this news clipping is related to mathematics: The article provides a brief opinion about how the difference in "sense of number" between female and male leads to the discussion of sexism on the Internet (Girl math vs. Boy math). This article shows that mathematics becomes a significant attribution of a person in the current society.

‘Can’t we have a funny joke?’ Why #girlmath is dividing TikTok

theguardian.com/lifeandstyle/2023/sep/28/girl-math-tiktok-joke-women-sexism

Alaina Demopoulos 2023年9月28日

According to girl math, you’re saving money if you spend extra to get free shipping.

The lighthearted trend – using questionable numbers to justify indulgent purchases – has been accused of fueling sexism

Anyone who watched 2000s episodes of What Not to Wear or read Cosmopolitan in the 90s knows girl math well. Back in the day, we used to call it fashion math. Let’s say a designer bag costs $800. That’s out of budget – until you remember you’ll use it every day. That’s, like, less than $1 per wear.

Congratulations: you’ve just completed girl math 101. Women on TikTok say the trend, which began with a video made by the user Samantha James, pokes fun at the lengths we will go to justify life’s indulgences. Maybe everything you want to buy on Sephora.com costs $38, but $40 will get you free shipping, so you’re actually saving money if you go ahead and add a $15 mascara to your cart. Makes sense, right?

In August, Daniela Soto posted a girl math video to TikTok sharing some of her wisdom, such as “if something is on sale and I don’t buy it, I’m losing money” and “anything in my Venmo or Apple Wallet is free money”.

“Women are equally capable of making fun of themselves, society’s expectations, and gender norms,” said Soto, who is 24 and works at a mental health startup in Los Angeles.

Malaysia Michelle, a 29-year-old beauty content creator, said: “When I first heard the trend ‘girl math’, I actually thought to myself, ‘Wow, finally a phrase I can use to validate my delusions of being a girl who loves to treat herself whenever and however she can.’”

TikToks with the hashtag #girlmath have been viewed over 488m times. (Just think of the price per view.) Many include comments that say the fad legitimizes sexist stereotypes about spendthrift women.

Girl math is one of a number of TikTok trends attributed to women recently, including the “hot girl walk” – one of the site’s most famous rituals, in which one takes daily jaunts to stave off the ennui of modern life. Then came the “lazy girl job”, the aspirational hope for an easy, 9-to-5 gig that doesn’t require much of one’s soul. After that was “girl dinner”, throwing a meal together out of a bunch of snacks after a tiring day.

Maddy Mitchell, a 25-year-old content creator who lives outside Boston, credits the Barbie movie, with all of its pink frothiness, with popularizing these trends. “Women are celebrating things that bring them together, which is so cool, but of course it’s going to be devalued by many other people out there,” she said. “That’s what it means to be a woman, unfortunately.”

Users clapped back at criticism of #girlmath with “boy math”, making light of men’s financial irresponsibility – or just making fun of men. Example: “Boy math is knowing 75% of your head is balding and still getting haircuts on the last 25%.” Or: “Boy math is not wanting to spend $10 on flowers because they’ll die.”

“These gendered differences reflect longstanding assumptions about the propensity of women towards smaller-scale, perhaps frivolous consumption, and men towards more planned, functional consumption,” said Eve Ng, an associate professor of women’s, gender and sexuality studies at Ohio University.

In Mitchell’s eyes, “honestly, girl math is really funny and I think people are blowing it out of proportion. They’re flipping the narrative to make it seem like girls are dumb, which is upsetting, because can’t we live and have a funny joke that doesn’t equate to our intelligence? I think that all too frequently, when women talk men do not have the nuance to understand if we’re being ironic.”

Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

Item 10
Source: **CNN, October 7, 2023** **URL:** **https://edition.cnn.com/2023/10/07/us/girl-math-boy-social-media-cec/index.html**
Note to explain how this news clipping is related to mathematics: The article shows the origin of girl math, a term for the jokes that women make about their internal logic or calculations, showing that mathematic, as an essential skill in daily life, leads to Sociological debate, such as gender stereotypes.

‘Girl math’ was a fun social media joke. Then ‘boy math’ came along

edition.cnn.com/2023/10/07/us/girl-math-boy-social-media-cec/index.html

AJ Willingham 2023年10月7日

"Girl math" has been making the rounds on social media, but the discourse around it has gotten increasingly complex.

The problem with social media in-jokes is they don’t stay funny for long. Someone takes them too seriously, then they become overblown commentaries on society as a whole, and then a media outlet goes and writes about them and drives it all into the ground.

The concept of “girl math” is currently coasting through this process. The trend features women trading jokes about the internal calculations they make to explain their silly-but-sometimes-not-so-silly behavior. It’s less “math” and more, say, an internal feminine logic, often opaque but always amusing. Some examples of “girl math” include:

- Timing your hair washing so it lines up with weekend plans.
- Spending enough to get free shipping, because otherwise you’re kind of losing money, right?
- Recognizing that if you wear a cute outfit, but no one important saw it and you didn’t get a picture, you didn’t really wear that cute outfit.
- Planning an evening around a reservation, and walking back through every step of your routine so you can figure out when you have to start getting ready. (The answer to this equation is always earlier than one would think.)

“Girl math is essentially the recognition that time, convenience, and money are interchangeable currencies,” disability rights influencer Imani Barbarin wrote on X, the platform formerly known as Twitter.

It’s supposed to be a joke, and like all jokes, it’s not for everyone. You either understand the concept of girl math or you don’t, and it’s not worth getting too upset about if you’re in the latter camp. You don’t necessarily need to know its heritage; that it comes during the 2023 Barbie-tinted Season of Girlhood, or on the heels of the “girl dinner” trend, or that it echoes a 2021 social media motto that posits, simply, “The girls that get it, get it.”

Enter ‘boy math’

Unfortunately, the relatable axioms of girl math found their way onto parts of the internet that, well, didn’t get it. Groups of people started criticizing these innocent jokes, as if a single quip about the mysterious desire for free shipping indicates deep financial illiteracy or that the

circuitous logic women admit to very occasionally using affects every serious decision of their lives.

"'Girl math' is simply ignoring our responsibilities momentarily," one commenter wrote on X. "And everyone has to make it a civil rights issue."

Naturally, "girl math" also entered the lexicon of brands and big names jumping on the latest trend. ("Girl dinner," a term for essentially a personal charcuterie board or random bite-sized snacks from the fridge, attracted similar hype over the summer.)

"You call it Girl Math, we call it the Labor Day sale," a recent promotion from clothing brand Lane Bryant read.

From this tangle of overly serious criticism and brand interference, the idea of "girl math" stretched far past its original intent. Finally, the social media peanut gallery turned the trend on its head. After all, if "girl math" exists, what is "boy math"?

"I think the great equivalent to girl math for boy math is the fact that all of us dudes think we could land a plane," a man in one popular TikTok posited. (This could also be an interesting extension of the Roman Empire discourse, which began when many men admitted they think about the Roman Empire on a shockingly regular basis.)

Democratic Rep. Alexandria Ocasio-Cortez of New York is one of the big names to wade into the "girl math" trend.

Kevin Lamarque/Reuters
Some boy math examples were a bit less, shall we say, lighthearted

"Boy math is wanting a traditional wife but calling you a gold digger cause he has to provide."

"Boy math is how 5'10 measures 6'"

When 51-year-old comedian Dane Cook married his 24-year-old longtime girlfriend Kelsi Taylor," the social media response was filled with jeers of "boy math."

New York Democratic Rep. Alexandria Ocasio-Cortez used this permutation in late September to call out Republican Rep. Kevin McCarthy before he was ousted from his position as House speaker.

"Boy math is needing 15 attempts to count the votes correctly to become Speaker and then shutting down the government 9 months later," she wrote on X, much to the consternation of some male commenters who called it sexism.

“Girls were just being silly and making fun of themselves with girl math jokes but y’all wanted to be rude for no reason now look at you, the boy math drag is endless,” one commenter wrote on X.

All of a sudden, a lighthearted joke became so much more: A commentary on gender and stereotypes, an obscure reference through which even serious political conversations could be observed.

The deeper meanings of boy and girl math

Once a trend is mutilated and reanimated into discourse, it’s time to bring in an expert. Mary Louise Adams, a sociology expert and associate professor of kinesiology and health studies at Queens University in Kingston, Ontario, gamely offered her take on what “girl math” and “boy math” may mean — if we want it to mean anything.

“What I read through this trend is that people still do feel like they live in a profoundly gendered world,” she told CNN via email. “They assume, and their experience confirms for them, that women and men approach the world from quite different positions.”

Some of the discomfort around the whole “girl math” joke has stemmed from the use of the term “girl,” which some people find belittling when used to describe grown women, and its apparent riff on the false stereotype that women are less mathematically capable than men.

“Some women are trying to make jokes that rely on the fact that differences between men and women are still seen as fundamental to how people live,” Adams said. “In the 1970s feminists definitely would have thought we would be getting over this by now!”

However, she said jokes about “girl math” could be a humorous reclamation of these stereotypes. Such humor, she says, is a form of natural bonding, and can produce a shared identity. Through this lens, jokes about spending money to save it, or how to manage time while trying to fulfill different social roles, serve as a subversion of these “girl”-coded expectations rather than a reiteration.

“The desire for identity is not just about the ‘math,’ of course, but maybe about resisting a bigger cultural belittling of women’s consumption habits, and persistent assumptions that women can’t be as good as men at math and other technical things,” Adams said.

“It could be women thumbing their noses at people who try to devalue them.”

At that point, it’s less “girl math” and more girl calculus, or girl game theory. It makes sense to those who need it. For everyone else, it’s an equation they shouldn’t trouble themselves to solve.

Name: Wong Kwok Yin UID: 3036070362 Tutorial Group: Toby 3

Mathematics and technology have a mutually influential and irreplaceable relationship that promotes each other's development. From Item 3, mathematics holds an irreplaceable position in technology. Taking AI as an example, various fields of mathematics such as statistics, algebra, and calculus enable computer to analyze lengthy passages, reconstruct language, and ultimately facilitate intuitive communication between humans. Mathematics not only serves as foundation of technology but also acts as its fertilizer, allowing technology to expand, like ChatPDF (AI application which understand PDF files by mathematical algorithms). Technology also promotes mathematic education, as observed in Item 1 and Item 2. AI not only provides students with real-time explanations but also allows teachers to improve teaching methods and cater to individual needs. Ultimately, technology assists in nurturing more mathematical talents in education and lead to exponential progress in the future of mathematics.

Mathematics also enhances human psychology. From Item 9 and 10, some girls make irrational decisions due to weak perception of

mathematical concept, which leads to ridicule from people on the Internet, yet, as seen in Item 8, mathematical ability is not inherently linked to gender. What is more important is mathematic is essential to make rational choices and personal intelligence, as demonstrated in Item 7. However, as seen in Item 6, many students struggle to understand mathematics, and part of responsibility can be attributed to teaching methods (Item 4 & 7). It is suggested mathematic educational approach should be evidence-based and tailor-made in order to retain mathematical talents. Fortunately, as shown in Item 5, new educational measures prevent students from overestimating or underestimating their abilities. I believe that mathematics education contributes significantly to future cognitive development. Therefore, it is crucial to improve educational measures appropriately, to prevent more students from developing a dislike for mathematics and losing a bright future.

(Word: 298)