

CyMath Report for 2023-24

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Tutoring assistant: Hae Tha Lay Paw (Elementary Education undergraduate student)

CyMath is a tutoring program that provides school-year long weekly small-group support to grade school students, primarily from populations that are underrepresented in engineering. The tutors are Engineering and Math/Statistics graduate students, postdocs, and faculty, and Elementary Education undergrads. Almost everyone, other than undergrads, volunteers their time. Due to the cumulative nature of mathematics education, if there is knowledge missing in students' learning in early grades, it becomes more difficult to address as the child advances in the education system. CyMath begins with students in third grade, allowing tutors to fill in the learning gaps while they are still small. The program hopes to continue support through high school. Its long-term goal is to increase the number of students prepared to pursue, and thrive in, math-intensive majors in college. CyMath was originally founded in Fall 2020.

Quantitative Summary of CyMath 2023-24 year

The growth for the 8 students who spent at least a semester at CyMath (6 third graders who spent entire year, 2 fourth graders who spent one semester) has been very encouraging. With two rounds of *Measures of Academic Progress (MAP)* testing data, we observed the following. *Four out of these eight students showed above-average and above-median growth (average and median for Sawyer students).* **One of the six full-year students grew by 30 points, when the average and median growth are both 17 points for the full year. This student went from being around 30-th percentile across Iowa to 85-th percentile across Iowa in a year.** Details are given below.

- One of the six third graders who spent a full year at cymath has grown a full 30 points from 186 to 216 in RIT score (MAP test score) and in percentile from 30-th to 85-th across Iowa. This student also practiced math regularly at home.
- Full year RIT score growth for the 6 third grade kids who spent an entire year at cymath (and all started at 30-th or lower percentile): 30,21,18,13,12,6 RIT points.
 - Average and median growth for Sawyer is 17 RIT points
 - Demographics: 3 Black, 1 Asian, 2 White
- One semester growth for two fourth grade kids who started in January: 19, 8.
 - Average and median growth for Sawyer is 9 RIT points.
 - Demographics: 1 Black, 1 Asian
- 6 kids started later (March or May 2024) and most of those have shown growth in their scores too. We of course cannot attribute much of their growth to CyMath.
 - Demographics: 1 Black, 3 Latino, 2 Asian
- Tutoring Team
 - Volunteers: Dr. Mohamed Selim, Ruoyu Meng (Dr Ramamoorthy's grad student), Jiabin Lin (Dr Moothedath's grad student), Seounghun Son (Dr Berk's student), Yingchao Zhou, Yan-Han Chen, Sarah McCarty; one semester: Silpa Babu (my student), Chevonne McInnis (Dr Holland and my student), Vrinda Girimaji (Dr. Ramamoorthy's grad student), Jorge' Yass, Michael Chen, David Walker, Rebeka Sultana, Susanne Chitying.

- Except Dr Selim, all are grad students in ECpE, Math, Stat, Comp Sci and almost all of them have taken an EE class (EE 623 or EE 425).
 - Tutoring assistant and tutor (Elementary Education major): Hae tha lay Paw – started in Spring 2024
 - Other Paid Undergrads: Ella Delgado, Jazmyn Moreno, Jordan Kreiger
- Compared with what is called typical growth (based on nation-wide data), six out the eight are above-typical.
 - Source for typical growth data: <https://www.montgomeryschoolsmd.org/siteassets/Schools/Elementary-Schools/P-S/pinecrestces/uploadedFiles/news/MAP-Scores-FAQ.pdf>
 - Typical nation-wide growth for fourth graders: 8, for third graders: 11

Brief History of CyMath

- **CyMath 1.0: School years 2020-2022:** In 2020-2022, CyMath started and ran in virtual mode for students from one Des Moines, Iowa elementary school, with one tutor working with 2-4 students. In 2020-21, we had 14 third grade students and 5 tutors, in 2021-22, we had about 35 third and fourth grade students and 10 tutors. Once a week small group learning worked well, even in online mode, for students who attended regularly. However, at the end of the second school year, students had lost the ability to focus virtually.
- **CyMath 2.0: Spring 2023:** We tried to reach students through Science Bound connections while still proposing to start tutoring in online mode with some in-person trips. This failed (started for 3-4 students of Des Moines Virtual Campus but they missed many weeks).
- **CyMath 3.0: School year 2023-24:** ran for a full year every Tuesday and Wednesday 2:45-4pm from September to May except school breaks at Sawyer Elementary in-person. Experimenting with sessions at ISU and Zoom during May-July.

Detailed Report for the 2023-2024 School Year

For the 2023-2024 program, we met with the Ames Community School District (ACSD) Director of Teaching and Learning, Erin Miller, and her team. They were excited about CyMath because they are currently unable to give additional math instruction to students who need it most. As a result, ACSD and Iowa State University CyMath entered into an agreement to provide the program at Sawyer Elementary School, where the principal is Nicole Coronado. Following is a 2023 “snapshot” of **Sawyer**:

- Student Enrollment (Oct. 1, 2023): 360
- Student Breakdown:
 - English Language Learners: 12.5%
 - Students receiving Special Education Services: 18.1%
 - Free and Reduced Lunch: 36.1%
 - Breakdown by Race
 - * Hispanic/Latinx: 10.57%
 - * American Indian/Alaskan Native: 0.23%
 - * Asian: 5.52%
 - * Black/African American: 8.27%
 - * Native Hawaiian/Pacific Islander: 0%
 - * White: 65.98%
 - * Two or more races: 9.43%
- Student Achievement
 - * ISASP Reading proficiency: 71% (as of 2023 end-of-year testing)
 - * ISASP Math proficiency: 63% (as of 2023 end-of-year testing)

CyMath 3.0 - Summer and Fall 2023 Overview

Summer 2023 Activities:

- Met with Ames School District and planned targeted recruitment
- Set up the cymath website and sign up forms for volunteers and tutors

- Prepared flyers and advertisement to be distributed by Iowa State University and ACSD
- Registered the program with Risk Management
- Created application and selection process for students and parents

August 2023:

- flyers distributed at Sawyer
- tutors recruited
- students enrolled

September - December, 2023.

- Weekly tutoring sessions were held on Tuesdays and Wednesdays after school (3-4 pm). Each student came in once a week.
- The school identified 25 third grade students and invited them to CyMatj
- Twelve students were signed up by their parents by filling the form on the CyMath website. Of these only 10 started.
- Students received the ALEKS license and were encouraged to do 10-15 minutes of math every day after school hours.
- While the default mode of tutoring remained in-person (needed for relationship building), we maintained a Zoom account to allow for occasional Zoom sessions. We do believe this is important, for additional support and snow days.
- All tutoring was one-on-one or in groups of two.
- A two-hour youth engagement training was held for tutors with an experienced instructor.
- Tutors maintain notes and obtain guidance from the director to challenge and support students appropriately. This is done via a Discord group, email, text or in-person meeting.
- A regular method for parent communication was instituted. Calls were made to parents as well to find out what was and wasn't working in the program.
- Parents were invited to one of two pizza party celebrations. The events were organized to recognize students who achieved or exceeded the goals of practicing math for a certain period of time and/or completing a certain number of modules, and to provide an opportunity to speak with families.
- The district provided bus transportation to those needing it after school.

Student Progress

During the course of the semester, several students either opted out of the program or moved from the Sawyer district. In consultation with the principal, it was decided that, in Spring, siblings of current participants (three) would be invited (all fourth graders) and that we would offer participation twice-weekly. One new student was invited by the Principal, but they did not start coming so far. Students met the following milestones:

- In general, students are mastering two- and three-digit addition and subtraction with regrouping, learning multiplication and division concepts, increasing their understanding of fractions, becoming proficient with time concepts, and working some logic questions.

- One student completed third grade ALEKS work and is starting on fourth grade components, and another will meet this milestone soon.
- One student, whose teacher noted his math improvement before his move out of the Sawyer district, gave credit to CyMath for his math learning.
- All students improved their Measures of Academic Progress (MAP) test scores from Fall [Aug/Sept] to Spring [January] test. Students were invited in Fall based on math test scores.
 - Of the six students who remained in CyMath through Fall semester, four demonstrated above-median or median growth (two at the 76th percentile, and two at the 46th percentile).
 - Two others showed lesser growth, but these were the two who started with the highest scores in the CyMath group of students (they will do better as more students at similar levels join CyMath).
 - Some background: (1) MAP score growth percentiles are normative; this means that the percentile is computed by comparing the student's RIT score with only those third graders of Iowa who had similar RIT scores in the previous MAP test. (2) We should point out that the test score is a single snapshot; and that 6 kids is not a valid statistical sample.

Spring 2024 Activities:

- Program assistants (undergraduates from Education and related majors) hired to help students, maintain supplies, be extra hands, and ensure the tutoring runs smoothly.
- More tutors recruited.
- Siblings of students (4th graders) have been invited and are participating
- Most students got the option to attend two sessions a week (Tuesday and Wednesday)
- A few tutor training sessions provided (peer training) by a retired teacher Ms Kosterman and by the Elementary Education undergraduate student Hae tha lay Paw.
- **April 2024:** CyMath Engineering Day was organized on Saturday April 13 at ISU for CyMath students and families.
- Our program is improving student math skills. We also have the tutor support to add more students. As a result, we want to
 - add more kids and
 - try out a zoom-from-school day.
 - We will request the school to send invitations to students in the 20-70th percentile. We will also follow up directly if school provides parent contacts.
 - Based on tutor availability, some students will be invited to start after Spring Break, while most will be invited for Fall 2024. As the program grows, it helps to have students identified but starting after a delay.

Summer 2024

CyMath ran tutoring sessions at ISU (Coover Hall) on Saturdays in May and on four weekdays in early August. We provided four Zoom tutoring sessions during June, July and one in August.

Fall 2024

We have expanded to a total of 20 students. 16 from Sawyer (hybrid), 1 from Fellows (online) and 3 who are now at AMS (online). Two Graduate Assistants and one lead undergraduate student (working as an REU student) have been hired to run the program smoothly.

Quantitative Growth during just Fall 2023

CyMath ran for third graders in one Ames school (or we can write it as CyMath ran in one Iowa school). All CyMath students improved their Measures of Academic Progress (MAP) test scores from Fall [Aug/Sept] to Spring [May] test. Of the six students who remained in CyMath through Fall semester, four demonstrated above-median or median growth (two at the 76th percentile, and two at the 46th percentile). Two others showed lesser growth, but these were the two who started with the highest scores in the CyMath group of students (they will do better as more students at similar levels join CyMath).

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