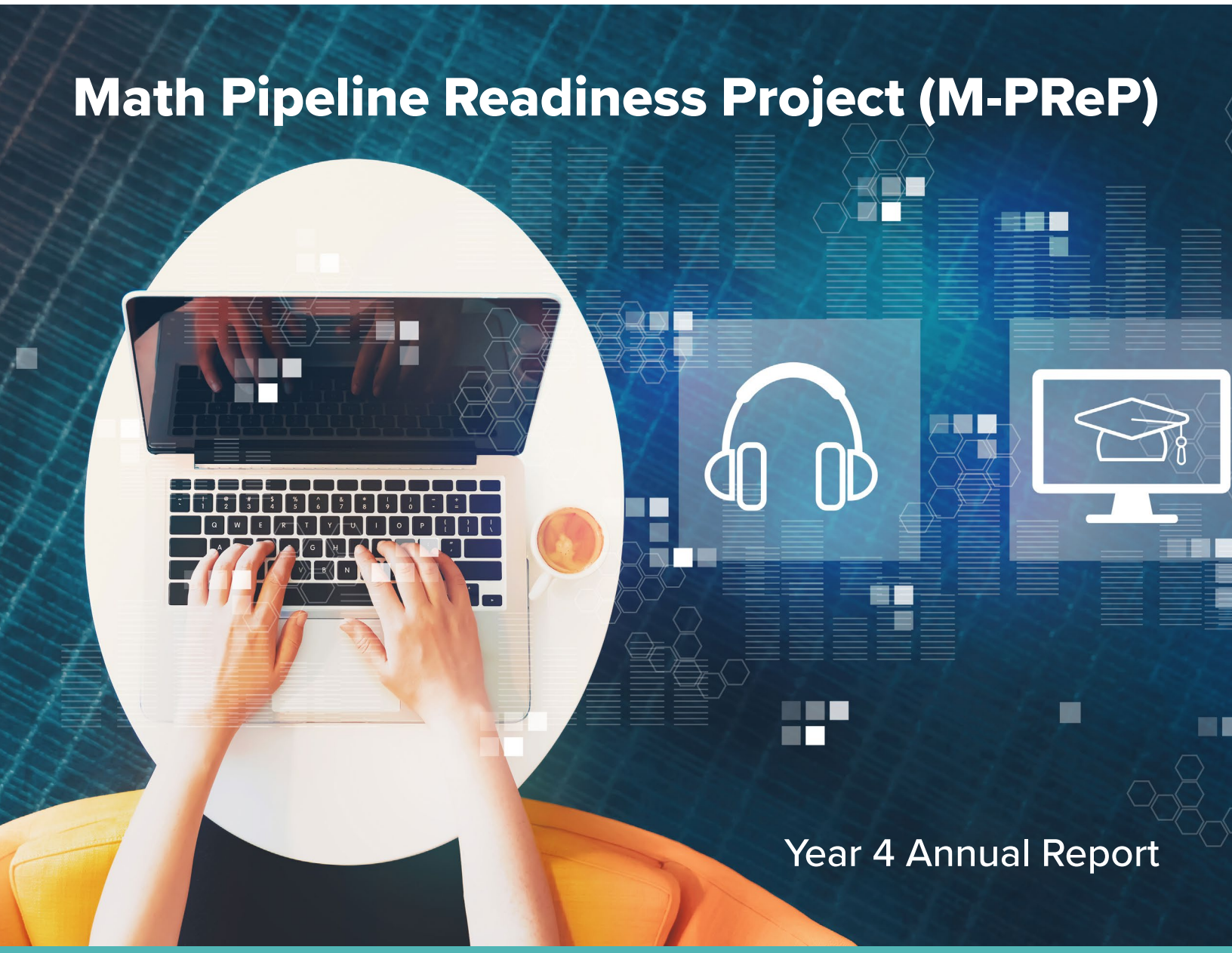
COLLEGE BRIDGE

Math Pipeline Readiness Project (M-PReP)



Year 4 Annual Report

Abstract

A longitudinal project to improve college outcomes through the K-16 alignment of math education and college knowledge in Southern and Central California.

Authors

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Owynn Lancaster, MAT

Executive Summary

"I am so very tired of my house." – M-PReP High School Student

In the 2020-21 school year, the Math Pipeline Readiness Project (M-PReP) pivoted to support math teachers and counselors in remote instruction. Professional development and research focused on the implementation and evaluation of remote math instruction in grades 6-12, including the SLAM dual-enrollment intervention program for high school seniors. Research findings are provided for Remote Learning in 6-12 Mathematics (2020-21 cohort), SLAM Dual-Enrollment Outcomes (2020-21 cohort), and College Outcomes (2017-18, 2018-19, and 2019-20 cohorts).

Remote Learning in Grades 6-12 Mathematics

Our general conclusions are that the attitudes around the remote pivot and experiences of the academic year 2020-2021 were stressful for most students and teachers. However, in terms of student learning, **approximately three-fourths of students reported that their remote learning experience was generally good.** Of the students in grades 6-12 who completed surveys (4,490 in Fall 2020 and 2,510 in Spring 2021), **20% preferred learning math online to in-person** and would choose this modality in the future. This statistic was similar for undergraduate college students pre-pandemic.

SLAM Dual-Enrollment Outcomes

Participation in dual-enrollment courses, as well as pass rates, held with 439 students during the campus closures. The aggregate pass rate of 84% in 2020-21 was the same as the average pass rate from the previous seven years of implementation. A trend continued with SLAM STEM students outperforming SLAM Statistics students.

College Outcomes

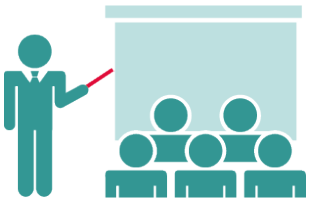
College course-level data were attained for 222 SLAM alumni who graduated high school in 2018, 2019, or 2020. Of these alumni, **80% passed a college-level math course with a grade of C- or higher.** The outcomes below are disaggregated by SLAM course and college math pathway.

SLAM Stats alumni outperformed STEM alumni in college calculus. While the population of students taking college calculus is small, previous reports found similar outcomes in college STEM math pathways for both SLAM Stats and SLAM STEM alumni. These findings suggest that a positive experience in any dual-enrollment math may impact future college STEM outcomes.

Initial trends for 1-Year College Return rates for SLAM alumni for the Classes of 2018 and 2019 continue to be positive, matching or outpacing the national 4-year average.

The Numbers

11
SCHOOLS



116
TEACHERS

10,876
STUDENTS

The Setting

M-PReP includes urban schools in Greater Los Angeles and rural schools in California's Central Valley.

Participating schools include large comprehensive, small magnet, and charters and must serve at least 80% low-income, minority students.

Schools in the Los Angeles region partnered with local California State University campuses; schools in the Central Valley partnered with a Community College.

Report Sections

- **Remote Learning Findings (page 3)**
  - Initial Discussion
  - Attitudes about Distance Learning
  - Student Engagement
  - Student Experiences Over Time
  - Future of Distance Learning
    - Technologies to Keep
    - Optimizing the Distance Learning Experience
- **2020-2021 School Year Outcomes (page 10)**
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  - Earned College Credit in Math
  - SLAM Alumni College Persistence
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Remote Learning Findings

Initial Discussion

The disruption caused by the COVID-19 pandemic shifted our focus to the impacts of remote math instruction on students and teachers. We compiled four surveys and several de facto focus groups to track, analyze, and reflect those changes. Both teachers and students were administered surveys late in the Fall term and again late in the Spring term. Teacher responses were collected and analyzed first to inform the survey questions for students. Over the course of the year, our focus pivoted from whole attitudes and feelings into specific experiences with online technology and learning.

Our general conclusions were that the attitudes around the remote pivot and experiences of the Academic Year 2020-2021 were stressful for most students and teachers. However, **most students reported that their remote learning experience was generally positive or the same as in-person learning, with potential opportunities for more success in a subgroup of the student population.**

In our exploratory research of understanding student experiences from the pandemic, we observed disjointed perceptions of learning, effort, and experience whereas teachers perceived student learning to be poor while students reported otherwise. Initially, **both teachers and students were focused on their general anxiety as the overwhelming influencer of learning.** According to Mega et al., (2014), this anxiety created an affective barrier to learning. However, when students were asked about specific examples of their learning experience, most reported that they learned as well, if not slightly better, during the pandemic.

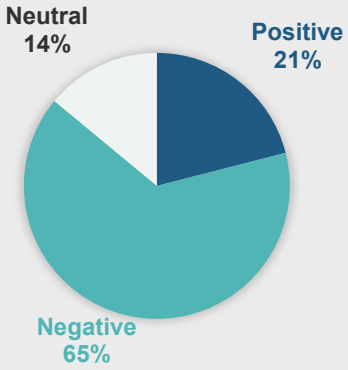
Throughout this section, we present the comparative information for our two student surveys and the progression of attitudes and experiences about remote and online learning impacted by COVID-19. For reference, 4,490 students participated in the Fall 2020 student survey and 2,510 students completed the survey in Spring 2021. The number of student responses to individual questions varied and is noted in each chart.

Attitudes about Distance/Remote Learning

With 1,710 open-ended descriptions of experience from our Fall 2020 survey, our team found it best to qualitatively code these responses on a continuum from a positive experience to a negative experience with neutral a mixture of both negative and positive qualities. Dumas (2018) summarized the inclusive coding model used by Lonigan and Burgess, stating "that younger students, such as those in a K-12 setting, are more likely than higher education students to indicate latent constructs that are undifferentiated, or unidimensional." Dumas (2018) further asserts that categories can be used to qualify individual student experiences as opposed to blanket conceptualizations about learning opportunities at schools.

Using inclusive coding, we distilled students' comments to the quality to their experiences. Students who described a **positive experience discussed learning more** or engaging more with their class, content, or teacher than they had previously. On the other hand, **negative responses emphasized disruptive** environments or "**non-academic**" **or affective barriers**; stress, distraction, trouble focusing issues, family stressors, etc. While **neutral comments** described a transitory place, **shifting from negative affective barriers to positively describe their learning.**

OPEN-ENDED COMMENTS ABOUT DISTANCE LEARNING, FALL 2020
(N=1,710)



Selected student responses with minor edits for clarity:

***Positive**: "I prefer distance learning in terms of math because it seems more personalized, it feels like I'm being taught directly instead of a group because there's no tangible peer or social pressure. Also, the teachers were forced to cater to the students' needs because we are distanced. I feel like this was the most explicit care and attention I have had as a student, compared to in-person school."*

***Negative**: "It's very hard to focus because I'm in one room most of the day so it feels like I'm trapped."*

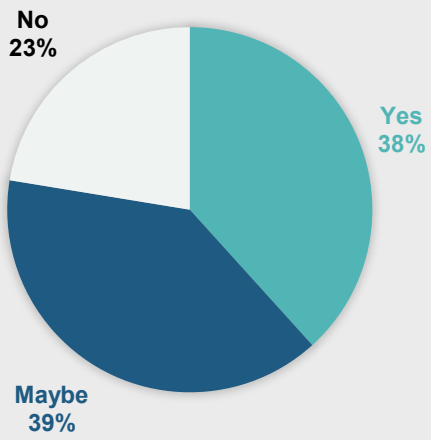
***Neutral**: "My experience in distance learning is quite interesting since I am not getting the full experience like when I'm actually at the school. I am used to be being in school, but distance learning gave me a new perspective of learning things. It might take forever to go through each topic, but understanding is the key part."*

The 21% of students identifying positive experiences from remote learning is in line with the 18% of college undergraduates who opted for online classes and the 20% who chose a mix of online and in-person in Fall 2019 (IPEDS, 2019). To determine if, similarly to their higher education counterparts, a subset of students in grades 6-12 would chose online over in-person, we explicitly asked about their choice to be online in the follow-up survey in Spring 2021.

To filter non-cognitive barriers from student learning, we divided our inquiry into students' level of preparedness for, and choice to take, online math classes in the future.

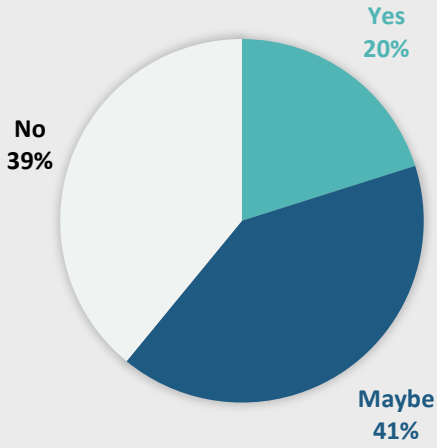
Do you feel prepared to take online math classes again?

ALL STUDENTS (N = 2,217)



In the future, would you choose online math classes over in-person?

ALL STUDENTS (N = 2,207)

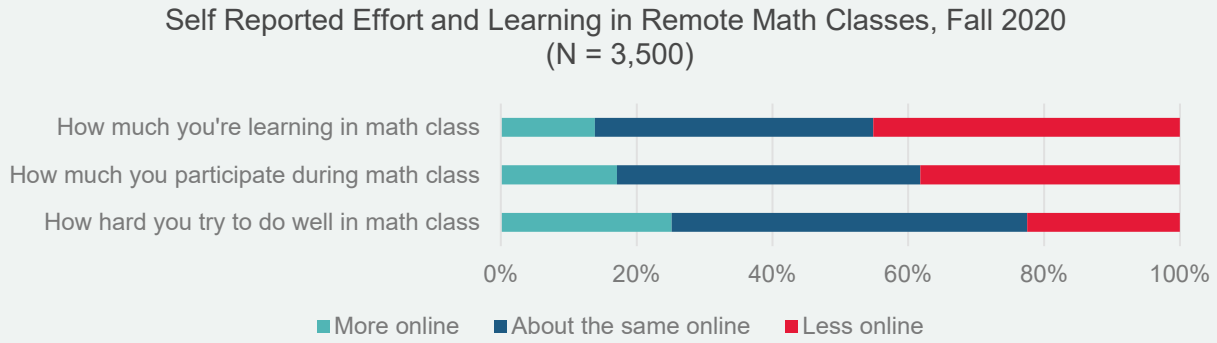


Despite 38% of students claiming to feel prepared for online math, only 20% stated they would choose online over in-person. This statistic aligns to the 21% of students citing positive experiences in distance learning in the fall survey. **The same rate of 20% of students citing a preference to online math over in-person occurred when the data were disaggregated for high school (grades 9-12) and middle school (grades 6-8) students.**

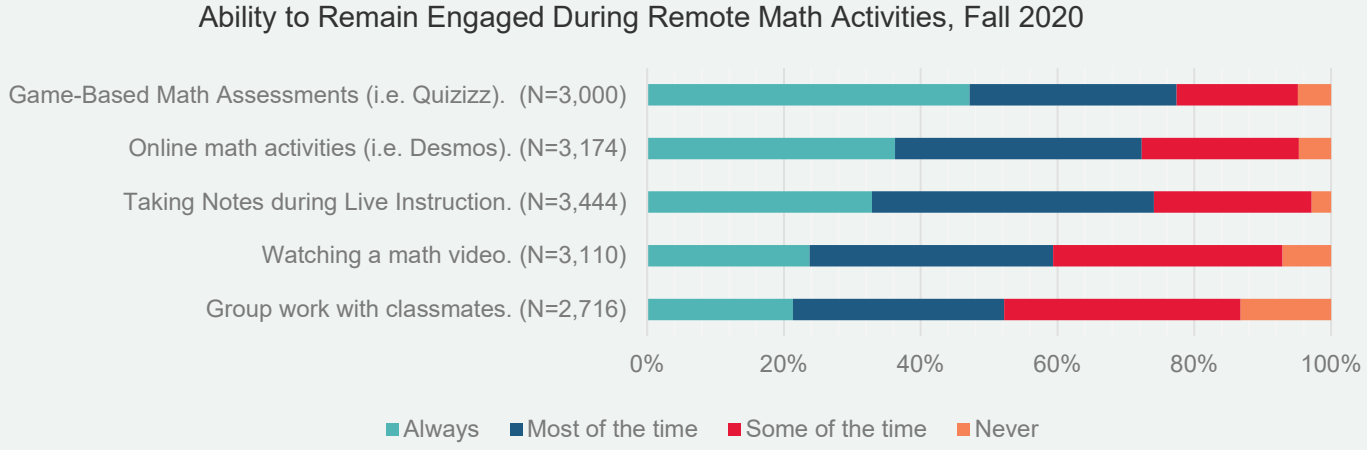
With this many consistent associations, **an online learning modality should be considered as a permanent component of secondary education in California**. At a minimum, the data suggest that online learning may be a key factor in improving learning outcomes in math for 20% of students. The next section will explore the experiences with distance learning for the remaining 80% of the student population.

Student Engagement

When surveying teachers in Fall 2020, the biggest concern reported was student engagement in the online environment. Therefore, the student survey asked several questions about levels of engagement in addition to questions about the students' perception of their learning experiences. According to Deslauries et al., (2019), students are not good judges of their learning. Still, they are aware of changes in participation and their level of engagement, which can approximate their perception of learning. The chart below illustrates responses from Fall 2020.

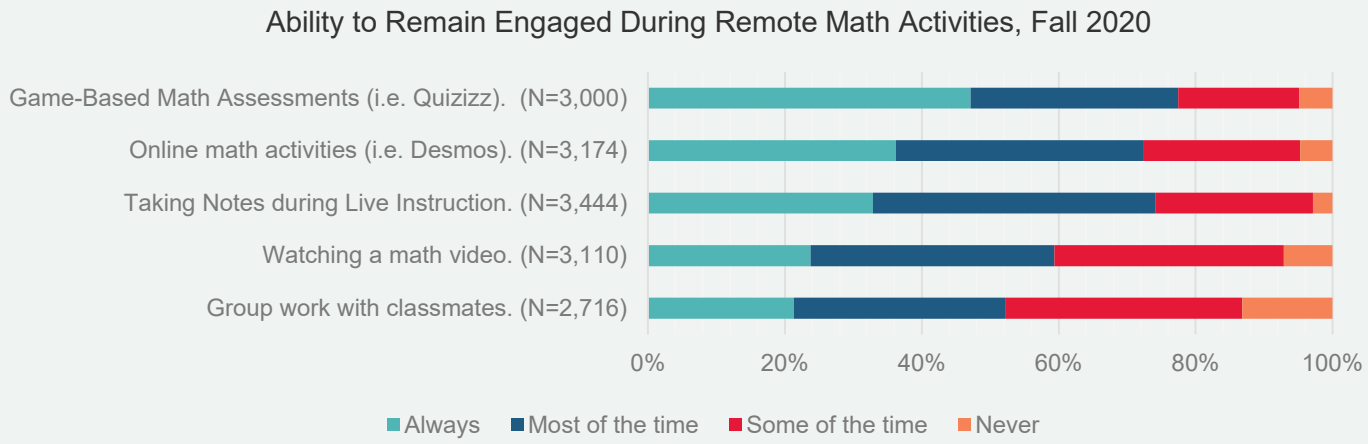


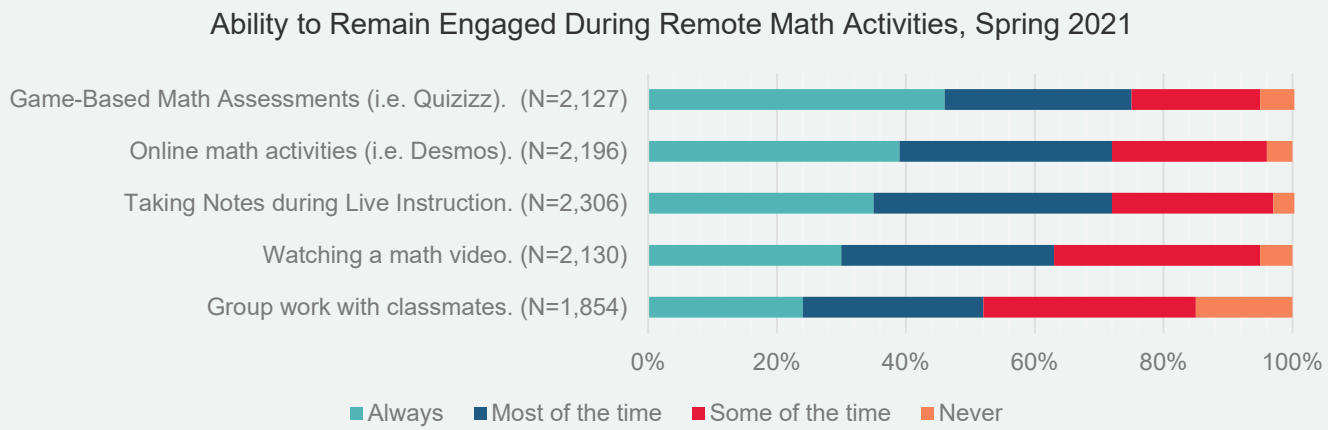
In the fall, a little more than half of the students perceived their learning was the same or better with remote instruction while about 75% cited trying the same or harder to do well. According to Carpenter, 2013; Deslauriers et al., 2019; and Porter, (2013), the level of effort, or engagement, students experience correlates to learning. A connection can be seen between the percentages of students trying hard in the previous chart to their level of engagement during the top three activities listed in the following chart.



Student Experiences Over Time

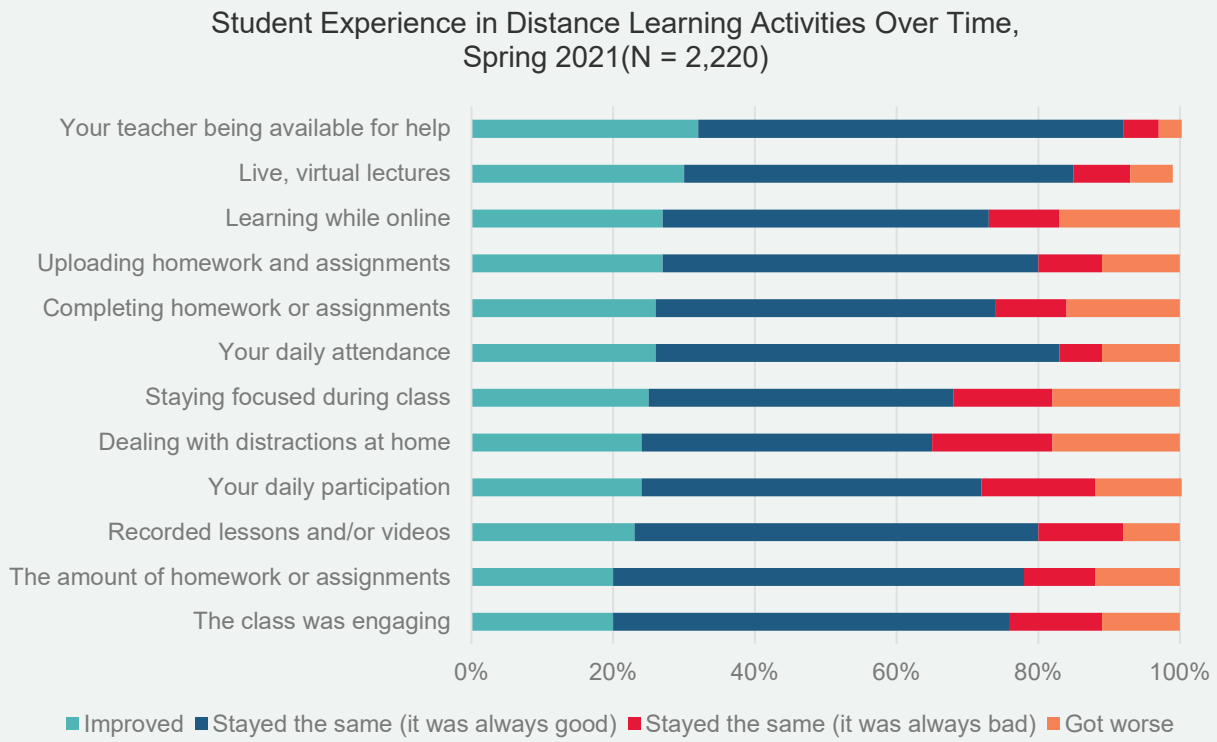
The students described levels of engagement that remained consistent throughout 2020-2021. For comparison, the outcomes from the Fall 2020 and Spring 2021 survey are provided together below.





The outcomes were nearly identical from fall to spring with **approximately three-fourths of students remaining engaged during active learning activities**. One anomaly, however, is the lower engagement during group work. According to (Frey & Fisher, 2009), when groupwork typically lacks structure in new learning modalities, it generally is less liked or perceived negatively. This research may explain the lower engagement as, throughout the project, several teachers discussed challenges with student participation in break-out rooms. Schools continuing with distance learning should explore professional development opportunities to improve student-to-student engagement.

In response to the outcomes of the fall survey where student experiences with remote instruction were viewed as positive, negative, or neutral, we created a set of follow-up questions to tease out learning from non-academic affective barriers. In this survey, students were asked to rate the change in their experiences with specific activities over time.



Overall, approximately 75% of students reported distance learning as good, or improving over time. Variation is seen within the subset of the academic versus non-academic activities. To note, the two items "staying focused during class" and "dealing with distractions at home" represents the largest, non-academic, affective barriers that students might have. Consistent with our findings from Fall, those were the areas with the largest portion of students stating that it 'got worse,' or was in itself 'always bad.'

Students, again, were given the opportunity to provide open responses about their experiences with distance learning. Similarly to fall, they articulated, **positive experiences about learning**, **negative experiences about affective barriers**, and **neutral responses going from affective barriers to specifics about their learning**.

Selected student responses with minor edits for clarity.

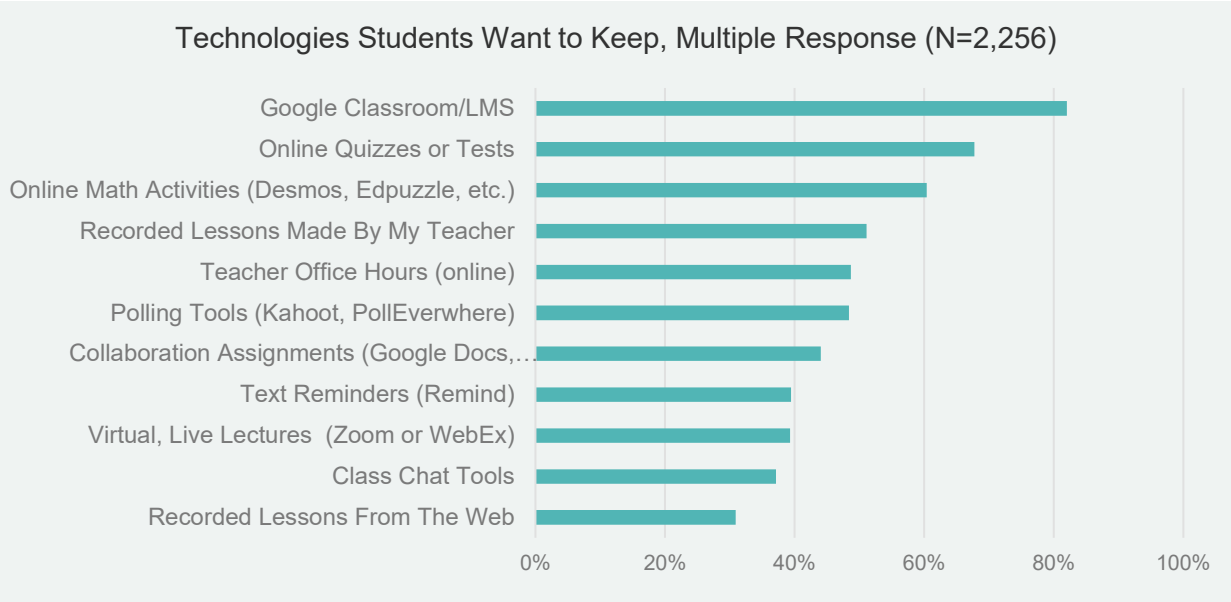
***Positive**: "I feel as if recorded lessons really helps because if I need to rewind on a part I don't understand, I can until I understand that. I obviously can't do that in person. I can ask questions, but I don't feel comfortable with everybody staring at me, making me feel dumb. That is why I prefer online because no one knows who asked the question, (because it's anonymous in private chat) and I don't get the additional blank stares I would get in person."*

***Negative**: "Honestly I feel like in persons is better than online because online I couldn't focus and I would fall sleep or would be late and I would get bad grades and In person I get better grades and I focus better and I don't fall asleep and I'm not really late to classes."*

***Neutral**: "It was a good experience. I just hate doing classes online, because I have more distractions in my house, which causes me to not pay attention as much as in-person class."*

Future of Distance Learning: Technologies to Keep

COVID-19 caused a massive infrastructure buildout around internet connectivity and devices for students. With students connected, teachers globally introduce digital tools and practices into the learning environment. We surveyed students to learn what technologies, if any, they would like to keep using in future math classes. The chart below illustrates their responses.



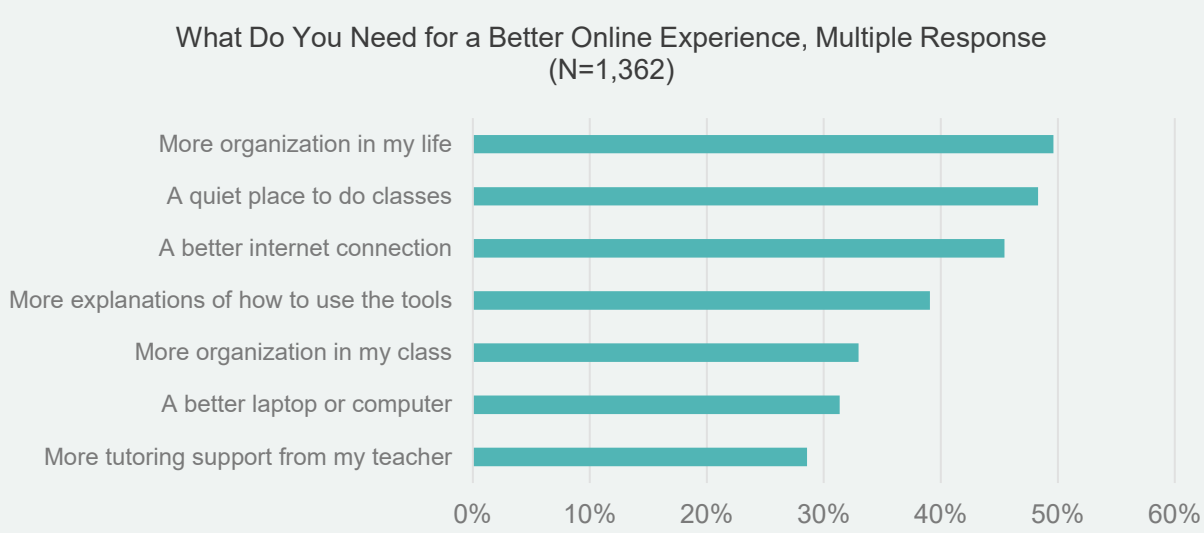
Overwhelmingly students cited a learning management system such as Google Classroom, Canvas, etc. as a must-have technology. This resource organized class content, displayed homework assignments, provided assessments and discussion boards, and allowed students to

directly submit assignments. **The LMS provided a new tool for students, parents, and teachers to view and access all course materials and grades in real time**.

Other **popular technological tools correspond to engagement activities,** rather than traditional learning tools. Students want to keep the tools that kept them interested and connected to that content. This is especially poignant since the return to in-person instruction has emphasized a narrative that students did not like anything during their time online. The data suggest that students did not want "Zoom School" but enjoyed the online tools that help manage their materials and assignments and keep them connected and engaged.

Future of Distance Learning: Optimizing the Distance Learning Experience

When students were surveyed about their feelings of preparedness, they were subsequently asked to share reasons why they did not feel prepared; several non-academic barriers were cited as significant factors. Any secondary schools planning to offer distance learning should ensure that students are well-equipped with the components detailed in the chart below.



While certain student requests, such as "more organization in my life," are outside of the school's control, technology and teacher activities can be provided and supported to improve students' distance learning experiences.

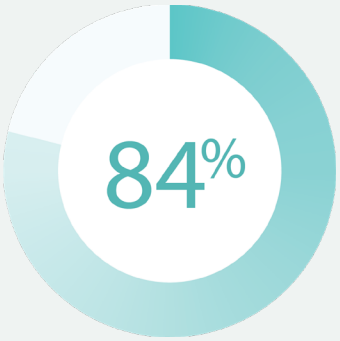
2020-2021 School Year Outputs & Outcomes

SLAM Dual-Enrollment Outcomes

The SLAM dual-enrollment program continued as a component of M-PReP through the pandemic. In the urban Los Angeles schools, the SLAM Statistics program changed to a fall/spring Pre-Statistics/Statistics model and SLAM Pre-Calculus continued as a year-long stretch course. Both extended support models enrolled students in the university in the spring, allowing lead time to settle into remote instruction. The rural models included extended support as well as three courses for college-ready students. All rural models began in fall to a rocky start with difficulties registering students in person.

SLAM Pass Rates

Participation in dual-enrollment courses, as well as pass rates, held during the campus closures. All SLAM courses were taught online and hosted on the Canvas platform. While there were logistical differences across high school campuses such as shifts to a quarter system and varying synchronous schedules, the aggregate pass rate in 2020-21 was similar to the average pass rate of 84% from the previous seven years of implementation.



N=439 UNIQUE STUDENTS

Pass rates were consistent for both college-ready and underprepared students. Within the Non-STEM and STEM categories of SLAM courses, student outcomes were similar in the support options and non-supported classes.

		Enrolled	Passed	Rate
Non-STEM	Pre-Statistics/Statistics*	257	200	78%
	Statistics	24	19	79%
STEM	Pre-Calculus w/support*	82	78	95%
	College Algebra	50	47	94%
	Trigonometry**	45	43	96%
	Calc 1/Calc 2	21	21	100%

*supported courses for underprepared students. **Subset of College Algebra students.

Outcomes in STEM pathway courses were higher than the outcomes in the Statistics pathway. This finding is consistent with the past three years of data comparing STEM and non-STEM SLAM programs.

College Transition Plan Revision

The College Transition Program (CTP) works well as a Distance Counseling model.

Given the school closures, the College Transition Program (CTP) was offered through a distance counseling format in the 2020-2021 school year. The new format consisted of pre-recorded lessons offered through both zoom and YouTube, paired with office hours. Office hours were held twice a week for three weeks, staffed by a College Bridge College Counseling Specialist.

Distance CTP Content Overview

Pre-Recorded Lessons	Office Hours
• Entering SLAM course on college applications • Ordering SLAM college transcript • Planning for first semester in college • Finding and planning for your college graduation requirements • Utilizing college student services to help with any challenges that arise	• Ordering college transcript • College graduation requirements • Creating your Fall 2021 College Schedule

Ideally, CTP lessons should be delivered by School Counselors, but as we have learned over the past several years, counselors are stretched thin and often do not have the time or content knowledge to deliver these lessons.

Moving forward, the CTP will be imbedded in all SLAM courses. Students will access the curriculum through Canvas with SLAM teachers facilitating the course delivery. Professional learning will be provided for SLAM teachers to support the students during class time. Additionally, the lessons on "making a college list" and "financial aid" will be reintroduced to the curriculum. Due to the unstable start of the school year, these lessons were eliminated from the Year 4 program.

School-wide College Readiness Outcomes

In response to the COVID-19 pandemic, state law (SB 98 (19)) suspended the requirement for school districts to adopt a local control and accountability plan (LCAP) for the 2020-21 school year, including metrics for the College and Career Readiness Indicator (CCRI). Statewide math testing, SAT, and ACT were not administered; therefore, data are not available. Further, AB104 allows students to change any grades from the 2020-21 school year to Pass/No Pass, making GPA ranges for College Readiness calculations invalid. This outcome cannot be provided for M-PReP for the current report.

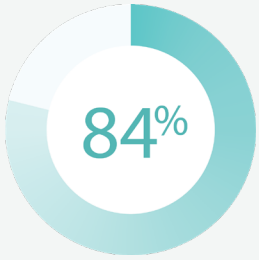
College Outcomes

College Math Outcomes

The long-term goal of M-PReP is students' successful completion of subsequent math courses while in college. Data for this metric is collected through direct data requests from colleges and universities. A limitation of this study is the ability to only collect course-level data from 30% of alumni.

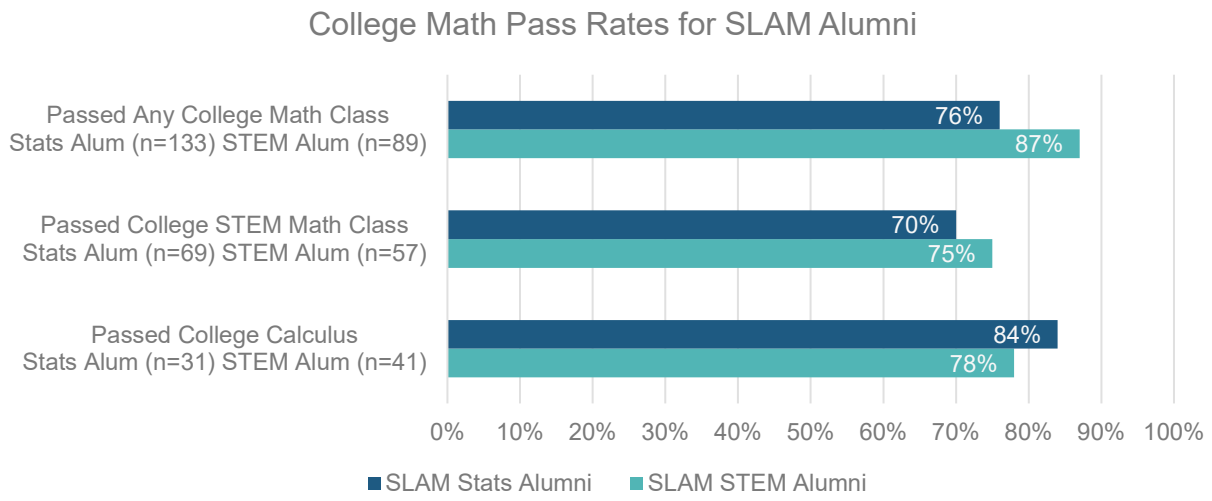
Earned College Math Credit

M-PReP high school graduates from 2018-2020 had the time needed to attend at least one year of college. Of these students, **at least 84% (N=1,048) have passed a college math course with a grade of C- or higher through SLAM dual-enrollment or in college.**



N = 1,048

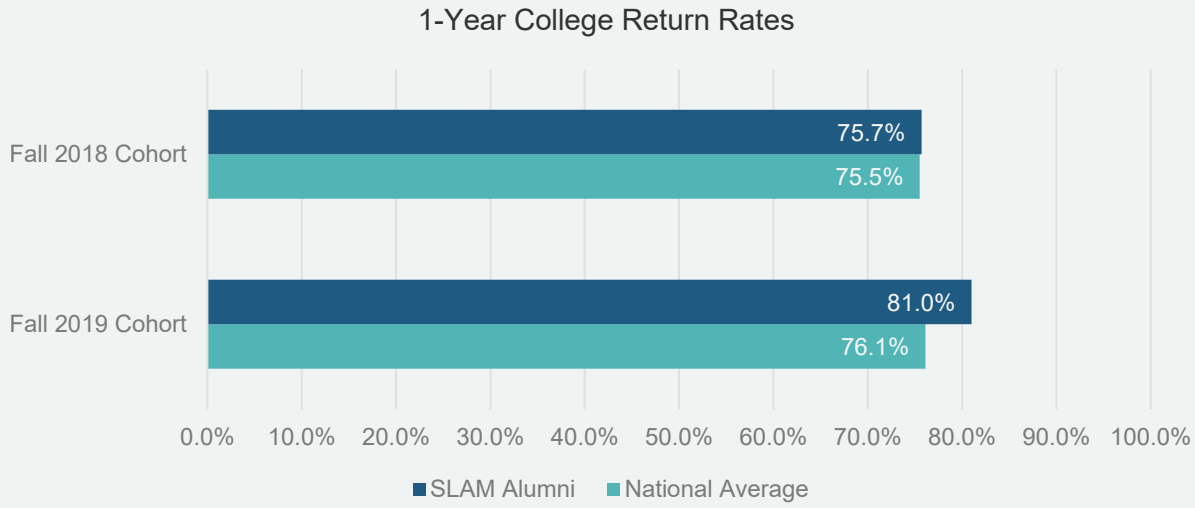
College course-level data were attained for 222 SLAM alumni who graduated high school in 2018, 2019, or 2020. Of these alumni, **80% passed a college-level math course with a grade of C- or higher.** The outcomes below are disaggregated by SLAM course and college math pathway.



SLAM Stats alumni outperformed STEM alumni in college calculus. While the population of students taking college calculus is small, previous reports found similar outcomes in college STEM math pathways for both SLAM Stats and SLAM STEM alumni. These findings suggest that a positive experience in any dual-enrollment math may impact future college STEM outcomes.

College Persistence and Return Rates

Initial trends for 1-Year College Return rates for SLAM alumni for the Classes of 2018 and 2019 continue to be positive, matching or outpacing the national 4-year average.



Data for 2-Year persistence rates pending by partner institutions due to COVID-19 impacts to data collection staff. The persistence data will be available in the final M-PReP report at the end of 2021.

Limitations of the Study

Data collection continues to be the most challenging part of M-PReP, with continued reductions in response from our partner sites due to COVID. This was especially difficult when staffing changes at some district offices were not shared with our team. In addition, a compounding factor this year was the legislative waivers placed on data collection and reporting, as noted earlier. While beneficial to several sites in the immediate overwhelming nature of life in the pandemic, the gaps in records will likely pose compounding issues in the coming years regarding college admissions. Overall delays and updates persist with Institutional Research departments. Survey response rates were inconsistent this year. Our fall survey of students saw a roughly 41% return rate vs. the spring returns of 22%, likely indicative of COVID or Pandemic fatigue by all respondents.

The final report for all of M-PReP will be made available at the end of the year, 2021.

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