



The Impact of COVID-19 on Undergraduate Mathematical Sciences Education: Report on a CBMS Survey

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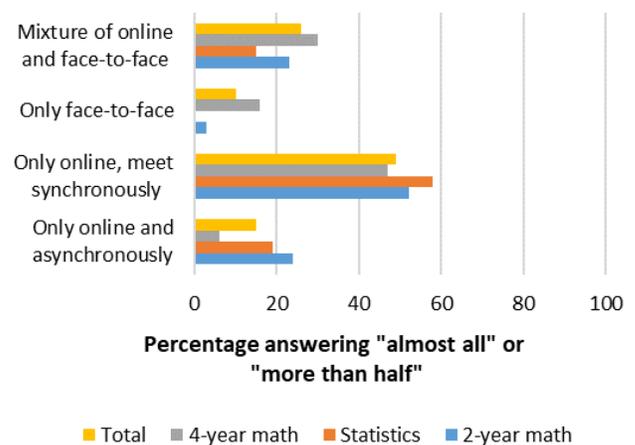
The following report is a summary of results from a survey of undergraduate mathematical and statistical sciences programs in two-year and four-year institutions in the US about how the COVID-19 pandemic has affected these programs, and what changes to future instruction might occur as a result of the experience. Administered on behalf of the Conference Board of the Mathematical Sciences (CBMS) in October and November 2020 by the American Mathematical Society in conjunction with Westat, Inc. and with funding from the National Science Foundation, the survey consists of six multiple-choice questions, a request for enrollments, and two free response questions. The survey instrument is located at <http://www.ams.org/profession/data/cbms-survey/cbms2020>, where response data is also available, broken down by department type, highest degree offered, institutional size, and institutional control (public/private).

In this report, the headings generally indicate take-away messages from the responses, and they generally follow the sequence of the survey instrument questions. Within the headings, the discussion, figures, and tables summarize or highlight the authors' findings. Information about methodology, response rates, and other statistical matters appear in the appendices along with tables giving fuller breakdowns on responses.

“Online synchronous” was most commonly used format

The first question on the survey was designed to get at departments' choice of instructional delivery method under pandemic conditions. Figure 1 shows how various types of departments addressed class formats through the question, “Based on your current plans for the fall 2020 term, what proportion of your department’s mathematical sciences sections are taught in the following formats?”

Figure 1. Distributions of class format, by department level



NOTE: Department chairs could choose more than one response. Percentages may add to more than 100.



- Considering the total of all respondents and combining the two categories of “almost all” and “more than half of courses”, the format “only online synchronous” was the most frequently used option (50%), followed by “a mixture of online and face-to-face sessions” (26%; Figure 1).
- “Only online and asynchronous” and “only online synchronous” together accounted for the responses from 53% of the mathematics departments at four-year institutions, 77% of the statistics departments, and 76% of the mathematics departments at two-year colleges.
- The least used format in all the departments combined was “only face-to-face” (10%).
- There was more frequent use of the “only online only asynchronous” format at two-year colleges (24%) and in statistics departments (19%) than at four-year mathematics departments (7%).
- Private four-year mathematics departments reported offering “almost all” or “more than half” of their courses in “face-to-face” or a “mixture” format (60%) than departments at public universities (30%).

Schedule and staff changes: Class sizes reduced, part-timers released, and full-timers teach more

In light of pandemic conditions, many departments may have changed their fall 2020 term length, number of sections offered, enrollment limits, and assignments to instructional staff, and the second question on the survey was designed to elicit information about these changes. Figure 2a gives insight to schedule changes that departments made. The percentages shown are of “yes” responses to the indicated changes. Note that these numbers are not meant to sum together. Figure 2b also shows “yes” responses to statements regarding staffing changes. The results indicate that the most frequently utilized personnel changes—except in the statistics group—were reductions in part-time faculty numbers and more sections assigned to full-time faculty. Table 2 in the Appendix gives further breakdowns for these two figures.

Figure 2a. Changes in course schedule and size limits, by department type

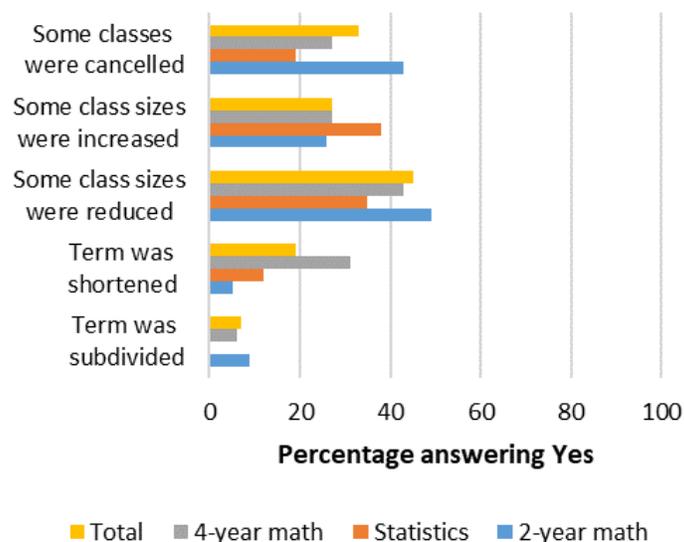
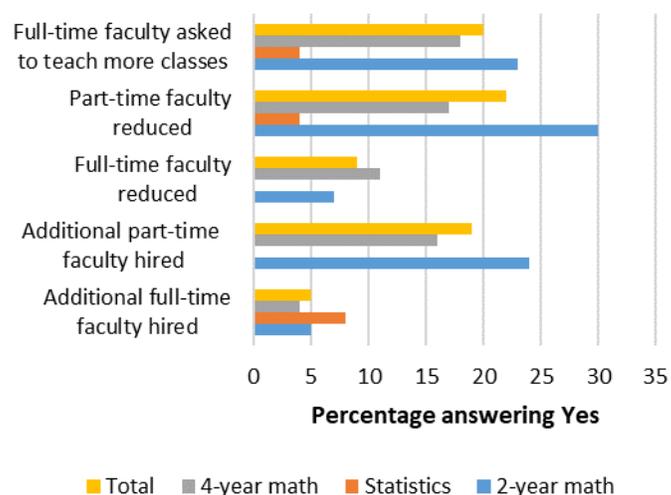


Figure 2b. Instructional personnel changes, by department type



- Among the total of all responses, terms were subdivided at few (7%) departments, and the terms were shortened at 19% of departments (31% of four-year mathematics departments).
- Thirty-three percent of all departments cancelled some classes. Classes were more likely to be cancelled at two-year college mathematics departments (43%).



- Changes in the number of faculty hired or fired were most likely for part-time faculty (Figure 2b).
- Full-time faculty were asked to teach additional classes at 20% of all departments.
- The responses to these questions were quite similar for four-year and two-year college mathematics departments. In statistics departments there were few departments reporting changes in numbers of faculty hired, fired, or full-time faculty asked to teach additional courses.

- The percentages in the table above were relatively consistent over all three types of institutions. More mathematics departments at four-year private colleges and universities provided instruction than at public institutions.

Face-to-face is better, and not because students are ill-equipped

Department respondents voiced opinions on the effectiveness of face-to-face instruction, students' ability to choose their mode of instruction, and students' equipment. Figure 4a gives a breakdown of responses on these questions across the three main department types. Overwhelmingly, respondents felt that face-to-face outcomes are better. Their responses showed a mix of opinion regarding whether students have a choice of modality. While mathematics and statistics respondents felt that students were adequately equipped for online learning, there was disagreement among two-year respondents about how well students were equipped.

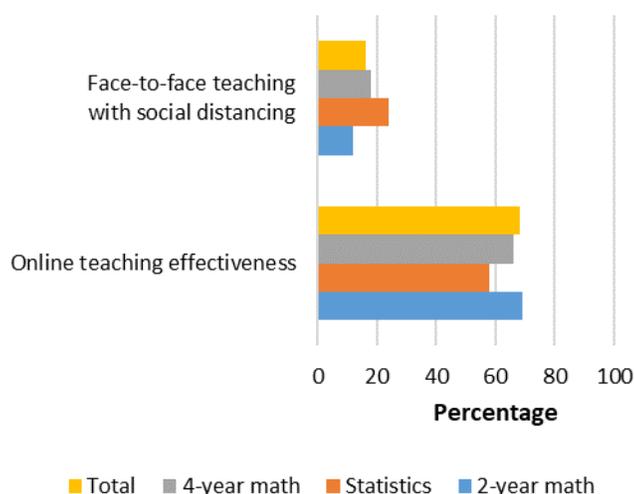
“Students’ learning outcomes from a face-to-face learning experience are better in an online experience”: 72% of all respondents agreed (i.e., “agreed” or “strongly agreed”), and this response was relatively consistent over the three types of institutions (Figure 4a).

- “Students have a choice of which mode of instruction they receive”: 47% of all respondents agreed and 38% disagreed, but this percentage was different across different types of institutions.
 - In four-year college mathematics departments, the percentage of those “(strongly) agreeing” was about the same as the percentage as those “(strongly) disagreeing”.
 - A larger percentage of statistics departments “(strongly) disagreed” than “(strongly) agreed”.
 - More two-year college mathematics departments “(strongly) agreed” than “(strongly) disagreed”.

Training for teaching in the pandemic: Emphasis on online over in-person

Approximately two-thirds of respondents indicated that “more than half” or “almost all” of their staff received training in online instruction, and much smaller numbers cited similar training for in-person/socially-distanced teaching. Figure 3 shows these percentages across the three groups of departments.

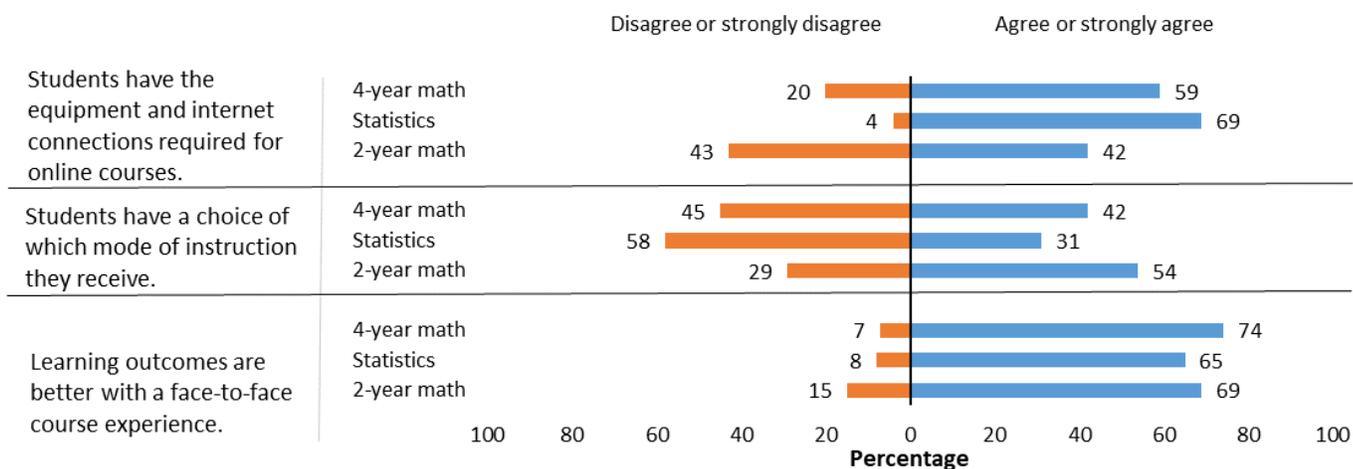
Figure 3. Percentages of departments reporting training for instructional staff, by department type



- At all departments combined “almost all” plus “more than half” of their faculty received training in online instruction at 68% of departments and training in face-to-face instruction with social distancing at 16% of departments (Figure 3).



Figure 4a. Percentages of department with various views on student experiences



- “Students taking courses online have the equipment and internet connections required for taking courses online”: Across the total of all respondents, 52% (strongly) agreed and 30% (strongly) disagreed.
 - In two-year college mathematics departments, there were about the same percentage of departments (strongly) agreeing (42%) as departments (strongly) disagreeing (43%).
 - In four-year college mathematics departments, more departments (strongly) agreed (59%) than (strongly) disagreed (20%).
 - In statistics departments, almost all departments (strongly) agreed (69%) as opposed to those that (strongly) disagreed (4%).

to adequate equipment for online teaching, (2) prefer face-to-face teaching, and (3) have choices about teaching modality.

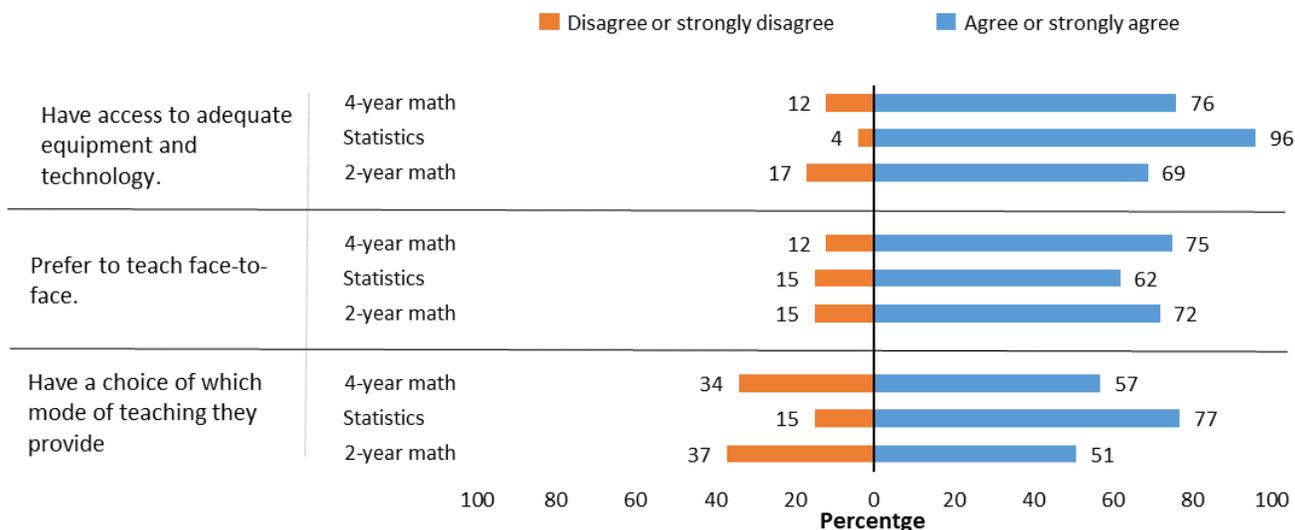
- “Instructional staff teaching online have access to adequate equipment and technology for teaching online”: Ninety-six percent of statistics departments, 76% of four-year college mathematics departments, and 69% of two-year college mathematics departments (strongly) agreed.
- “Instructional staff prefer to teach face-to-face classes”: Across all respondents combined 73% (strongly) agreed and 13% (strongly) disagreed, and this percentage was relatively consistent across all three types of departments.
- “Instructional staff have a choice of which mode of teaching they provide”: Across all respondents combined 55% (strongly) agreed and 35% (strongly) disagreed. These percentages were about the same over four-year and two-year college mathematics departments, with the percentages in statistics departments showing more agreement (75% (strongly) agreeing and 15% (strongly) disagreeing). When data from

Instructional staff have adequate technology, prefer to teach face-to-face, and have a choice of teaching mode

Figure 4b provides insight to faculty experiences teaching under pandemic conditions. Very broadly, respondents felt that instructional staff (1) have access



Figure 4b. Percentages of department with various views on faculty experiences



Tables 1 and 4 are combined, we see that at departments where almost all sections were in a particular format, there was less agreement with the statement that the instructor could choose their mode of instruction because choice was not possible.

Training for online teaching increased dramatically with the pandemic

Figure 5 shows a dramatic shift in preparedness to teach online between the winter/spring 2020 and fall 2020 terms. Chairs were asked the question, “During the terms listed below, what proportion of your department’s instructional staff were/are adequately prepared to teach online?” and by fall, it was quite rare for instructors to be unprepared for online teaching.

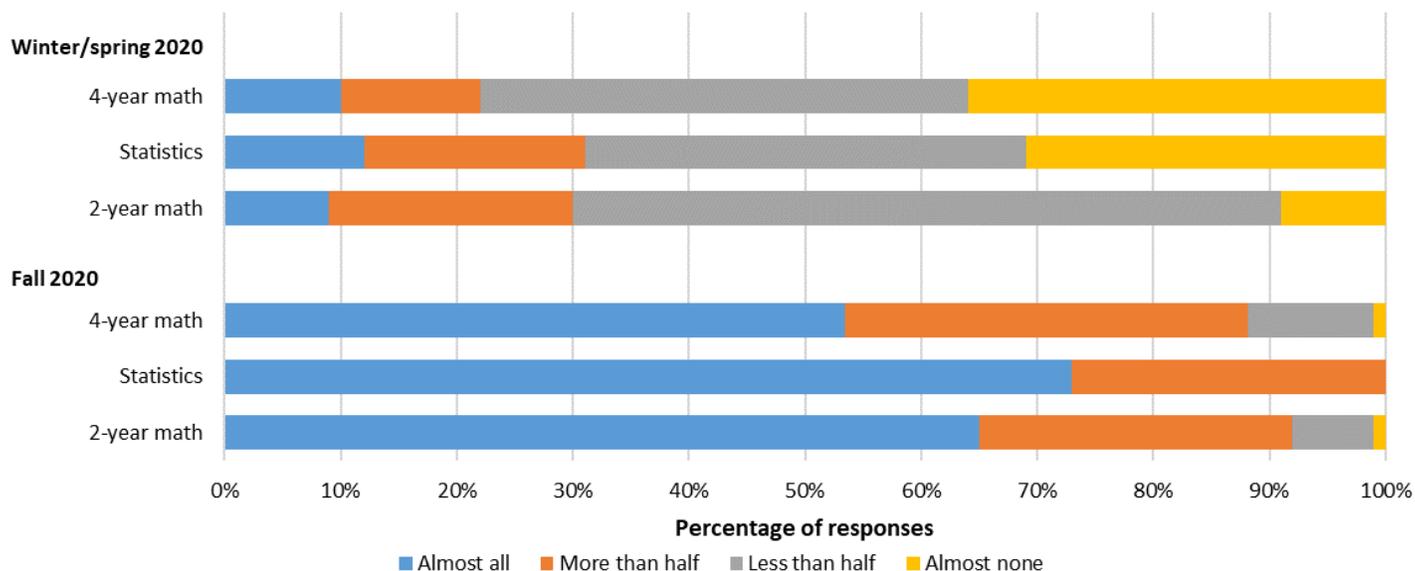
- At each of the three types of department, the largest percentage was “less than half” of the faculty were adequately prepared to teach online pre-pandemic. Faculty were better prepared pre-pandemic at two-year college mathematics departments than at statistics departments or at

four-year college mathematics departments, as the percentage of “almost none” were adequately prepared was 9% at two-year college mathematics departments, 31% at statistics departments, and 36% at four-year college mathematics departments.

- Twenty-five percent of all departments combined had “almost all” or “more than half” of their faculty adequately prepared pre-pandemic. Ninety percent of all departments had “almost all” or “more than half” of their faculty adequately prepared after the pandemic—a dramatic change.
- The percentage of departments with “almost all” or “more than half” of their faculty adequately prepared in fall 2020 was relatively consistent across all types of institutions. In fall 2020 statistics departments had the largest percentage of “almost all” adequately prepared to teach online (73%), followed by two-year college mathematics departments (65%), and then by four-year college mathematics departments (54%).



Figure 5. Comparison of instructor preparedness for online teaching between winter/spring 2020 and fall 2020



Two-year departments most interested in expanded online offerings

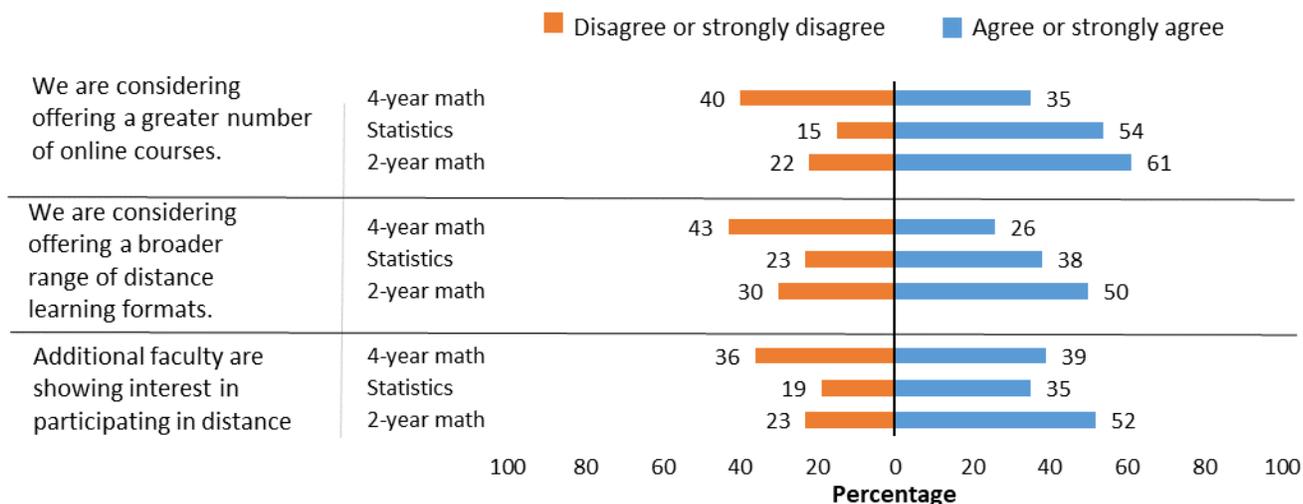
Faculty and leaders in departments in two-year institutions overall show the strongest interest in more and broadened online course offerings, and smaller four-year mathematics and private institutions showed the least interest in these sorts of future changes. Overall, though, a majority of departments believe that more faculty are interested in teaching online courses and possibly more sections of online courses will be offered. Figure 6 summarizes.

- “We are considering offering a greater number of distance learning mathematical sciences classes.” Combining all respondents, 47% (strongly) agreed while 31% (strongly) disagreed. The percentage of two-year college mathematics departments (strongly) agreeing was 61%, while at four-year mathematics departments the percentage was 35%.

- Private mathematics departments at four-year colleges had the lowest (strongly) agreed percentage of departments considering offering more online courses in the future (25%).
- “We are considering offering a broader range of distance learning formats in mathematical sciences classes (e.g., more types of mathematics courses).” Overall, 37% of respondents (strongly) agreed and 37% (strongly) disagreed. Across all types of departments, a larger percentage (strongly) disagreed than (strongly) agreed, except for statistics departments and two-year college mathematics departments.
- “Additional faculty are showing interest in participating in distance learning.” Across all respondents 45% (strongly) agreed and 30% (strongly) disagreed, with 52% of two-year college mathematics departments (strongly) agreeing. The percentage of departments (strongly) disagreeing was greater at smaller four-year college mathematics departments and at private four-year college mathematics departments.



Figure 6: Departments' future course-delivery planning



Falls 2019 to 2020, a third of departments experienced small enrollment changes, but almost as many had decreases of more than 10%

Departments were asked, “What are the total Fall enrollments in mathematics and statistics courses in your department for 2019 and 2020? If your Fall term has been split into shorter blocks, combine enrollments for all of the blocks in the term.” Overall, more departments reported essentially no change in enrollment between the two fall terms than any other size change. That said, nearly a third of departments reported enrollment decreases of more than 10%. The department group with the largest percentage citing enrollment increase was statistics. Figure 7 provides details.

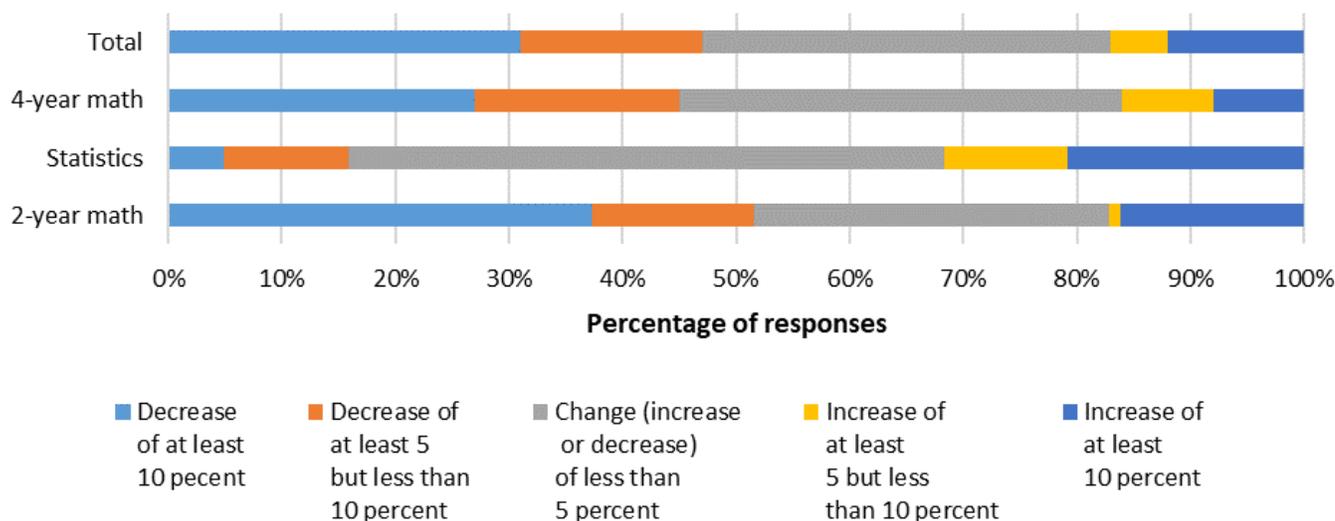
- The three types of departments each reported the largest percentage of departments had some decrease in enrollment (i.e., both categories of decrease added together). Generally, the next largest percentage of departments had little change in enrollment, and the lowest percentage of departments had some increase in enrollment (both categories of increase added together). Over

all departments combined these percentages were 31% of all departments reported a decrease at least 10%, 16% a decrease of 5 – 10%, 26% less than 5% change (either increase or decrease), 5% an increase of 5 – 10%, and 12% an increase of at least 10%.

- Statistics was the only type of department reporting a larger percentage of departments with some increase (both categories of increase added together) than some decrease (both categories of decrease added together).
- In most of the types of departments, the largest single category was a change of under 5% (i.e., little change) in enrollment—except at two-year college mathematics departments (where the largest percentage is a decrease of at least 10% in enrollment).
- Statistics departments are the type of department with the highest percentage of departments (21%) reporting at least 10% increase in enrollment—the next largest percentage occurs at two-year college mathematics departments, where 16% of departments reported at least a 10% increase in enrollment.



Figure 7: Percentages of departments with various changes in fall enrollments from 2019 to 2020



Challenges: Student engagement, assessment, and integrity; institutional and faculty inertia

The survey incorporated two free-response questions, designed respectively to get at the respondents' sense of key challenges and opportunities presented by pandemic conditions. First, the challenge question was, "What stands out to you as the greatest difficulty your department has faced with relation to the COVID-19 pandemic? Describe only one."

In the free responses to this question from two-year college mathematics departments, **student assessment** and **making connections with students** emerged as frequently-cited challenges.

In connection with assessment, respondents mentioned both academic integrity and faculty time and expertise with online testing:

- Increase number of academic dishonesty incidents on exams. "Rampant cheating online, inability to stop it." "Continual struggle how to ensure academic integrity of exams."

- Proctoring exams: faculty felt online test proctoring software was an equity issue or an invasion of student privacy.
- Grades not a reflection of student learning and grade inflation.
- "Determining how to effectively do testing."
- Additional time required by instructor to enforce showing all workspace during tests to "ensure students are not using cell phone online solvers."
- "Providing students with annotate corrections on tests and quizzes."

Regarding the theme of making connections to students, respondents addressed the motivation of students, engaging students, and employing active learning strategies:

- "Interactions between students and faculty have reduced in quality and quantity to a point where students feel that they have issues with comprehension, mentorship, and competitiveness." Faculty and students feel isolated.
- "Online communication is a poor substitute for in-person."



- “Students are choosing to join class remotely out of convenience. It is difficult to connect with these students and they have various distractions at home.”
- Keeping students engaged and working on new materials and assignments.
- Replicating active learning in a virtual environment and how to do group activities online.

Other difficulties reported by two-year college respondents included:

- Ensuring the integrity and quality of instruction.
- Lack of bandwidth and technology equipment. Students not technically prepared for online classes. “Access to adequate equipment. Most technology in faculty hands are centered around face-to-face classes.”
- Converting to/from face-to-face instruction to remote instruction.
- Training faculty.

Among respondents in four-year mathematics and statistics programs, a wide variety of difficulties were reported. Indeed, one response was: “that there are SO MANY challenges at once.”

- Students and faculty rapidly pivoting to new modalities (including online, face-to-face with distancing, and mixed) for which they were initially unprepared, for which they had little training and without established departmental norms.
- Maintaining quality instruction: “the median quality of teaching is lower, and the variation is bigger”. Replicating active learning, group work, and office hours in online courses.
- Institutions using “HyFlex” modalities, where students could choose their modalities, and accommodating quarantined students, forced faculty to teach in different modalities in the same section.
- Supervising TAs and inexperienced faculty.

- Maintaining the usual course content.
- Engaging students in the new modalities and helping students who were struggling.
- Designing appropriate assessments and problems with student cheating was a frequently mentioned greatest difficulty in online courses.
- Building and maintaining community: among faculty, among students, and between students and faculty were frequently mentioned greatest difficulties.
- Finding adequate classrooms for face-to-face classes, given social distancing requirements; the inability to use computer labs compromised instruction.
- The administration’s uncertain and changing plans, cuts in budgets, poor communication, and lack of faculty involvement in decision-making.
- Cuts in numbers of faculty and increasing teaching loads. The new modalities required more faculty time resulting in low morale and burn-out.
- Concern that other responsibilities of faculty such as research were compromised
- A lack of equipment and technical support for faculty. Remote students having inadequate equipment, internet access, and good working environments; accommodating students abroad in different time zone.
- Addressing student and parent complaints.
- Pressure to offer face-to-face courses, and faculty reluctance to teach face-to-face.

Opportunities: Learning new teaching methods and styles, greater faculty sympathy for students, and more inclusiveness

The second free-response question was, “What is the greatest benefit, if any, that you see as arising because of the COVID-19 pandemic? Describe only one.” Among responses from two-year college department chairpersons, the chief benefit cited was the



opportunity to learn new methods and styles of teaching, learn new technology, and engage in professional development.

- “Faculty have learned online teaching strategies and technology that will help them in their future classes.”
- “Potential development of web sections for courses that were not under consideration before.”
- “We are learning to use tools that we've had access to for a long time but sat dormant for lack of perceived need.”
- “Instructors have learned many things; using Zoom, using drawing tablets, e.g., to help the learning environment in different situations.”
- “More students and instructors were educated on the use of technology.”
- “More instructors are aware of technology that can be used to enhance their traditional classes.”

Two-year college chairs also mentioned the following:

- Faculty became more creative about instructional delivery.
- Meetings were streamlined and more convenient.
- Faculty realization that students are able to learn mathematics remotely.
- “More students are realizing they can succeed in online sections.”

Almost ten percent of respondents felt there was **no benefit**:

- “None. It has been an excruciating and problematic transition with no upside.”
- “None - too many changes and knee jerk reactions, enrollment down 13%.”

The following list is illustrative of the benefits cited by four-year mathematics and statistics program respondents:

- Faculty and students now are better equipped to teach and learn remotely (e.g., instead of cancelling class on hurricane or snow days classes might continue remotely, some office hours might

occur online), and some departments might offer online courses in the future.

- Faculty are now familiar with new technologies (e.g., making videos, using learning management systems, having students submit assignments electronically) that will be used in the return to normal instruction.
- Faculty found teaching techniques such as “flipped” classes, new assessments, additional materials for students, and new ways of capturing student attention (e.g., putting course content into modules) effective. These techniques are likely to be used in normal times.
- Faculty are now more open to trying new teaching methods and to rethinking course content.
- Learning Centers provided remote tutoring that may continue and serve more students.
- Faculty have become more sympathetic to the problems of students and colleagues, which may help inclusiveness and response to under-represented groups.
- Faculty discovered online instruction has some advantages over face-to-face instruction, including breakout groups that worked better than some face-to-face group work settings, that some students were more willing to write questions in the Zoom chat than to ask a question in class, that online classes solved some space problems on campus, that online courses may be more convenient for non-traditional students, and they can provide students from around the world expanding enrollments.
- Teaching remotely saved time that was usually lost commuting.
- Recordings of class sessions provided students the ability to watch class sessions again.
- Students have learned skills such as scanning and turning in assignments online.
- Some respondents stated that students spent more time on their classes due to lack of conflicting activities.



- Some chairs stated that videos of class sessions provided good ways of assessing teaching.
- Some departments were able to host and to participate in more seminars and colloquia with remote speakers, and faculty found it easier and cheaper to participate in some conferences.
- Some departments found enrollments increased due to the greater availability of courses, and that it was easier to find adjunct instructors for classes that were taught remotely.
- Technology resources in some departments increased because of the pandemic.

Virtual meetings were seen by some as more efficient and easier to schedule than face-to-face meetings, and virtual honor ceremonies and teas allowed alumni, donors, and parents to participate.

Similar to the two-year group, eight percent of four-year departments responded that there was no benefit. To some departments the pandemic provided confirmation that remote instruction is not effective, and it helped them understand the limitations of online instruction better. The pandemic experience made students and the public appreciate the privilege and value of face-to-face instruction. If nothing else, as one respondent noted, the pandemic has provided some good modeling problems.

CBMS surveys: Tracking the mathematical and statistical sciences in higher education since 1965

This survey was supported by the National Science Foundation under grant #DUE-1916764. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

This COVID-focused survey has been possible through the flexibility of the NSF, which has been the underwriter of the CBMS Surveys of Undergraduate Mathematical Sciences Programs every five years since 1965. Like many regularly-occurring activities, the full 2020 Survey has been postponed to 2021, and this targeted COVID survey has been incorporated into the overall CBMS Survey project.

Examining programs at two- and four-year institutions, these national surveys are sponsored by the Conference Board of the Mathematical Sciences (CBMS), a consortium of nineteen professional associations. The project is administered by the American Mathematical Society, and survey reports can be downloaded from <http://www.ams.org/profession/data/cbms-survey/cbms-survey>. See <http://www.ams.org/profession/data/cbms-survey/cbms2020> for further information about the survey to be conducted in the fall of 2021.

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Appendix 1: Methodology

Developed by the authors in consultation with Westat, Inc. and the CBMS Survey Steering Committee (listed below), this survey was sent to chairpersons of 855 two-year mathematics programs, 85 statistics programs, and 1,342 mathematics programs in the US under the management of Westat. These effectively constituted a census of four-year mathematics and statistics programs, and a random sample of two-year programs. For the purpose of this survey, a two-year mathematics program is one housed in an institution whose degrees awarded (undergraduate and graduate combined) consist of at least 51% associate recipients. Generally, the categories of level, institutional size, highest degree offered, and control were obtained from the Integrated Postsecondary Education Data System (IPEDS) operated

by the US Education Department’s National Center for Education Statistics (NCES).

Usable responses were received from 81 two-year mathematics, 26 statistics, and 402 four-year mathematics programs. The data were weighted to adjust for the probability of selection and nonresponse. For consistency, statistics in this report are designed to match the appendix tables. When two different responses are summed, however, the actual statistics sometimes differ slightly because of rounding and other issues (such as missing data). The following table provides illustrative standard errors and confidence intervals for the survey statistics.

A special word of thanks goes to Dr. Brad Chaney of Westat. His insight and attention to detail have been invaluable in this COVID study and in the larger CBMS Survey project.

CBMS Survey Steering Committee
Ed Aboufadel, Grand Valley State University
Elizabeth Burroughs, Montana State University
Beth Chance, California Polytechnic State University, San Luis Obispo
Ted Coe, Northwest Evaluation Association
T. J. Hitchman, University of Northern Iowa
Dennis Pearl, Penn State University
Emily Puckette, Sewanee: The University of the South
April Strom, Maricopa Community Colleges
Linda Zientek, Sam Houston State University

Sections are taught only online, with an opportunity to meet synchronously online (Q1b)

College type	Percent	Standard Error of Percent	95% Confidence Limits for Percent	
Two-year colleges				
Almost all	22.2063	4.7267	12.8857	31.5269
More than half	29.4794	5.4213	18.7892	40.1696
Less than half	48.3143	6.0481	36.3881	60.2404
Total	100.0000			
Statistics				
Almost all	23.0769	8.5427	6.0918	40.0621
More than half	34.6154	9.6460	15.4365	53.7943
Less than half	42.3077	10.0172	22.3909	62.2245
Total	100.0000			
Four-year colleges				
Almost all	23.1738	2.2736	18.6905	27.6571
More than half	23.9295	2.2562	19.4805	28.3784
Less than half	52.8967	2.5279	47.9119	57.8815



Appendix 2: Tables

Table 1: Percentages of departments answering "more than half" or "almost all" to the question, "Based on your current plans for the fall 2020 term, what proportion of your department's mathematical sciences sections are taught in the following formats?"				
	Only online and asynchronously	Only online, meet synchronously	Only face-to-face	Mixture of online and face-to-face
Total	15	49	10	26
4-year math	6	47	16	30
Statistics	19	58	.	15
2-year math	24	52	3	23
4-year math departments only				
Highest degree offered				
Doctoral	7	52	11	27
Master's	7	42	24	31
Baccalaureate	4	38	21	39
Institution size				
Under 5,000	3	34	26	35
5,000 - 9,999	10	66	8	22
10,000 - 19,999	10	41	7	34
20,000 or more	9	75	1	16
Control of institution				
Public	10	56	7	23
Private	3	39	24	36

Table 2. Percentages of departments answering "yes" to the question, "Which of these changes have occurred in your department in response to the COVID-19 pandemic?" Note that these percentages do not constitute distributions.										
	Term was subdivided	Term was shortened	Some class sizes were reduced	Some class sizes were increased	Some classes were cancelled	Additional full-time faculty hired	Additional part-time faculty hired	Full-time faculty reduced	Part-time faculty reduced	Full-time faculty asked to teach more classes
Total	7	19	45	27	33	5	19	9	22	20
4-year math	6	31	43	27	27	4	16	11	17	18
Statistics	.	12	35	38	19	8	.	.	4	4
2-year math	9	5	49	26	43	5	24	7	30	23
4-year math departments only										
Highest degree offered										
Doctoral	4	26	36	34	28	6	18	11	18	19
Master's	4	36	54	16	23	2	9	11	14	16
Baccalaureate	8	13	61	26	36	1	12	10	22	10
Institution size category										
Under 5,000	7	37	52	20	23	2	12	10	13	17
5,000 - 9,999	5	29	27	26	34	3	13	13	19	19
10,000 - 19,999	3	29	43	32	32	5	19	19	25	32
20,000 or more	3	18	28	47	25	10	30	9	21	9
Control of institution										
Public	3	28	40	36	29	6	19	14	23	21
Private	8	35	45	20	25	3	13	9	12	16





Table 3. Percentages of departments responding "almost all" or "more than half" to the question, "During the summer and/or fall of 2020, what proportion of instructional staff in your department received training in the following?"

	Online teaching effectiveness	Face-to-face teaching with social distancing
Total	68	16
4-year math	66	18
Statistics	58	24
2-year math	70	12
4-year math departments only		
Highest degree offered		
Doctoral	65	18
Master's	64	18
Baccalaureate	80	22
Institution size category		
Under 5,000	70	24
5,000 - 9,999	61	13
10,000 - 19,999	57	17
20,000 or more	68	8
Control of institution		
Public	57	9
Private	74	27



Table 4a. Percentages of departments' responses to the question, "Please state how strongly you personally agree or disagree with the following statements about your department's experiences and plans relating to the COVID-19 pandemic in fall 2020."

	Learning outcomes are better with a face-to-face course experience		Students have a choice of which mode of instruction they receive		Students have the equipment and internet connections required for online courses	
	Strongly agree or agree	Disagree or strongly disagree	Strongly agree or agree	Disagree or strongly disagree	Strongly agree or agree	Disagree or strongly disagree
Total level	72	11	47	38	52	30
4-year math	74	7	42	45	59	20
Statistics	65	8	31	58	69	4
2-year math	69	15	54	29	42	43
4-year math departments only						
Highest degree offered						
Doctoral	71	9	42	45	56	20
Master's	76	4	43	44	60	23
Baccalaureate	82	4	41	43	67	12
Institution size category						
Under 5,000	78	6	41	45	58	23
5,000 - 9,999	68	8	41	48	52	23
10,000 - 19,999	69	11	52	41	66	15
20,000 or more	72	7	37	46	62	15
Control of institution						
Public	69	9	46	42	61	19
Private	78	6	38	47	56	21

Note: the percentages responding "undecided" or "not applicable" are not shown.



Table 4b. Percentages of departments' responses to the question, "Please state how strongly you personally agree or disagree with the following statements about your department's experiences and plans relating to the COVID-19 pandemic in fall 2020."

	Have access to adequate equipment and technology for teaching online		Prefer to teach face-to-face		Have a choice of which mode of teaching they provide	
	Strongly agree or agree	Disagree or strongly disagree	Strongly agree or agree	Disagree or strongly disagree	Strongly agree or agree	Disagree or strongly disagree
Total	74	14	73	13	55	35
level						
4-year math	76	12	75	12	57	34
Statistics	96	4	62	15	77	15
2-year math	69	17	72	15	51	37
4-year math departments only						
Highest degree offered						
Doctoral	78	13	71	14	55	37
Master's	71	14	82	11	59	33
Baccalaureate	82	8	80	4	65	20
Institution size category						
Under 5,000	70	16	81	8	58	33
5,000 - 9,999	77	13	69	16	66	29
10,000 - 19,999	80	10	69	15	57	36
20,000 or more	91	4	69	16	47	38
Control of institution						
Public	82	10	73	11	59	33
Private	71	15	77	12	56	34

Note: the percentages responding "undecided" or "not applicable" are not shown.



Table 5. Percentages of departments' responses to the question, "During the terms listed below, what proportion of your department's instructional staff were/are adequately prepared to teach online?"

	Winter/spring 2020				Fall 2020			
	Almost all	More than half	Less than half	Almost none	Almost all	More than half	Less than half	Almost none
Total	9	16	50	24	59	31	9	1
level								
4-year math	10	12	42	36	54	35	11	1
Statistics	12	19	38	31	73	27	.	.
2-year math	9	21	61	9	65	27	7	1
4-year math departments only								
Highest degree offered								
Doctoral	7	14	42	37	54	34	12	0
Master's	14	8	41	37	53	38	8	1
Baccalaureate	8	12	45	35	58	33	8	.
Institution size category								
Under 5,000	13	12	41	33	54	34	11	1
5,000 - 9,999	5	16	45	34	55	34	11	.
10,000 - 19,999	8	10	34	48	50	33	17	.
20,000 or more	4	9	49	38	57	38	4	.
Control of institution								
Public	8	15	44	34	49	39	12	.
Private	11	10	41	38	59	31	9	1



Table 6. Percentages of departments in agreement or disagreement with statements describing course delivery planning. The lead question was, "How has the COVID-19 experience influenced your department's plans for the future (after fall 2020)? Only report on changes that your department is considering because of your COVID-19 experience. Do not consider changes that you would have made anyway."

	We are considering offering a greater number of distance learning classes		We are considering offering a broader range of distance learning formats		Additional faculty are showing interest in participating in distance learning	
	Strongly agree or agree	Disagree or strongly disagree	Strongly agree or agree	Disagree or strongly disagree	Strongly agree or agree	Disagree or strongly disagree
Total	47	31	37	37	45	30
level						
4-year math	35	40	26	43	39	36
Statistics	54	15	38	23	35	19
2-year math	61	22	50	30	52	23
4-year math departments only						
Highest degree offered						
Doctoral	39	34	32	36	45	28
Master's	34	44	19	50	36	43
Baccalaureate	14	63	18	59	22	55
Institution size category						
Under 5,000	27	51	20	51	28	49
5,000 - 9,999	45	21	31	32	50	23
10,000 - 19,999	40	33	32	37	53	18
20,000 or more	46	31	37	35	51	22
Control of institution						
Public	46	28	38	31	52	21
Private	25	51	17	53	28	48



Table 7. Percentage of departments experiencing various changes in fall enrollments from 2019 to 2020

	Decrease of at least 10 percent	Decrease of at least 5 but less than 10 percent	Change (increase or decrease) of less than 5 percent	Increase of at least 5 but less than 10 percent	Increase of at least 10 percent
Total	31	16	36	5	12
level					
4-year math	27	18	39	8	8
Statistics	5	11	53	11	21
2-year math	37	14	31	1	16
4-year math departments only					
Highest degree offered					
Doctoral	25	18	43	8	6
Master's	27	19	32	10	12
Baccalaureate	38	13	33	8	10
Institution size category					
Under 5,000	33	15	32	9	12
5,000 - 9,999	32	38	21	6	2
10,000 - 19,999	26	11	55	4	4
20,000 or more	9	14	59	13	5
Control of institution					
Public	25	20	42	8	5
Private	29	15	36	9	10