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Evaluating Faculty Perceptions of Changes in Teaching and Students in Conjunction with the Extent of Compassionate Course Policies Post-Pandemic

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Dr. Saundra Johnson Austin has dedicated her career to promoting diversity, equity, inclusion, and belonging of elementary, middle, and high school students in science, technology, engineering, and mathematics (STEM) education and careers. Her research is grounded in the effective implementation of STEM curricula in urban middle schools. She has published and presented on STEM education and organizational change. Dr. Johnson Austin earned a Bachelor of Science in Civil Engineering from The Pennsylvania State University, a Master's in Business Administration from the University of Notre Dame, and Doctor of Education in Organizational Change and Leadership from the University of Southern California.

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Dr. Johnson Austin held positions as: math faculty at Academy Prep Center of Tampa; executive director of Curated PathwaysTM to Innovation; senior vice president for operations at the National Action Council for Minorities in Engineering, Inc.; president and CEO of St. Michael's High School; executive vice president of the Community Partnership for Lifelong Learning; executive director of the National Consortium for Graduate Degrees for Minorities in Engineering and Science; and Minority Engineering Program director at The Pennsylvania State University. She began her career as a cost engineering at Bechtel Power Corporation. In 2007 she founded Charis Consulting Group, LLC.

Dr. Johnson Austin was recognized by numerous organizations for her work in promoting equity and access to STEM education. Her most notable award is the 2015 Outstanding Engineering Alumnus in Civil and Environmental Engineering from The Pennsylvania State University. In addition, she was awarded the 2004-2005 Selected Professions Fellowship by the American Association of University Women (AAUW). Dr. Johnson Austin was awarded in 2007 the Strengthening Our Communities Inaugural Community Educational Leadership Award at the 2nd Annual Celebrate Literacy Conference. In 1998, she was recognized with the National Society of Black Engineers' (NSBE) Inaugural Golden Torch Award for Minority Engineering Program Director of the Year and the Outstanding Contribution by a Minority Engineering Program Administrator Award by the National Association of Multicultural Engineering Program Advocates (NAMEPA).

She is a member of various STEM organizations including the United States White House endorsed initiative under the Obama Administration, Algebra by 7th Grade, and advisory committee member for the Smithsonian Science Education Center's 'Zero Barriers in STEM Education.' Dr. Johnson Austin is

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She enjoys doing yoga, spending time on the beach, and mentoring young girls and women in STEM studies and careers.

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Evaluating Faculty Perceptions of Changes in Teaching and Students in Conjunction with the Extent of Compassionate Course Policies Post-Pandemic

Introduction

Radical shifts in course modality have occurred since 2020 due to the pandemic. Engineering faculty and students alike were required to navigate continually evolving institutional policies, shifts in workloads, changes to course policies and adaptive instructional strategies. The rapidly changing landscape has had significant impacts on mental health, stress, and academic preparedness and performance [1]. Soria and Horgas [2] found that, post pandemic, 39% of college students are experiencing clinically significant anxiety and 35% of students are experiencing clinically significant depression. At this time, post-pandemic, the ramifications to engineering education are still being discerned.

This work attempts to begin to understand in what ways engineering faculty perceive their teaching to have changed and to what extent course policies have evolved post-pandemic. In particular, given rising mental health concerns, have faculty instituted pedagogies and policies that are more compassionate? Compassionate pedagogy has been put forth as an approach for addressing the challenges of the pandemic with practices such as providing clear and detailed syllabi, building in flexibility, transparent communication, and support [3], [4], [5]. In this work, engineering faculty were surveyed regarding how their teaching changed, how they perceive students changed, and how job responsibilities and satisfaction changed post-pandemic. In addition, syllabi pre- and post-pandemic were collected and examined for changes to course policies and to what extent policies became more compassionate.

Methods

Survey Analysis

Twenty-five engineering faculty and instructors participated and completed a survey examining pandemic related changes in teaching. The study was approved by the University of Kansas Human Subjects committee, and participants consented to participate. Opportunities to participate in the study were distributed through email solicitations to ASEE regional chapters, through postings on engineering faculty focused social media sites, and through university engineering faculty lists at four universities. The survey was conducted using the Qualtrics software package (Seattle, WA).

The survey consisted of four categories of questions: 1. Demographics, 2. Changes in Teaching Practices, 3. Changes in Students, and 4. Changes in Faculty. Following the questions, participants were asked if they would be willing to share a syllabus from before the pandemic and one from the last year for the same or similar courses.

Demographics questions focused on understanding participants' engineering teaching experience and the environment in which they teach. These questions ask the primary discipline of the participant, the type of institution (research focused or primarily undergraduate, public or private, 2-year or 4-year, predominately undergraduate (PUI), minority serving (MSI), historically black college and university (HBCU), or tribal college or university (TCU)), the region/country of the institution, and the type of appointment the participant has. The participant

was also asked basic demographics questions including gender, race/ethnicity, and years of teaching experience.

The next set of questions examined how participants have changed their teaching practices. With a sliding Likert scale, from "a lot less" (-100) to "a lot more" (100), participants were asked to rate their changes in use of technology (learning management systems, online meeting software, team management software, online polling/feedback software, and e-portfolios). On the same scale, participants were also asked to range their changes in content delivery including asynchronous online content, synchronous online content, hyflex (in person and remote students simultaneously), and hybrid (mix of online and face-to-face). Participants were asked about changes in teaching practice including the use of active learning, flipped classroom, physical laboratory activities, and virtual laboratory activities. They were also asked, on the same sliding scale, if they had changed their availability outside the classroom, flexibility of deadlines, statements and accommodations for students' mental health statements, accommodation for students with disabilities, and assessment methods. For all these questions, a text box was provided for participants to elaborate on answers.

Participants were also asked to comment on changes they had observed in students relative to pre-pandemic using the sliding Likert scale. These included completion of assigned work, classroom attendance, study skills, fundamental skills from high school, and skills from prerequisite courses. Participants were asked to comment on changes in the frequency of mental health challenges, students living with disabilities, and challenges from demands outside of the classroom (such as outside work and family responsibilities). A text box was provided to elaborate on these answers.

Finally, participants were asked to respond on the sliding Likert scale to changes in their perception of their job as faculty members. They were asked about time spent teaching, time spent doing research, and time spent doing service activities. They were also asked about impacts on their job satisfaction and on work-life balance. These questions included asking if they felt the prioritized family/life priorities more or less and if they were thinking more or less about changing careers or retirement.

Syllabi Analysis
Six course syllabi were collected using convenience sampling from the survey respondents. The syllabi were collected for engineering courses that were taught before 2019 (i.e., pre-COVID) and again after 2021 (i.e., post-COVID). A rubric was created, adapting existing rubrics and definitions reported by Gin et al. [6] and Stanny et al. [7]. Syllabus elements (i.e., grading policy, general absence policy, general makeup work policy, office hours, instructor contact information, important course dates, instructor encourages student contact, general campus resources, grading rubrics, emergency planning, and mental health resources, Table 1) were evaluated using direct coding [8]. The presence or absence of each syllabus element was recorded for all syllabi (i.e., pre-COVID and post-COVID). In addition, the presence of substantial changes between the early and late syllabi were recorded. The syllabi were coded independently using two coders, and discrepancies were resolved through discussion [6]. Notes were also recorded, identifying examples of differences between years.

Table 1.

Definitions of each syllabus element, adapted from Gin et al. [6] and Stanny et al. [7]

| Syllabus element	Definition
Grading policy	Syllabus includes information on the grading structure of the course and how students can expect to be evaluated. Describe how the instructor will evaluate student work in the course. Describe required exams and assignments and how these will be evaluated and weighted to compute the final grade in the course.
General absence policy	Syllabus includes policy information on missing class. If an instructor provides attendance information (e.g., attendance is required), it would be coded here. If there is only a participation policy (and it does not explicitly mention attendance or absences), then it would not be coded here.
General make-up work policy	Syllabus includes the conditions under which assigned work and/or tests may be made up. For example, if an instructor says that they will accept no make-up work for absences, then it would be coded here. Conditions surrounding late work, such as percent penalties per day, would also be coded here. Acceptance of late work; permission to make up a missed exam; procedures to request extensions of deadlines or arrange alternate exam dates when conflicts arise with official University functions.
Office hours	Syllabus includes office hours and appointments available outside office hours.
Instructor contact information	Syllabus includes instructor's name, e-mail address, telephone number, and office/room number.
Important course dates	Syllabus provides important dates relevant to the course, such as dates for exams and finals, assignments, or projects. This can be in the form of a course calendar, or as dates listed under their respective sections. If a separate document of a course calendar, or directions how to access a course calendar (such as a link or description of location on learning management system) is provided, this would be coded here. Calendar of important events (schedule of required readings, assignment due dates, exam dates, etc.) Dates can be identified as tentative dates and/or subject to change.
Instructor encourages student contact	Syllabus welcomes student interaction and explicitly tells students that the instructor, TA(s), and/or any part of the instructional team can be contacted for help or assistance.
General campus resources	Syllabus provides information about campus resources that students could go to for help or assistance besides disability resources or academic dishonesty. If an instructor provides information for technical support for classroom software such as clickers or the learning management system, this would not be coded here. If resources are offered regarding mental health, this is coded under "Mental health resources." Assistance to all students; strategies for success in the course; sources available for assistance made available to all students (writing lab, tutoring). May include reference to hand-outs, extra problems, etc. that students can access in learning management system or on the web. Not mere encouragement to students to visit the instructor during office hours or ask for assistance or mere reference to technical skills needed.
Grading rubrics	Grading rubric(s) for assignments provided in the syllabus (either a grading key or formal rubric); reference to use of rubric for grading an assignment.
Emergency Planning	Emergency planning information for course continuity (e.g. weather, campus epidemic).
Mental health resources	If resources are offered regarding mental health.

Results

Survey

Of the twenty-five participants who completed the survey, eleven were full professors, seven were associate professors, two were assistant professors, two were non-tenure track faculty, and one was an instructor. The faculty represent the fields of Mechanical Engineering, Civil Engineering, Bio/Biomedical Engineering, Chemical Engineering, Environmental Engineering, and Electrical/Computer Engineering. One participant had less than 3 years of experience, one had 3-5 years of experience, six had 5-10 years of experience, 10 had 10-20 years of experience, and seven had more than 20 years of experience teaching at a college or university. All faculty participating were at United States institutions.

In the survey, participants indicated that they have increased their use of online meeting software and learning management systems. Courses have also increased in the amount of online context including online, hybrid, and hyflex courses (Figure 1). Participants indicated that they have made changes in flexibility of deadlines, availability outside the classroom, and statements supporting student mental health as they grapple with a perceived increase in student mental health challenges (Figures 2-3). For the students, participants indicated that students were facing challenges across most fronts including difficulties completing work, attending class, and coming into classes with prerequisite skills (Figure 4). Participants indicated that mental health challenges have increased significantly over the course of the pandemic. Results for faculty indicate they spend more time doing service and teaching activities and less time doing research (Figure 5). They are prioritizing family and outside life more and are considering retirement or changing careers more. Since we currently have a small sample size, we may need to examine a larger sample before drawing broad conclusions.
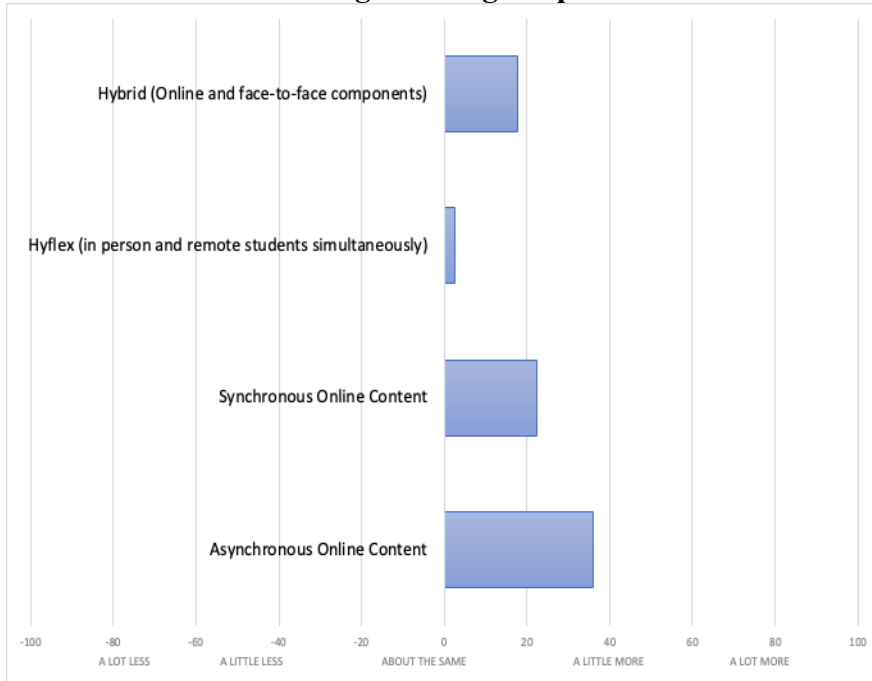
Figure 1
**Use of technology during pandemic**
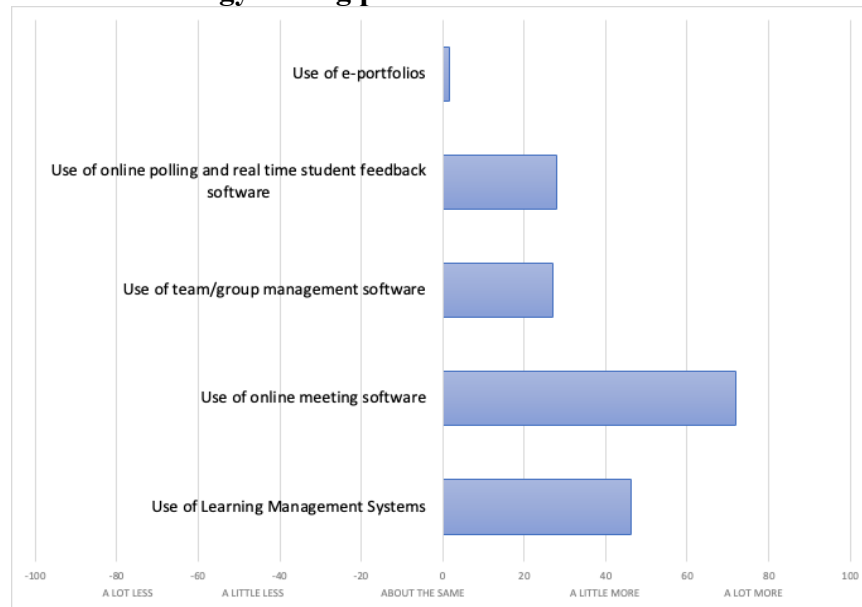
Note: In questions about the use of technology, participants indicated an increase in the use of online meeting software (such as Zoom and Webex) and learning management systems (such as Canvas and Blackboard).

Figure 2
**Online instructional changes during the pandemic**

Note: In questions about class format, participants indicated all forms of online instruction.

Figure 3
**Online teaching methods and accommodations for students**
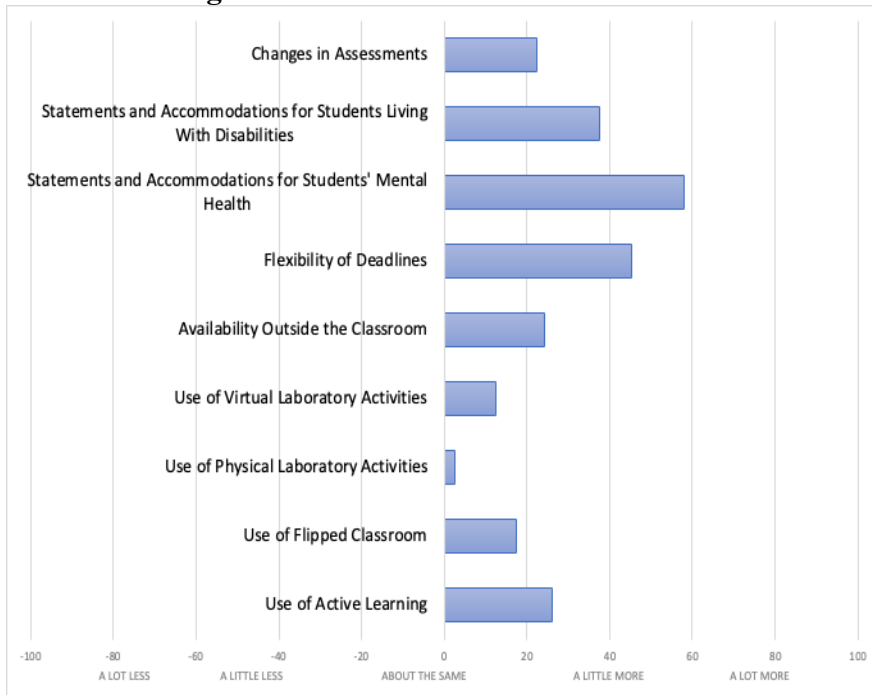
Note: In questions about teaching methods and accommodations for students, participants indicated increases in accommodations for mental health and greater flexibility in deadlines. Participants did not indicate a difference overall in the use of active learning methods.

Figure 4
Challenges students faced during the pandemic
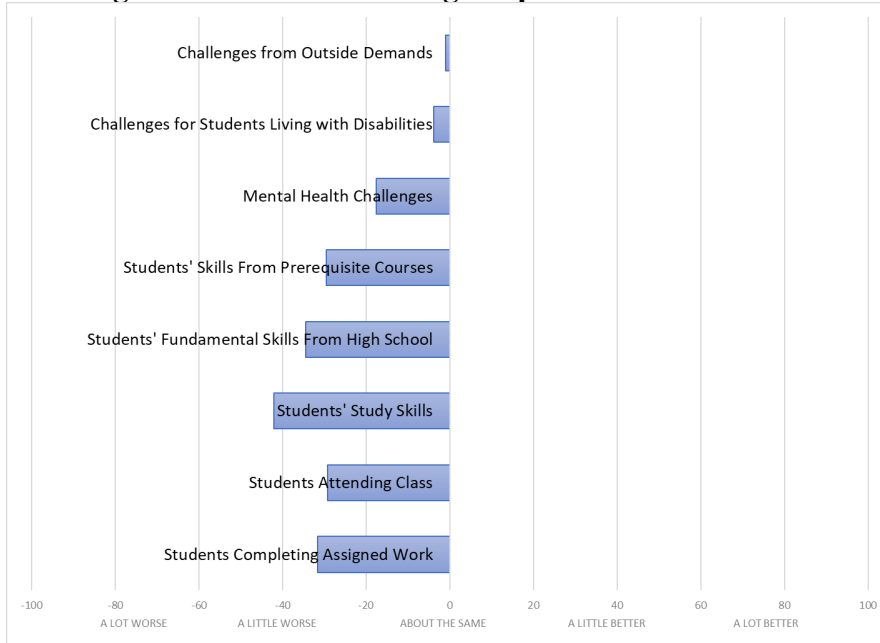
Note: In questions about student preparation and challenges, participants indicated that study skills, course preparation, and course participation had declined post-pandemic. Participants noted changes in mental health challenges.

Figure 5
Faculty job satisfaction and time
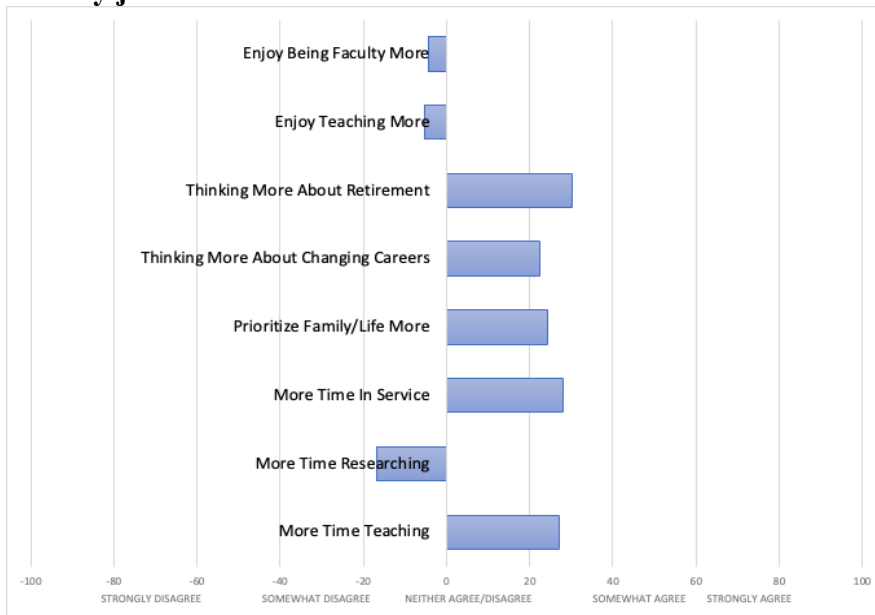
Note: In questions about faculty's own job satisfaction and time, participants indicated that they spend more time in teaching and service and less time in research. They are prioritizing work life balance.

Syllabi

Before the influence of COVID, instructors were likely to include syllabi information related to the grading policy, make-up work policy, office hours, instructor contact information, and important course dates (≥ 83%). Instructors were more likely to include information about the absence policy, general campus resources, grading rubrics, and mental health resources after the influence of COVID (Table 2).

Table 2
Percent of syllabi that include each syllabus element before and after COVID interruption and percent of syllabi for which a change was detected per syllabus element (n = 6)

Syllabus element	Pre-COVID	Post-COVID	Change detected
Grading policy	100%	100%	67%
General absence policy	67%	100%	67%
General make-up work policy	100%	100%	50%
Office hours	83%	83%	33%
Instructor contact information	83%	83%	0%
Important course dates	83%	83%	17%
Instructor encourages student contact	50%	83%	67%
General campus resources	0%	50%	50%
Grading rubrics	33%	50%	17%
Emergency Planning	17%	17%	0%
Mental health resources	0%	17%	17%

The most changes were detected in the categories of grading policy, general absence policy, instructor encourages student contact, and general campus resources. Changes to the grading policy were generally related to differences in the grading distribution of assessments (n = 2). Three syllabi changed the absence policy after COVID to include information regarding health-related absences. Differences related to encouraging student contact were often related to changes in language welcoming students to attend office hours. Three syllabi added general campus resources. These resources included items related to an inclusive classroom, technology help, and resources for extended illness.

Information related to emergency and mental health resources were not well represented. Only one syllabus, both before COVID and after COVID, included information for emergency planning. Similarly, one syllabus after the influence of COVID included reference to mental health resources.

Discussion
Survey participants indicated that they have made changes in flexibility of deadlines, availability outside the classroom, and course assessments (Figure 3). A participant remarked they "definitely am more flexible with deadlines" and another said, "I mostly teach in the same way, although I do office hours on Zoom and I am more flexible in deadlines.". A third participant remarked they had added "hybrid office hours, more flexibility in accepting homework, (and)

recording lectures". One participant added "I used the Zoom movies generated for reviewing old homeworks as part of my new class resources". Another remarked "Students' attitudes and expectations of their instructors have increased, they expect to have organized notes completed and posted online for them, homework schedules given at the beginning of the semester, and other accommodations that were not expected pre-pandemic." The syllabi analysis supported these perceptions. Changes in the type and grade weights of assessments, allowances for health-related absences, and adjustments in language related instructor availability were observed in some of the post-pandemic syllabi. These changes could be considered evidence of more compassionate teaching practices in engineering courses post-pandemic.

Survey participants indicated an increase in mental health changes over the course of the pandemic. One participant remarked they were "much more open about mental health issues" and another remarked "Mostly, I have become more aware of just how stressful student life is. Maybe it was always that way, but students are more comfortable expressing it and I am more comfortable asking about it." However, only one syllabus referenced mental health resources. This reference was prepared by the instructor of the course and did not seem to be part of an institution-level syllabus statement initiative. Therefore, there seems to be an opportunity to direct students to mental health resources in engineering course syllabi as another means to support mental health challenges.

Conclusions
Results suggest that instructors have made changes in teaching style, assessment structure, and tools used to accommodate changes as education moves through the pandemic. Instructors also reported more time teaching and responses that suggest a decrease in work-life satisfaction. The syllabi analysis supported perceptions in changes in flexibility of deadlines, availability outside the classroom, and course assessments, suggesting evidence for more compassionate teaching practices in engineering courses post-pandemic. Survey participants indicated an increase in mental health changes over the course of the pandemic, but we did not observe substantial changes in the course syllabi reflecting this change. Since we currently have a small sample size, we may need to examine a larger sample before drawing broad conclusions.

Acknowledgements

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