



HUMANIZING ONLINE STEM

PRELIMINARY RESEARCH FINDINGS

#HumanizingSTEM

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ABSTRACT

This study examines the impact of a six-week online professional development program, the Humanizing Online STEM Academy offered in the summer of 2021, on the involvement of online STEM faculty's perceptions and attitudes about teaching online and instructional approaches, as well as the learning experiences of their students in the redesigned courses that incorporated humanizing elements covered by the Academy. A total of 68 STEM faculty and 11 faculty support specialists from eight different institutions including both community colleges and state universities in California participated in the Academy. Longitudinal surveys and interviews conducted both prior to and after the Academy indicate that instructors had significantly higher confidence in their online teaching capacity, believed more in their own impact on closing equity gaps in online courses, and paid closer attention to supporting students from diverse backgrounds. Instructors also changed substantially in their instructional approaches post-Academy and reported being more actively engaged in promoting interpersonal interactions and more responsive to individual needs. These changes were echoed in surveys and interviews with students, who reported high levels of satisfaction with their learning experiences in the humanized online courses, with particularly positive experiences reported by Black, Latino, Native American, and Pacific Islander students.

HIGHLIGHTS FROM THE PRELIMINARY FINDINGS

- The Academy covered eight humanizing elements. Participants found all elements moderately to very beneficial in helping them establish trust with their students. Depending on the specific humanizing element examined, 72% to 91% of the instructors teaching a humanized course in the fall of 2021 reported using the element.
- The most widely mentioned reason for not using an element was that there is not sufficient time for instructors to incorporate them into their courses.
- After the Academy, participants had significantly higher confidence in their online teaching capacity, believed more in their own impact on closing equity gaps, and paid closer attention to supporting students from diverse backgrounds.
- Pre- versus post-Academy comparison of self-reported instructional practices reveal a significant improvement in instructor-student social interaction, flexibility in course policies and grading, student-student interaction opportunities, and student-content interaction.
- Students reported high levels of satisfaction with their sense of belonging, instructor-student relationships, teaching presence, social presence, and cognitive presence, as well as positive attitudes towards online learning in the humanized online courses.
- Students from minoritized racial groups reported particularly positive perceptions of their experiences in both the week two survey and the end-of-course survey.

- Focus group interviews indicate that students appreciated the approachability and responsiveness of the course instructor, and clear communication of course expectations.
- Both the survey and interview data suggest that student-student interactions need to be further strengthened.

THE HUMANIZING ONLINE STEM ACADEMY

The Humanizing Online STEM Academy is a six-week asynchronous online professional development program for higher education STEM faculty and faculty support specialists in support of equitable online teaching. The program introduces research findings about the importance of learning environments that are identity-safe (*Pacansky-Brock et al., 2020; Murphy & Destin, 2016; Walton, 2014*), the integration of independent and interdependent cultural values (*Hecht et al., 2021*), and positive instructor-student relationships (*Wood, 2019; Wood et al., 2015; Hammond, 2015; Gay, 2000; Rendón, 1994; Ladson-Billings, 1994*). During the Academy, participants engage with content, interact with peers from different institutions, and develop eight research-based humanizing elements in their online course, which are created with a variety of digital technologies and function as kindness cues of social inclusion (*Estrada et al., 2018*). Following the Academy, faculty redesign their online courses using humanizing elements and approaches. Throughout, participants are supported by an engaged, empathetic, high-touch facilitator who serves as a “warm demander” (*Berry, 2021; Kleinfeld, 1975*) through connection, care, and push. The Academy was developed with funding from the California Education Learning Lab.

METHODOLOGY

The Humanizing Online STEM Research Study intends to achieve a comprehensive understanding about the impact of the Humanizing Online STEM Academy professional development program and subsequent course redesign work on the online STEM faculty and online STEM students alike. The project started with a research design development phase between the Summer of 2019 and Spring of 2020, and a pilot phase with three STEM online courses from two California Community Colleges (CCC) and one California State University (CSU) between the Spring of 2020 and Spring of 2021 to refine the data collection tools and perform reliability testing. The scale up phase occurred the Summer of 2021, with a total of 68 STEM faculty and 11 faculty support specialist participants from eight different institutions including both CCCs and CSUs. Four types of data were collected during the scale up phase, including:

- two waves of instructor surveys (one pre- and one post-Academy with >75% response rates),
- three waves of instructor interviews from a “deep dive sample” of 10 instructors (one pre-Academy, one immediate post-Academy, and one post-Academy after the instructors taught their humanized course),

- student week-two survey (responded by 825 students with an average response rate of 45%) and end-of-course survey (responded by 599 students with a 62% response rate) in the humanized courses,
- student focus-groups interviews with a total of 20 students in the humanized course taught by instructors in the “deep dive sample.”

We used descriptive analyses to summarize common patterns for each of the key survey constructs. A number of comparison tests were also performed (for example, to compare instructor perceptions before versus after participating in the Academy) to shed light on changes in instructors' perceptions and practices over time, as well as possible differences in the experiences of students from different racial backgrounds in the humanized courses. For the interview data, a preliminary coding scheme was developed drawing on the key constructs nested under the study research questions. Interviews were first de-identified and then coded independently by two researchers with Dedoose software. The preliminary codes were refined through interactive reading of transcripts to identify additional thematic codes drawn from participants' responses.

PRELIMINARY FINDINGS

Characteristics of Faculty and Student Participants. The faculty surveyed are predominantly female (74%) and White (61%). All of the faculty participants have a master's (45%) or doctoral degree (55%), with an average of 9 years of teaching experience and 4 years of online teaching experience. The “deep dive sample” of instructors who participated in the interviews roughly reflects the demographic characteristics of the survey sample. Students who responded to both waves of surveys consist of 66% females and 50% students from minoritized racial groups.¹ Students participating in the interviews have similar demographic composition. Below we summarize the main themes identified from the survey and interview data.

CHANGES IN INSTRUCTOR PERCEPTIONS AND ATTITUDES

Overall, participants found all elements covered by the Academy moderately to very beneficial in helping them establish trust with their students and helping students feel included, respected, and engaged in their courses. While there was no significant difference pre- versus post-Academy in terms of participants' mindset beliefs (growth versus fixed mindset) and their perceptions of how students' own characteristics (such as race, income, gender) play a role in their achievement, instructors had significantly higher confidence in their online teaching capacity, on the role instructors play in improving student achievement overall, and on closing equity gaps between students.

¹ Students from minoritized racial groups include Black, Hispanic, Native Americans, and Pacific Islander students

- 1. Self-efficacy.** Instructors reported a significantly higher overall self-efficacy post-Academy, which was measured by eight items asking instructors' beliefs in their capacity to achieve various teaching goals in online courses, with higher scores representing greater confidence in terms of their capacity of teaching online effectively (1= Not at all confident; 5=Extremely confident; Pre mean=3.29 versus Post mean=3.63; $p<.001$). In particular, instructors' confidence in supporting the individual needs of students and designing a welcoming environment in online teaching increased by 18% (Pre mean =2.71, Post mean=3.21, $p<0.001$) and 19% (Pre mean=2.89, Post mean=3.45, $p<0.001$), respectively.
- 2. Closing equity gaps.** Relatedly, instructors tended to believe more in their own impact on closing equity gaps in online courses. Their average agreement level on the statement that "professors play a role in students' successful completion of a course" increased by 6% (Pre mean =4.53, Post mean=4.79, $p=.04$); similarly, the agreement on the statement that "A professor's ability to teach with video is a factor that can influence which students succeed in online STEM courses" increased by 9% (Pre mean =3.92, Post mean=4.26, $p=.02$).
- 3. Stepping away from a "one size fits all" approach.** One important theme that emerged from the longitudinal interviews is that the Academy helped the instructors to be more cognizant of the different backgrounds students came from and make intentional efforts to accommodate such diversity. For example, one instructor reflected: "It's not just about caring for the student just in your course. It's about understanding where they are a little bit in life and being able to help support them so that they can take your class successfully and get what they need." These efforts not only enabled students to be more open to coming to the course instructor for support, but also helped ameliorate the level of performance anxiety among students.

CHANGES IN INSTRUCTIONAL PRACTICES

Overall, instructors changed substantially in their instructional approaches post-Academy and reported being more actively engaged in promoting instructor-student social interaction, flexibility in course policies and grading, student-student interactions, and student-content interaction. Additional interview data further indicate that instructors were enthusiastic about the strategies they learned immediately following the Academy. Many indicated plans to incorporate all eight humanizing elements in their upcoming course and, though few were able to implement all eight over the course of the semester, most expressed an intention to do so moving forward. Instructors stated that some challenges to incorporating all of the humanizing elements included instructors' time restrictions, wanting to minimize student work-load, and feeling bogged down with managing covid19 related online teaching challenges. Instructors did report receiving positive responses from students as they implemented elements from the Academy.

1. Using the humanizing elements. After the Academy, participants reported that they were significantly more likely to use all the eight humanizing elements compared to pre-Academy. Depending on the specific element examined, 72% to 91% of the instructors teaching a humanized course in the fall reported using the element. In particular, instructors reported that the use of personalized videos to introduce themselves on their course humanized homepage helped establish a stronger, more personal connection with students. Others commented on the use of bumper videos to help prepare students to complete complex assignments. The most widely mentioned reason for not using an element is that there is not sufficient time for instructors to incorporate them into their courses, suggesting that ongoing institutional support is needed for the Academy to have a sustaining impact.

2. Promoting instructor-student social interaction and increasing instructor approachability. Instructors were more engaged in interacting socially with their students after participating in the Academy. This construct was measured by six items regarding different ways of promoting social interactions, such as sharing backgrounds, personalities, and personal lives. On average, 60% of the instructors used practices to promote instructor-student social interaction before the Academy, and this number further increased to 86% after the Academy, representing a 26% increase. It seems that the Academy did not only change the amount of efforts instructors made to facilitate instructor-student interaction, but also the dynamics of those interactions. For example, prior to the academy one instructor described having a "staunch" teaching style that sometimes intimidated some of her students. After the Academy, she shared ways that she tried to be more approachable:



"I used a lot more pictures. I tried to be more personable and light ... I always wanted to really help students, but I was too terse, so I tried to be more friendly and just more open minded in terms of what they're coming to me with and I felt that it really changed the climate of the course in terms of students feeling comfortable to come to me."

3. Instructor flexibility. Flexibility was measured by three items about the extent to which instructors were flexible with course policies, including accepting late submissions, offering extra credit opportunities, and allowing make-up exams/assignments, where higher scores represent greater flexibility (1= Very inflexible; 5=Very flexible). Instructors reported a 7% increase in their flexibility post-Academy (Pre mean =3.76, Post mean=4.01; p=.03). During interviews, instructors mentioned that these changes were partly driven by a shift in their perceptions of the relationship between instructors and students, as elaborated by one of the participants:



“Prior to this class I always felt like an instructor was at this level and your students are down here at this level. And really after the Humanizing STEM course, I realized we’re a team. We’re a team to get through this. And the less I view it as a hierarchy, the better my outcomes are.”

4. Creating student-student interaction opportunities. Instructors provided more student-student interaction opportunities in their humanized courses, such as assigning collaborative work and having students share their struggles and successes with each other. These patterns were echoed in the interview data, where several instructors reported increased efforts to allow students to interact with one another and get to know each other at the beginning of the course more intentionally. Instructors also mentioned that the tools introduced during the Academy, such as the asynchronous video discussion tool, Flipgrid, were useful in facilitating increased student interaction and developing a sense of community. One instructor shared that he started to partner students in breakout rooms so that they could work on experiments and “actually build a relationship” but he also shared how covid19 created challenges in group work: “This past semester I think is unusual because some students, they just stop showing up. And then, so that makes partnering a little bit more difficult.”

STUDENT EXPERIENCES IN THE HUMANIZED ONLINE COURSE

Overall, students reported high levels of satisfaction with sense of belonging, instructor-student relationships, teaching presence, social presence, and cognitive presence, as well as positive attitudes towards online learning in the humanized online courses. Students from minoritized racial groups reported particularly positive perceptions of their experiences in both waves of the student survey. Focus group interviews indicate that students appreciate the approachability and responsiveness of the course instructor, and clear communication of course expectations. Yet, both the survey and interview data suggest that student-student interactions need to be further strengthened.

1. Especially positive experiences reported by students from minoritized racial groups.

Among students who responded to both waves of the student surveys, Black, Hispanic, Native American, and Pacific Islander students, who are traditionally considered disadvantaged in online STEM courses, reported higher levels of sense of belonging, instructor-student relationships, teaching presence, and cognitive presence than their White and Asian counterparts in both the week two and end-of-course surveys. Minoritized students also experienced a greater increase in most of the constructs between week two and the end of the term compared with White and Asian students. In particular, minoritized students experienced a significant increase in sense of belonging and student-student interactions, although there was a decrease in cognitive presence. In the end-of-course survey, minoritized students reported higher social presence, student-student interactions, and more positive attitudes with respect to the online courses than White and Asian students.

2. Instructor approachability and responsiveness. A common theme that emerged from interviews with students was that they appreciate the approachability and responsiveness of the course instructor. Students noted that their instructors made themselves accessible through actions such as office hours, email interactions and discussion forums. Instructors who constantly reassured students that they were happy to help, made students feel comfortable in the online class. Students also emphasized the importance of both approachability and responsiveness, which re-framed the way students thought of the relationship with the course instructor. As a student explicitly shared, *"She [instructor] expresses all the time how much she wants to help us and how important it is for us to be able to reach out to her and feel comfortable reaching out to her. . . I just feel a lot more comfortable now to reach out to her because she's, I keep saying the same thing, she just expresses it so much that it's like, 'Okay, well I know that she does care, and I know that she does want to help me. And so I'm willing to reach out if I need to.'" Even when students didn't meet with their instructor they indicated that they would if they needed help as their instructors' approachability made it easy for them. It seems that an approachable and responsive*

instructor not only enabled students to reach out to the instructor for help when needed, but also communicated a sense of caring that encouraged students to feel more connected to the instructor and committed to the course.

3. Articulation of course expectations and timely feedback. Throughout the interviews, students emphasized the benefits of having a clear sense of instructors' expectations for key performance tasks and explicit guidance on how to perform well in the course. Students appreciated consistency of learning materials, assignments, timely feedback, and grading rubrics that provide clear guidance in terms of what constitutes a high quality response. As one student explicitly stated: *"I just wanted to make sure that it was always very consistent, which he has been, it was more his guidelines and everything that he expects from you he'll lay it out right then and there. Whereas with other professors, I feel like it's more of guesswork. And for me it's always been like, 'I want to stay at an A, so how can I do that?' And so because he places a rubric on anything that we choose to do, it's helped me make some choices as to how I proceed. So for me it's been the rubric, he's been very consistent."* Similar states were mentioned by other students, who agreed that explicit communications of expectations and guidance helped assuage performance anxiety and strengthen their motivation to succeed.

4. Need to further strengthen student-student interactions. Among all the non-cognitive constructs included in the survey, students reported the lowest level of satisfaction with student-student interactions compared with other constructs. This sentiment was echoed in the interviews, where most students indicated that they had limited group projects with class peers and would appreciate more opportunities to connect with each other academically. While most of the students mentioned that the course included some social interactions with peers, such as through the introductory posts about oneself, students generally welcome opportunities that would enable sustainable and deeper-level connections with peers.

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