Post-Pandemic Transition from Online to On-Campus Learning Environments for College Mathematics Instructors

A thesis submitted to the faculty of San Francisco State University In partial fulfillment of the requirements for the Degree

Masters of Arts In Mathematics

by

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San Francisco, California
August 2022
Certification of Approval

I certify that I have read *Post-Pandemic Transition from Online to On-Campus Learning Environments for College Mathematics Instructors* by George Wally Nacouzi, and that in my opinion this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirement for the degree Master of Arts in Mathematics at San Francisco State University.

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Abstract

In March 2020, the coronavirus pandemic forced institutions across the globe to transition to remote/online instruction. This abrupt transition sparked a lot of research focused around shifts in instructors’ preparedness, professional values and expectations, and perception of student expectations/needs. Throughout 2021, the coronavirus pandemic restrictions eased and consequently schools moved back to on-campus instruction. The same research that was so prevalent during the pandemic waned. This study picked up where others left off, by investigating shifts in instructors’ thinking about their teaching during the post-pandemic pivot from online back to on-campus instruction. To understand instructors’ experiences, 30 San Francisco State University (SFSU) instructors were surveyed, 7 of whom were interviewed. Analysis of survey and interview data suggests there were three instructor types that each experienced the transition from online back to on-campus instruction differently:

- Interns (instructors who started teaching within the last 2 years, i.e., during the pandemic): They struggled to transition to on-campus instruction, only being familiar with online teaching practices.
- Residents (instructors who have between 2 and 10 years of teaching experience): They readily transitioned back to on-campus instruction but chose to incorporate newly developed skills with online learning tools into their pre-pandemic teaching practices.
- Fellows (instructors who have more than a decade of teaching experience): They eagerly transitioned back to on-campus instruction and chose to rely almost exclusively on their pre-pandemic teaching practices.
Acknowledgements

I would like to thank the following people. My committee chair, Dr. Shandy Hauk, for spending countless hours to make this paper possible. My committee members, Dr. Emily Clader and Dr. Chun-Kit Lai, for reviewing my thesis. My research group peers (Helena Almassy, Jonathan Farley, Christopher Gibson, and Tuto Lopez Gonzales) for meeting weekly to collaborate on ideas. And San Francisco State University mathematics department chair Dr. Eric Hsu for distributing my survey.
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Chapter 1: Introduction

1.1 Author Background

I, George Nacouzi, am a Master of Arts in Mathematics student at San Francisco State University. I have taught undergraduate level classes at the University of California, Berkeley (Data 8) and San Francisco State University (Math 122/123). Teaching is my passion and I plan on continuing with it. However, during my past ten semesters of teaching I have noticed that my teaching ideologies are changing. Students, new technologies, professional development resources, and other outside factors influence my outlook on teaching. Acknowledging this has helped me focus my growth as a teacher. This paper explores one of those influencing factors: the coronavirus pandemic.

My experience with pandemic influences on teaching began, as did that of many, with the sudden pivot to remote instruction in March 2020. At that time, I was teaching an in-person, 30 student introductory data science lab and discussion section at UC Berkeley. I was one of 45 undergraduate student instructors working together to deliver instruction to a 1,700 student class. Luckily for me, moving my section online happened relatively seamlessly because of the large amount of staff support and the already mostly online material. Nevertheless, I noticed a dramatic drop in attendance, absence of student engagement, and disconnection from my students. I taught the same class in the Summer 2020 term. After starting graduate school at San Francisco State University, I taught an introductory statistics class online in Fall 2021 and Spring 2022. These were my first experiences as instructor-of-record for a course. I still had the same frustrations with online teaching as before. My peers who moved back to on-campus instruction in Spring 2022, however, enjoyed the perks of in-person instruction. Some of them even adapted
some of their newly realized online teaching components. These experiences generated questions for me to explore about what others were thinking and doing as they dealt with post-pandemic circumstances and their teaching. The result of my exploration is this thesis.

1.2 Introduction

In the spring of 2020, COVID-19 abruptly disrupted college and university instruction across the globe. In efforts to slow the spread of coronavirus, many schools switched from on-campus (i.e., face-to-face) to online instruction. Over the next two years these same schools transitioned to hybrid (i.e., combined online and on-campus) instruction and eventually back to on-campus instruction.

The early 2020 shift (on-campus to online) replaced traditional brick and mortar mathematics classrooms with Zoom meetings, replaced chalk with stylus pens, and shifted course design from a printed syllabus to multi-faceted online learning platforms. The hastiness of these transitions meant instructors had little to no formal training on how to adapt to changes in learning environments. As discussed in the next chapter, several studies have investigated the effects of these transitions to digital formats on instructors' thinking about their teaching. Most of these studies focused on the abrupt pivot in early 2020, when the coronavirus pandemic forced on-campus instruction to move online. Now, in 2022, education is entering a post-pandemic era. The number of classes offered through synchronous online instruction is rapidly decreasing and teaching is moving back to campus. The post-pandemic shift back to campus returned students and instructors to brick and mortar classrooms, but this time with face masks, social distancing, and an instructional workforce with new skills and experience in using online tools in teaching.
The 2021-22 school year was a first opportunity to explore the pandemic lessons learned for instructors and how new and modified approaches were reshaping instructor perceptions and practices for on-campus instruction. This thesis investigates how the post-pandemic swing back to on-campus instruction affected instructors’ thinking about their teaching.
Chapter 2: Literature Review

The influence on student learning opportunities exerted by college instructors’ approaches to teaching has been widely discussed for many years (Laursen et al., 2019). In the pandemic years, there has been a vast amount of instructor learning about online teaching methods in asynchronous and synchronous settings. In 2020 and 2021 instructors spent a great deal of time and effort experimenting with their teaching, often without much preparation. They learned about and used new tools. Shifts in self-perceptions, professional values, and professional expectations were legion. The pandemic years also saw changes in how instructors viewed the others in their classes, the students. All of these experiences have meant that, for many, the return to on-campus instruction has not been a return to previous practices. This chapter reviews a selection of research and practice literature related to these experiences. It is organized to highlight four themes about the shaping of instructor views and practices: Instructor Preparation, Learning About and Using New Tools, Professional Values and Expectations, and Perceptions of Student Expectations/Needs.

2.1 Instructor Preparation

According to Deshler et al. (2015), preparation programs for novice instructors generally fall into one of three categories:

**Basic** – offers rules with little guidance beyond a short (1 to 3 day) orientation;

**Moderate** – includes basic orientation plus at least one semester-long support along with continuing logistical support (e.g., one semester of a weekly seminar or course and ongoing course-specific coordination) and may also have some sort of mentoring;
**Sustained** – includes initial intensive (i.e., Basic and Moderate) and continuing sustained professional learning across several years in seminar, course, or other regularly scheduled formats.

Moderate and especially Sustained professional learning cultivate more effective instruction (e.g., greater undergraduate student success in terms of grade distributions and better student reviews of instructors). The novice instructor pool Deshler and colleagues focused on were mathematics graduate teaching assistants (GTAs).

In the pivot to online teaching in early 2020, instructors – both inexperienced and experienced – were suddenly novices. In the early months of the pivot, instructors across the country had access to Basic online transitional training and, consequently, the unpreparedness associated with it (Bartlett et al., 2021). In the following semesters, instructors sought more and different professional support in both Moderate and Sustained ways (Rutherford et al., 2021; Walsh et al., 2022). To better prepare for future needs, particularly responding to and managing change during crises, it is valuable to document the array of pandemic and end-of-pandemic professional learning taken up and used by instructors as well as the longer-term consequences (if any) of that new learning. In doing so, future professional development services can be implemented to better support instructors in effective teaching.

### 2.2 Learning About and Using New Tools

The early 2020 pandemic shift to online instruction introduced many new online tools. Worksheets and exams on paper were no longer an option. “Turn and talk with your neighbor” no longer had meaning and familiar classroom movements of looking around the room at whiteboards vanished. Addressing the instructional challenges of how to have students work
with those around them, or teach from a whiteboard, were made new again. Instructors navigated a new digital world to post electronic/reworked online exams, use Zoom breakout rooms, and write on tablets. Instructors, many of whom were uncoached during the transition, struggled to move their courses online. They reported time panic, fear of cheating, and untrustworthy online tools (Bartlett et al., 2021). But Bartlett and colleagues also found that as time progressed, instructors found coping strategies and some eventually excelled in online formats.

Even before the pandemic Crompton and Burke (2018) argued that building expertise with digital tools was long overdue. In pre-pandemic on-campus instruction, higher education had few robust mobile learning options. In the 21st century, “smart” personal mobile device ownership has skyrocketed, yet use of “smart” learning environments has not kept pace.

In the past year, as classes have moved towards hybrid formats and eventually back on-campus, some instructors have chosen to continue using online components. What are instructors holding on to? Why? The answers to these and other questions (e.g., What are the downstream consequences of those instructional choices for student learning?) are important for shaping future work in post-secondary mathematics instructor development.

2.3 Professional Values and Expectations

In 2020, the California Community Colleges Chancellor’s Office surveyed instructors and students from 97 California Community Colleges. In particular, instructors were asked about their experiences during the early 2020 pandemic shift from online to on-campus instruction. Instructors reported concerns related to changes in teaching duties and challenges in being and staying motivated to teach. Identifying these shifts in instructors' thinking about their teaching prompted the CCC Chancellor's Office to set up response teams to address concerns.
In what ways might similarly concerning experiences be felt by instructors during the post-pandemic online to on-campus shift? Studies, like the small exploration reported here, are important to identify questions and directions about instructors’ needs for transitional assistance.

2.4 Perceptions of Student Expectations/Needs

California colleges saw a 5% drop in student enrollment between 2020 and 2021 (Penrod, 2022). This was in large part because students felt disconnected and disregarded by instructors. Instructional efforts were misaligned with students' needs. As Hauk et al. (2021) point out, instructors are sometimes ready for making instructional change but may require a constellation of supports for the needed shifts in knowledge, skill, and perspective to set and achieve new goals. Student expectations were shaken by the early 2020 pandemic shift from on-campus to online instruction and instructors faced the additional challenge of identifying (and responding to) student needs and expectations in and for online environments. On top of this, the added demands of pandemic teaching made grading – a primary mechanism pre-pandemic for instructor learning about student needs – even more challenging for instructors (Mazur et al., 2021).

The post-pandemic change from online to on-campus instruction also saw a shift in learning environments. Thus, to inform future professional learning design, it is important to explore changes in instructors’ perceptions of student needs/expectations in the post-pandemic migration of teaching from online to on-campus settings.
2.5 Approach and Research Questions

Instructional change efforts interact with instructors’ thinking about their teaching in various ways (Hauk et al., 2021). The post-pandemic shift from online back to on-campus instruction is an instructional change effort. What are instructors’ perceptions about their teaching now, after an abrupt pivot, a year or more of online-only teaching, and one or more semesters of work in the new post-pandemic on-campus spaces? How have those experiences been reshaping their thinking and teaching practices? The thesis project reported here was one attempt to address these questions. In particular, surveys and interviews collected and data analyzed were driven by the Research Question: How did the post-pandemic pivot from online to on-campus instruction affect instructors’ thinking about their teaching?
Chapter 3: Methods

In order to successfully answer the research question, necessary steps were taken to ensure a rigorous study. This chapter explains those steps. First, the participant pool choice is addressed and why it was appropriate. Then, being that this study was primarily qualitative, the survey and interview protocol are explained. From there, the data collection and data analysis procedures are laid out in enough detail that the investigation could be repeated. And finally, the criteria for rigor in this study are explored.

3.1 Setting and Participants

The participants in this study were mathematics instructors at San Francisco State University (SFSU). SFSU offered an appropriate participant pool for two reasons. First, the majority of SFSU mathematics instructors had both online/pandemic and on-campus/post-pandemic teaching experiences. Second, SFSU employed a wide variety of mathematics instructors with varying years of teaching experience and academic roles.

Prior to March 2020, most SFSU mathematics classes were taught on-campus. From March 2020 through the end of Summer 2021, most SFSU mathematics classes were taught online because of the COVID-19 pandemic. In Fall 2021, some SFSU mathematics classes were taught on-campus, some were taught online, and some were taught as a hybrid of online and on-campus. In Spring 2022, most SFSU mathematics classes were taught on-campus. This paper's research focus required instructors who taught through the transitions.

SFSU’s mathematics department employs a diverse group of instructors. Some are just starting their teaching career, whereas others are now retiring after decades of teaching. Furthermore, SFSU mathematics instructors hold a variety of academic posts (e.g., graduate
teaching associate (GTA), faculty lecturer, and tenure-line professor). While the number of participants is too small to support generalizability of results, such a variety of participants is helpful in supporting transferability of research methods and findings to other contexts.

In the 2021-22 academic year the SFSU mathematics department employed 65 people as instructors: 22 tenure-line faculty, 25 lecturer faculty with renewable contracts, and 18 graduate students who were instructor-of-record for one or more lower division courses. Of these 65 instructors, 32 completed the survey and of those, 7 participated in interviews. The demographics of the department, the participants in the surveys, and interviewees are summarized in Figure 3.1. Data tables for Figure 3.1 are in Appendix C.

**Figure 3.1. Demographics**
Ethnicity

Department Surveys Interviews

African American or Black / Asian / Hawaiian/Pacific Islander
Latino/Latina/Latinx, Chicano/Chicana
Native American/American Indian/Alaska Native
White / Multi-group

Academic Post

GTAs / Lecturer faculty / Tenure-line

Department Surveys Interviews

Years of Teaching

0-2 years / 2-10 years / 10+ years
Though information was not available for each person in the department or among survey respondents on all demographic categories (gender, ethnicity, academic post, years of teaching), it was available for most. The set of survey respondents was similar to the department in each category. The pool of interviewees had less ethnic diversity than the department and set of survey respondents. They also differed from the department in terms of gender identity and academic post. The survey set and interviewees included more male and fewer female identifying instructors than the department ratios would suggest. The survey and interviews also included a much smaller proportion of lecturer faculty instructors than the department.

3.2 Instrumentation: Survey

In order to connect results of pandemic-pivot research with post-pandemic reflections by instructors in this study, the survey questions for this study were adapted from Teaching During COVID-19 Times: A Community College Perspective (Mazur et al., 2021). Questions adapted from Mazur et al.’s survey were individually selected if they were categorically related to the focus areas suggested by existing research: Instructor Preparation, Learning About and Using New Tools, Professional Values and Expectations, and Perceptions of Student Expectations/Needs. The survey was built and distributed on Qualtrics. The structure and question types from the survey are summarized in Table 3.2 (see Appendix A for the full survey).

<table>
<thead>
<tr>
<th>Table 3.2. Outline of survey sections and items.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consent page</td>
</tr>
<tr>
<td>Page 0 - Launch page</td>
</tr>
<tr>
<td>Page 1 - Instructor Preparedness [ranking]</td>
</tr>
<tr>
<td>Asked respondents to rank their level of agreement with each of the following statements for each era: pre-pandemic, pandemic, and post-pandemic.</td>
</tr>
<tr>
<td>● I was familiar with strategies for effective teaching and learning.</td>
</tr>
<tr>
<td>● I was familiar with technology I needed for teaching and learning.</td>
</tr>
<tr>
<td>● I learned about online tools for teaching and learning.</td>
</tr>
</tbody>
</table>
● Online teaching conflicted with my personal identity as an instructor.
● I personally felt well-prepared for teaching.
● I was able to find sufficient resources for my teaching.
● I knew where to go for instructional support for my teaching.
● I knew where to go for technical support for my teaching.

Page 2 - Learning About and Using New Tools [checkboxes]
Asked respondents to indicate which of the following online tools they used during each era: pre-pandemic, pandemic, and post-pandemic.
● Collaborative documents (e.g., google docs, online whiteboard)
● LMS (e.g., Canvas, iLearn, Blackboard, Moodle)
● Online homework (e.g., publisher, My Open Math, WebWorK)
● Presentation software (e.g., slides)
● Video conferencing (e.g., Zoom, Teams, Meet)
● Videos (e.g., youtube, pre-recorded myself)
● Website (e.g., personal, school, non-interactive site)

Page 3 - Professional Values and Expectations [ranking]
Asked respondents to rank their level of agreement with each of the following statements for each era: pre-pandemic, pandemic, and post-pandemic.
● I was able to stay true to my teaching values and objectives.
● I was productive in my other (nonteaching) responsibilities (research, administration, etc.).
● I felt overwhelmed by the time I invested in teaching.
● Teaching felt like the most important aspect of my job.
● I was motivated to teach.
● It was difficult to teach.
● I felt confident in my grading scheme.

Page 4 - Perceptions of Student Needs/Expectations [ranking]
Asked respondents to rank their level of agreement with each of the following statements for each era: pre-pandemic, pandemic, and post-pandemic.
● I felt comfortable interacting with my students.
● I worried about my students’ mental health.
● I felt like my students needed motivational support.
● I felt like my students needed academic support.
● I felt disconnected from my students.
● I think students are comfortable learning technical subjects through remote instruction.

Page 5 - Professional Info
Asked survey participants about their academic post and years of teaching experience.

Page 6 - Demographic Info

Page 7 - Interview inquiry
Asked for contact information if willing to participate in a follow-up Zoom interview.

Note: Each ranking item had a dropdown list with the following options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree, Not applicable.
3.3 Instrumentation: Interview

The purpose of interviews was to ask instructors open-ended questions about their teaching. Interview questions covered three main topics, asking about course design, teaching practices, and classroom culture. The interview questions are in Table 3.3 (see Appendix B for more detail).

Table 3.3. Interview questions.

1. If you know, can you tell me how it was determined for Fall 2021 whether a course would pivot to be in-person, hybrid, or remain online? synchronous, asynchronous, or some combination?
2. This next question is about how your roles as a teacher may have shifted between last year and this year.
   a. How did your course design differ last year from this year?
   b. How did your thinking about facilitation differ last year from this year?
   c. How did your allocation for lecturing vs group work time differ last year from this year?
3. As you may already know, the term ‘classroom culture’ describes how safe and willing students are to participate in a classroom. Over the past few semesters, were there differences you noticed in your classes' classroom culture?

I, the author, conducted seven interviews via Zoom. The interviews were recorded and interviewees were assured that Dr. Shandy Hauk, the committee chair, and I were the only ones who could access the recordings. Interviewees' identities have been kept confidential through the use of pseudonyms.

Those pseudonyms and some teaching background of the interviewees are summarized in Table 3.4. Note that the pseudonyms are indicative of gender (all interviewees provided a gender identification on the survey). Names also indicate the number of years of teaching experience: one syllable for 2 or fewer years, two syllables for more than 2 and up to 10 years, and three syllables for more than 10 years.
Table 3.4. Interviewees teaching experiences.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Pre-pandemic (on-campus instruction)</th>
<th>Pandemic</th>
<th>Post-Pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Spring ’20</td>
<td>Fall ‘20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(online/on</td>
<td>(online)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-campus)</td>
<td></td>
</tr>
<tr>
<td>Cam (GTA)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Rox (GTA)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tom (GTA)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>David (Lecturer)</td>
<td>✓ for 1 year</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ella (Tenure-line)</td>
<td>✓ for 9 years</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Katrina (Tenure-line)</td>
<td>✓ for 30 years</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Maverick (Tenure-line)</td>
<td>✓ for 20 years</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Note: ✓ indicates that the interviewee taught in a certain timeframe.

3.4 Procedures

Before data collection could start, SFSU’s internal review board (IRB) had to sign off on the survey and interview protocol. Once cleared, SFSU’s mathematics department chair, Dr. Eric Hsu, emailed out the survey link to all SFSU mathematics instructors. Participation in this survey was completely voluntary. Of the 65 instructors emailed, 30 of them attempted the survey. At the end of the survey, participants were asked if they would be willing to participate in a follow-up interview. Ten of them agreed, 7 of whom were actually interviewed. Interviewees were only asked the potential follow-up questions of the Interview Protocol (Appendix B) to elicit more
detail, clarify a response, or probe for connections among responses. The survey took participants about 15 minutes to complete, and each interview lasted roughly 30 minutes.

3.5 Analysis

Analysis of the survey involved noticing patterns of similarities and differences across participant responses. Statistically, the work is descriptive, not predictive. Many of the questions were about ranking the degree of agreement with statements. Graphs of the distributions of responses to key questions were generated and analyzed. Graphs of interest are presented and explained in Chapter 4. The time element in the survey is the fact that individuals’ responses were requested for pre-pandemic, pandemic, and post-pandemic eras.

Analysis of the interviews involved several steps. First, computer-generated interview transcripts were cross-referenced with interview recordings to correct transcription errors. Then, each interviewee's interview responses were paraphrased in a word document to summarize and to document particular wording (quotes) that captured the essence of each response. Next, these responses were cross-examined to identify any commonalities or themes. Finally, words or phrases (often quotes from participant statements) were chosen that best exemplified each commonality or theme.

Finally, analysis across survey and interview data was done. This analysis looked for similarities and differences interviewees might have had with the rest of the survey respondent pool.
3.6 Criteria for Rigor

This report has one author but has guidance from many (an advisor, committee members, and peer research group). Steps were taken to ensure that this research paper met the criteria for rigor (credibility, authenticity, transferability, dependability, and confirmability; Patton, 2015). Table 3.5 describes the tactics and associated challenges/successes associated with addressing each criteria for rigor.

Table 3.5. Criteria for rigor and how they were addressed.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description in this study</th>
<th>Challenges &amp; successes in addressing criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Audit Trail</em></td>
<td>Tracked communication with participants; used a written survey; documented interview protocol; transcription of interviews.</td>
<td>Challenge: Privacy guarantee to interviewees meant transcription of interviews had to be secured.</td>
</tr>
<tr>
<td><strong>Member Checks</strong></td>
<td>Minimal member check on survey results through interview question 2.</td>
<td>Challenge: Time needed to write up results and get feedback on them from members.</td>
</tr>
<tr>
<td><strong>Peer Debrief/ Expert Checks</strong></td>
<td>Primary peer feedback through research group and expert check by advisor.</td>
<td>Success: Modified interview protocol, which allowed for more productive interviews</td>
</tr>
<tr>
<td><strong>Negative Case Analysis</strong></td>
<td>Goal of study is journalistic: report on what happened using instructor perspectives. Goal is not creating or refining a framework.</td>
<td>Not applicable, design of study omits need to address criteria</td>
</tr>
<tr>
<td><strong>Progressive Subjectivity</strong></td>
<td>Weekly research group meetings support reflection; developed and revised a position statement (e.g., about switch in focus to post-pandemic transition).</td>
<td>Challenge: Purposeful reflection early on was about a different research question and design.</td>
</tr>
<tr>
<td><strong>Persistent Observation</strong></td>
<td>Limited to the time between survey and interview (a few weeks). Informed by review team meetings across 4 months of development of</td>
<td>Challenge: Change in research context due to external factors (moved from SRJC to SFSU as primary site).</td>
</tr>
<tr>
<td>Criteria</td>
<td>Description in this study</td>
<td>Challenges &amp; successes in addressing criteria</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>the research and analysis (among members of the target population).</td>
<td></td>
</tr>
<tr>
<td>Authenticity</td>
<td>Worked with advisor and research team to develop a survey and interview protocol that linked to existing research and left room for participant voice and experience to emerge in responses.</td>
<td>Success: Survey and interview protocol avoid leading questions and opinionated language.</td>
</tr>
<tr>
<td>Transferability</td>
<td>Participant pool and setting are described in detail and results are unpacked by instrument type and subgroup so the reader can extrapolate research findings.</td>
<td>Challenge: Survey and interviews were voluntary, so the participant pool may be biased and not representative in some ways of all mathematics instructors.</td>
</tr>
<tr>
<td>Dependability</td>
<td>Survey and interview data collection and analysis explained in this chapter. Data was cleaned by the researcher.</td>
<td>Challenge: Zoom speech to text feature is faulty and requires correction.</td>
</tr>
<tr>
<td>Confirmability</td>
<td>Survey and interview data reported in Chapter 4: Results is done with as much transparency as privacy constraints allow.</td>
<td>Challenge: Privacy rights of interviewees required use of pseudonyms to share interview transcripts.</td>
</tr>
</tbody>
</table>
Chapter 4: Results

After collecting survey and interview responses, analysis, as it is described in Chapter 3, was performed on the response data. Survey analysis was performed on the entire participant pool, whereas interview data was first aggregated based on interviewees' teaching experience and then analyzed. Finally, analysis compared subsets of interviewee survey responses. What follows summarizes and illustrates key themes and supporting data.

4.1 Survey

The following subsections offer descriptive statistical summaries for responses in each of the subsections of the survey. In each case, the figures show the profile for all 18 people who completed the survey. As mentioned in Chapter 3, the survey questions were adapted from Teaching During COVID-19 Times: A Community College Perspective (Mazur et al., 2021). For comparison, the results reported by Mazur are also plotted on the figures. Mazur’s participant pool consisted of instructors teaching online during the pandemic. It is worth noting that there were slight wording changes made for this study, though the intent and main idea of survey questions was maintained. The data tables for Figure 4.1, 4.2, 4.3, and 4.4 are in Appendix D.

4.1.1 Instructor Preparedness

In this section of the survey there were eight statements. For four of these statements responses were similar across all time points, pre-pandemic, pandemic, and post-pandemic: I was familiar with strategies for effective teaching and learning, I was familiar with technology I needed for teaching and learning, I knew where to go for instructional support for my teaching, and I knew where to go for technical support for my teaching. For four of the statements, responses differed by time point. Figure 4.1 is a clustered stacked bar chart showing the results.
for the other four statements with level of agreement (Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree) for each of the three time periods and the Mazur paper. Each bar represents 100% of responses to the item.

**Figure 4.1. Instructor preparedness statements with response differences across time.**

As illustrated in Figure 4.1, during the pandemic, instructors reported they did not feel well prepared for teaching (*I personally felt well-prepared for teaching*). This was in large part because they felt they had not learned how to use online teaching tools (*I learned about online tools for teaching and learning*).
tools for teaching and learning and I was able to find sufficient resources for my teaching). But in the post-pandemic era, trained instructors were more accepting of online tools and more likely than not to disagree with Online teaching conflicted with my personal identity as an instructor.

4.1.2 Learning About and Using New Tools

This section of the survey asked for information about the kinds of tools known about and used at each time point (before, during, after the pandemic). Previous pandemic-centered research (e.g., Mazur et al., 2021) asked general questions about this topic, but this study sought to unpack the types of tool use across instructor experiences. Figure 4.2 is a bar chart of the online tools used across the three different time periods: pre-pandemic, pandemic, and post-pandemic.

Responses about every online tool in the survey followed the same pattern. The tools were used the least in the pre-pandemic era. Then, during the pandemic when classes suddenly shifted online, these online tools were used frequently by most instructors. This jump in general usage was expected from prior research (Mazur et al., 2021). And finally, in the post-pandemic period when classes were on-campus, hybrid, and online, online tool usage subsided but still stayed above pre-pandemic levels.
Note the significant drop in use of Presentation software (e.g., slides) between the pandemic and post-pandemic era. Its usage dropped around 33 percent in this time period (i.e., those reporting regular use dropped from 75 percent to 50 percent), as opposed to the roughly 20 percent drop in usage of all the other online tools during the same time period (e.g., Video conferencing dropped from 95 percent to 75 percent).

4.1.3 Professional Values and Expectations

In this section of the survey there were seven statements. For four of the statements, there was no notable change across time points in response patterns: *I was productive in my other*...
(nonteaching) responsibilities (research, administration, etc.), Teaching felt like the most important aspect of my job, I was motivated to teach, and I felt confident in my grading scheme.

For three statements, responses differed, as summarized in the clustered stacked bar chart in Figure 4.3, grouped by the three statements on the vertical axis.

**Figure 4.3. Professional values and expectations statements with response differences across time.**
The variation in the patterns of response to three statements were similar: *I was able to stay true to my teaching values and objectives*, *I felt overwhelmed by the time I invested in teaching*, and *It was difficult to teach*. For example, instructors appear to have had a firm grasp on some professional values and expectations well before the pandemic. Then, during the pandemic, they questioned them in a negative way. After the pandemic, things improved, but not to their pre-pandemic levels.

### 4.1.4 Perceptions of Student Expectations/Needs

In this section of the survey there were six statements. For three of the statements, there was no notable change across time points in response patterns: *I felt like my students needed motivational support*, *I felt like my students needed academic support*, and *I think students are comfortable learning technical subjects through remote instruction*. For the other three statements, responses differed. Figure 4.4 gives a visual summary of the response pattern for the other three statements and is a clustered stacked bar chart, with different statements across the vertical axis. For the most part, instructors' perception of student expectations/needs followed a similar pattern as shown by the clusters around the statements: *I felt comfortable interacting with my students* and *I felt disconnected from my students*. Before and after the pandemic, instructors had much more similar experiences with their students than during it. The only exception to this trend was the statement *I worried about my students’ mental health*. Instructors continued to worry about their students’ mental health after the pandemic, much more than they had before it.
The seven interviewees each had unique experiences and consequently distinct responses to the interview questions. With that said, there was a lot of overlap and common themes amongst their responses. The point of the interviews was to elicit details that would elaborate on
the survey’s identification of shifts over time in instructors’ thinking about their teaching. After reviewing interviewee’s responses, there were three clusters of interviewees who shared similar responses. I chose to borrow terms from the medical profession to describe each cluster. Each term, as they are used in the medical profession, identifies how many years of experience that cluster has. In this paper, Interns have 0-2 years of teaching experience, Residents have 2-12 years of teaching experience, and Fellows have 12+ years of teaching experience. In more detail, the groups were:

**Intern** (Cam, Rox, Tom): These instructors started teaching right before or during the pandemic and consequently had little to no in-person instructional experience before the pandemic. The majority of their teaching had been online, which significantly shaped their teaching habits. Their reported shifts in thinking about their teaching could be related to many things, including the transition to on-campus instruction or simply learning how to teach.

**Resident** (David, Ella): These instructors started teaching on-campus less than a decade before the pandemic. Unlike Interns, they were already familiar with in-person teaching. However, after teaching online during the pandemic, they re-evaluated their post-pandemic on-campus teaching practices and reported including more online components.

**Fellow** (Katrina, Maverick): These instructors taught in-person for more than a decade before the pandemic. They reported “being fine online” during the pandemic, but felt much more comfortable when post-pandemic instruction moved back to campus. Pandemic-driven online teaching was a “hiccup” in their instructional methods, and they
reported that little use of pandemic-era online tools carried over in their return to
on-campus teaching.

4.2.1 Knowledge of administrative decision making for teaching formats

Question 1 of the interview protocol asked interviewees what they knew about why some
classes were in-person, some hybrid, or some remained online in Fall 2021. Intern instructors did
not know and gave differing answers. These varied from “I thought it was because it was in the
100 levels. But then, I also know all my grad classes were online. So I do not actually know.”
(Rox) to “I remember the math department asking the instructors about our willingness to do in
person teaching. So, at least in my case, I was willing to.” (Tom). On the other hand, all of the
more experienced instructors (Residents and Fellows) said something like David’s comment:
Instructors were sort of encouraged to be on-campus to whatever extent they felt
comfortable. But it was also insisted that courses have a remote option. So for courses
with multiple sections there was always at least one that was online. And for courses with
just one section, if that course was happening on campus, then it needed to be hybrid.

4.2.2 Shifts in instructional approaches

Question 2 asked interviewees to focus on recent changes in instructional practices. In
describing how their course design post-pandemic might have differed from the previous year,
the most experienced instructors (Fellows) said they had gone back to their pre-pandemic
teaching with little change: “I've been teaching for many years and all but a year and a half of
time has been in person and so it wasn't particularly challenging to return to in-person
instruction.” (Katrina). By contrast, the Intern and Resident instructors said their course design
retained much of the pandemic online format, the way people gathered just moved back to
campus. For example, Ella noted
One thing that was actually interesting for me was how similar I was actually able to make those two semesters. So in Spring 2021 when I was teaching exclusively online, the format was that I would post videos to convey the content that students would watch before class and then during our class time they would go to breakout rooms and complete worksheets based on what they learn in the video, in small groups. Versus in Spring 2022 when I was teaching that same course in person, I actually still used a split classroom format. So students still learn the material before coming to class by watching videos, mostly the same videos actually as in Spring 2021. And then when they came to class, you know, class was in person as opposed to over zoom, and they were doing their work spread around the room at whiteboards rather than in breakout rooms. But the format, in terms of sort of doing the worksheets together, was the same.

When asked how giving students feedback differed from pandemic (online) to post-pandemic, almost all interviewees said they experienced a change in giving group work feedback. Instructors reported it was much more difficult online because of navigating Zoom breakout rooms. As Tom put it,

> The online dynamics was, of course, using breakout rooms. In-person that really changed a lot because I was able to really see what the students were doing… I was able to see the personality of the students… being that close and having the opportunity to really be there, and seeing the students and seeing how they work.

And lastly for question two, instructors were asked how their allocation for lecturing versus group work time might have differed pandemic to post-pandemic. Intern and Residents, with the exception of Ella, said they allocated more group work time and less lecture time post-pandemic. As Cam put it:
Sometimes online getting people to do group work and things can be a little bit like pulling teeth. It is easier to just lecture occasionally, if they are not doing group work very well. But in-person group work can work a little better.

Fellows did not notice a change in their allocation for lecturing and group work time. According to Maverick:

I am not sure if they differ that much honestly. I mean, of course the mode differs. Online you have to make some Zoom breakout groups or something like this. But yeah, I am not sure if they differ that much. It is a good question, though. I had never thought about it, probably it is an indication that they do not differ that much, in my case.

4.2.3 Classroom culture

Question 3 asked interviewees if they have noticed differences in classroom culture over the past few semesters. The term “classroom culture” was defined by the researcher in the interview as “how safe and willing students are to participate in a classroom.” All instructors reported an increase in student participation when class transitioned from online to on-campus teaching. In Rox’s words:

In-person it was just much easier. Even though I was nervous and I might not have said all the right things, people were still participating and putting themselves out there time and time again, whereas it would be silent in a main room in an online class… Any answer is a good answer because if it is right it is right and if it is wrong we can figure out why it is wrong. That is a great experience and a lot easier to convey in-person. Versus online it felt like each individual heard me but the whole class did not, if that makes sense.
While all interviewees said students seemed more engaged post-pandemic, Fellows, who had much more teaching experience, also noted some nuances. Katrina considered that the engagement of students might not persist in subsequent semesters. In reflecting on a post-pandemic hybrid class (most students were on-campus in a room with her but some attended through Zoom), she said:

In the classes that we did in person this year, there was an excitement and energy about being together and taking care of one another. That was, that was significantly stronger, actually, than most of the classes that I was teaching two years earlier, before we went into remote instruction. And that extended to students who were having to participate some or all the time remotely.

Maverick made a similar observation, speculating that the online students in his post-pandemic hybrid class were more engaged than students in the entirely online classes during the pandemic because of the presence and participation of the on-campus students.

Additionally, some instructors noted particular communication channels in online teaching that were also continuing supports for classroom culture in on-campus teaching. For example, a class Discord channel (a social media application for sharing text/chat messages).

In summary, each of the three main questions in the interview protocol explored how instructors experienced the shift from online back to on-campus instruction differently. Question 1 responses indicated that Residents and Fellows were more aware of department procedures during the transition than Interns. Question 2 responses suggested that Intern and Resident adapted more online learning tools into their on-campus instruction than Fellows. Question 3 responses from all instructors highlighted their shared experience of a positive shift in classroom
culture, particularly student participation in classroom activities, when instruction moved from online to on-campus.

4.3 Across Instruments

The interview analysis highlighted three types of instructors: Intern, Resident, and Fellow. As these types of instructors reported different transitional experiences, it seemed worthwhile to revisit how each group of interviewees responded to the survey. In doing so, additional attributes of each type could be discovered. Below are similarities and differences each group shared with the entire survey pool across the various statements.

Pre-pandemic similarities/differences

- Interns: Their responses to most pre-pandemic statements were Not applicable because they did not teach prior to the pandemic.
- Residents: There were no notable differences from the entire survey pool in their responses to statements from any category (instructor preparedness, professional values and expectations, perception of student expectations/needs)
- Fellows: Their instructor preparedness responses were more empathic than the majority of the survey pool (e.g., they both strongly agreed with the statements I was familiar with strategies for effective teaching and learning and I knew where to go for technical support for my teaching). Their professional values and expectations responses were all concentrated on the agree/strongly agree side of the scale. Their perception of student expectations/needs were consistent with the rest of the survey pool.

Pandemic similarities/differences
• Interns: Their instructor preparedness and professional values and expectations were consistent with the rest of the survey pool. Their perception of student expectations/needs were also consistent, except for the statement *I worried about my students’ mental health* where they indicated less concern than the majority of the survey participants.

• Residents: Same as Residents during pre-pandemic (i.e., no notable differences).

• Fellows: Their instructor preparedness responses were not as positive as the majority of survey pool (e.g., they both disagreed with the statement *I was familiar with technology I needed for teaching and learning*), but they knew of helpful resources (e.g., they both agreed with the statement *I knew where to go for instructional support for my teaching*). Their professional values and expectations were consistent with the rest of the survey pool, except they both strongly agreed with the statement *I was motivated to teach*. Their perception of student expectations/needs aligned with the rest of the survey pool.

**Post-pandemic similarities/differences**

• Interns: Same as pandemic similarities/differences of Interns, except post-pandemic they agreed more with the statement *I think students are comfortable learning technical subjects through remote instruction* than the majority of the survey pool.

• Residents: Same as Residents during pre-pandemic and pandemic (i.e., no notable differences).

• Fellows: Their instructor preparedness was more emphatic compared to the survey pool (e.g., they both strongly agreed with the statements *I was able to find sufficient resources for my teaching*, *I knew where to go for instructional support for my teaching*, and *I knew where to go for technical support for my teaching*). Their professional values and expectations aligned with the rest of the survey pool, except they both strongly agreed
with the statements *I was able to stay true to my teaching values and objectives* and *I was motivated to teach*. Their perception of student expectations/needs aligned with the rest of the survey pool.

In summary, the Interns and Residents provided survey responses that were for the most part consistent with the rest of the survey pool. In contrast, the Fellows interviewed reported in their survey responses more positive experiences pre- and post-pandemic than during it.
Chapter 5: Discussion

5.1 Answering the Research Question

The results offer several insights into how the post-pandemic pivot from online to on-campus instruction affected instructors’ thinking about their teaching. First, the consequences of the pivot depended on the context of the previous professional experiences of instructors. While this may seem an obvious result, there is not much research about college mathematics instructional change that has compared across types of instructional experience. What has been done has looked at expert versus novice teacher comparisons (e.g., based in the literature on teacher noticing, Auerbach et al., 2018). Apparent in the results of this small study are indicators of the importance of considering the Resident experience, at least in the context of catastrophic changes on the scale of the pandemic and post-pandemic pivots. Also emerging from the results are aspects of readiness to learn more professionally and the persistence of instructional practices.

5.1.1 Readiness and Coaching

There has been a lot of research focused on instructor readiness surrounding the March 2020 pivot from on-campus to online instruction. Many instructors reported a lack of preparation for this new learning environment that was so abruptly put upon them. Most instructors had little to no online teaching experience before the pandemic. The shock of learning new online materials and dealing with shifts in student motivation and participation was difficult for instructors to adapt to (Nguyen et al., 2020; Rutherford et al., 2021; Walsh et al., 2022). Looking to Fall 2021, when classes were returning back on-campus in the post-pandemic era, instructors who taught on-campus before the pandemic easily, and in many cases gladly, transitioned back to
on-campus instruction. On the other hand, as this study highlights, novice instructors who only ever taught online (Interns) reported a lack of instructional readiness similar to what experienced instructors reported at the beginning of the pandemic. This small project supplies additional support for the claims of Walsh and colleagues (2022) about the importance of coaching and professional learning for any major shift in instructional practice. In such shifts, professionals can become “novices” again with the associated need for targeted professional learning.

5.1.2 Persistence of instructional practice

Interns found, and Residents had a renewed appreciation for, on-campus instruction and interaction. The apparent increase in students' willingness to participate and collaborate inspired Interns and Residents to allocate more in-class group work time. Interns increased their group work time from pandemic levels and Residents increased their group work time from pre-pandemic levels. Fellows, on the other hand, did not differ much in the amount of time spent on group work time pre and post-pandemic.

Interns and Residents also brought some of their pandemic online tools to their on-campus teaching. They kept much of their homework online, communicated via learning management systems, and even kept some in-class activities online (i.e., students would work together in-person on computer-based activities). In contrast, Fellows abandoned many online tools and reverted mostly to their pre-pandemic teaching tools.

5.2 Limitations and Delimitations

Not all survey participants completed the survey. Of the 28 survey participants, 18 of them made it to the end of the survey. Nonetheless, all survey responses were included in
analysis regardless of survey completion. To deter survey participants from leaving early if the study were repeated, perhaps the survey could be condensed and shortened.

One of the interviewees, David, suggested an improvement for the survey. The items on Pages 1, 2, 3, and 4 all used *Pre-pandemic (before March 2020)*, *Pandemic (March 2020 - July 2021)*, and *Post-pandemic (August 2021 - present)* headers (see Appendix A). David found these headers too broad. For example, the *Pandemic (March 2020 - July 2021)* header includes a couple of weeks at the beginning of March 2020 when classes were in-person right before the pandemic lockdowns, a couple of hectic weeks at the end of March 2020 when classes abruptly shifted online, and progressively calmer online weeks from April 2020 to July 2021. It was difficult for David, and likely other survey participants, to respond in the survey by collectively categorizing how he felt during that time period. To fix this problem for future studies, different headers could be used. Perhaps breakdown the *Pandemic (March 2020 - July 2021)* header into three shorter time frame headers, e.g., *Early March 2020*, *Late March 2020*, *April 2020 - July 2021*. Or replace all the time frame headers with instruction locale headers, e.g., *Pre-pandemic (on-campus)*, *Pandemic (online)*, and *Post-pandemic (on-campus)*.

### 5.3 Implications for Research, Coaching, and Practice

#### 5.3.1 Suggestions for further studies

Participants in this study were restricted to SFSU mathematics instructors. Every school and every department handled their response to the COVID-19 pandemic uniquely. The experiences reported by participants in this study are unique to SFSU mathematics instructors. Any extrapolation of the findings of this work require caution. This paper’s conclusions are most likely transferable to departments that followed a similar COVID-19 protocol to SFSU’s math
department. It would be interesting to conduct a similar study in other departments or schools to see how applicable these research findings are elsewhere.

This research is a snapshot in time. The survey and interview data was collected relatively close to each other, within the months of May and June 2022. Perhaps some of the transitional changes observed are permanent, or perhaps they are transient. Instructional practices could have been changed forever, or maybe things will revert back to their pre-pandemic ways. It would be nice to have clarity on these quandaries. To answer them, later and perhaps more drawn out studies similar to this one could be conducted. This report will allow researchers of these new studies to compare to see what stayed the same and what changed.

All of the interviewees reported an increase in student participation when class moved back to on-campus. This, from the perspective of instructors, was caused by a shift in students' motivation to be involved. It would be interesting to see if students felt the same way. A study with students, and not instructors, as the participant pool would be worthwhile to investigate how they felt during the shift.

5.3.2 Implications for coaching

Residents and Fellows reported adapting quickly when the pivot back to on-campus teaching happened. Coaching/professional development is important for everyone but there are only so many resources. It makes sense to focus those resources on novices because any major professional transition is eased by coaching, including significant changes in college teaching (Bartlett et al., 2021). Residents noted that they held onto some of their pandemic teaching practices, using them more frequently post-pandemic than pre-pandemic. In particular, they liked having the guided learning experience extend outside of class meetings and the reusability of some of those guided parts (e.g., short videos). Coaching for Residents’ future development
might focus on more or different ways to use the pandemic-generated knowledge to continue improving the teaching and learning in their courses. From the Fellows’ experiences there may be implications for coaching in how they bounced back so quickly from the “hiccup” of the pandemic changes. Who they were as teachers had been defined and nurtured in on-campus settings and was already a strong part of their identity.

5.3.3 Implications for practice

The results of this study indicated that one consequence of the pivot from online back to on-campus teaching for some instructors was a change in how online tools were used in teaching, increasing the number of conduits for communication. This suggests that classroom practices for those instructors and their students will, in future, have more variety in the opportunities to communicate online (e.g., between instructor and students and student-to-student through social media apps such as Discord). This brings up both a practical and potential research question: To what extent is the change noted in the small sample in this study representative of experiences of instructors at the university, the state, the nation, the world?

5.4 Conclusions

How the transitional experience from online to on-campus instruction changed an instructor’s thinking depended on the instructor. Some patterns indicated that there is a correlation between changes in instructor’s practices to the number of years of teaching experience. The greater the number of years of experience, the less likely that the instructor changed their instructional practices from pre-pandemic methods. The greatest struggle in coming to on-campus teaching was among those with the least teaching experience. The Intern group is a minority in the teaching population at SFSU (~25%). Yet, they are a persistent
minority: Every year there are more people entering this minority. Simultaneously, every year there are Interns moving into Resident status. Coaching and other professional learning that happens during the time spent in the Intern pool (0 to 2 years of teaching experience) is important and it has consequences for Resident experiences. A lot of professional learning happens informally, learning by doing. This was evident in the experiences of all the instructors in this study and was particularly important for the Interns, who did not have the experience as teachers to identify what parts of the new on-campus experience was about basics of how to teach and what was driven by being in the same room with other people.

I am an Intern. My conclusions are informed by that fact. Although I taught for a few years before the pandemic, it was as an undergraduate student instructor on a team of 50 staff members working together to teach 1,700+ students. I was only expected to teach one hour a week and most of the material was prepared by other staff members. I therefore do not identify as a Resident or Fellow. After this research, I am eager to return to on-campus instruction. I look forward to the increase in connectivity in my classroom culture. Nonetheless, I am nervous about finding successful strategies to incorporate my online learning tools to the physical classroom. As this study suggests, I hope to find coaching resources to make this transition easier.
References


[https://doi.org/10.1128/jmbe.00323-21](https://doi.org/10.1128/jmbe.00323-21)
Consent page

Please read this information below before you decide to participate.

Data collected from this survey will be used for completion of a master’s degree thesis in Mathematics at San Francisco State University. The information gathered will be used for research on how the post-pandemic pivot from online to on-campus instruction affects instructors’ thinking about their teaching. The information you provide will be handled confidentially and no personal information will ever be released.

The survey questions are about your experiences as a college mathematics instructor. You have been invited to participate because you taught at San Francisco State University over the past year.

There are no risks or benefits to you in participating in this survey. You may choose to participate or not. You may answer only the questions you feel comfortable answering, and you may stop at any time. If you do not wish to participate, you may simply close this window, with no penalty to yourself. If you do participate, online submission of the survey indicates your consent to the above conditions. Your decision whether or not to participate in this research will have no influence on your present or future status at San Francisco State University.

The survey should take approximately 15 minutes to complete. Any questions or concerns should be directed to the principal investigator, George Nacouzi, at gnacouzi@mail.sfsu.edu or the research advisor, Professor Shandy Hauk, at hauk@sfsu.edu.
Questions about your rights as a study participant, or comments or complaints about the study, may also be addressed to the Human and Animal Protections at (415) 338-1093 or protocol@sfsu.edu.

Please select “Yes” to continue. Otherwise, to decline participation, close this browser window.

- Yes, I have read the information above and agree to participate (start the survey)

Page 0 - Launch page

Welcome! This survey is part of my (George Nacouzi) master’s thesis research. I am investigating instructors’ thinking about their teaching related to the post-pandemic pivot from online to on-campus instruction.

This survey is 6 short sets of questions and should take about 15 minutes to complete. Ideally you will use a computer (some questions are difficult to view/answer on a small screen, like a phone).
**Page 1 - Instructor Preparedness**

In this question, I am asking you to think about your teaching in each of three periods of time.

1. Before the pandemic (before March 2020)
2. During the pandemic (March 2020 - July 2021)
3. Since students’ return to campus at SFSU (August 2021 - present)

For each row, in each column indicate your level of agreement with the statement.

<table>
<thead>
<tr>
<th></th>
<th>Pre-pandemic* (before March 2020)</th>
<th>Pandemic (March 2020 - July 2021)</th>
<th>Post-pandemic (August 2021 - present)</th>
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<tbody>
<tr>
<td>I was familiar with strategies for effective teaching and learning.</td>
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<td>I was familiar with technology I needed for teaching and learning.</td>
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<td>I learned about online tools for teaching and learning.</td>
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<td>Online teaching conflicted with my personal identity as an instructor.</td>
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<td>I personally felt well-prepared for teaching.</td>
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<td>I was able to find sufficient resources for my teaching.</td>
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<tr>
<td>I knew where to go for instructional support for my teaching.</td>
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<tr>
<td>I knew where to go for technical support for my teaching.</td>
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</table>

*Note: each box had a dropdown list with the following options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree, Not applicable.*
In this question, I am asking you to think about your teaching in each of three periods of time.

1. Before the pandemic (before March 2020)
2. During the pandemic (March 2020 - July 2021)
3. Since students' return to campus at SFSU (August 2021 - present)

For each row, in each column indicate the online tools you used.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Collaborative documents (e.g., googledocs, online whiteboard)</td>
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<tr>
<td>LMS (e.g., Canvas, iLearn, Blackboard, Moodle)</td>
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<td>Online homework (e.g., publisher, My Open Math, WebWorK)</td>
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<td>Presentation software (e.g., slides)</td>
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<td>Video conferencing (e.g., Zoom, Teams, Meet)</td>
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<td>Videos (e.g., youtube, pre-recorded myself)</td>
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<td>Website (e.g., personal, school, non-interactive site)</td>
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*Note: each box had a checkmark option.*
In this question, I am asking you to think about your teaching in each of three periods of time.

1. Before the pandemic (before March 2020)
2. During the pandemic (March 2020 - July 2021)
3. Since students' return to campus at SFSU (August 2021 - present)

For each row, in each column indicate your level of agreement with the statement.

<table>
<thead>
<tr>
<th>I was able to stay true to my teaching values and objectives.</th>
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<tbody>
<tr>
<td>I was productive in my other (nonteaching) responsibilities (research, administration, etc.).</td>
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<tr>
<td>I felt overwhelmed by the time I invested in teaching.</td>
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<tr>
<td>Teaching felt like the most important aspect of my job.</td>
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<td>I was motivated to teach.</td>
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<tr>
<td>It was difficult to teach.</td>
</tr>
<tr>
<td>I felt confident in my grading scheme.</td>
</tr>
</tbody>
</table>

*Note: each box had a dropdown list with the following options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree, Not applicable.*
Page 4 - Perceptions of Student Needs/Expectations

In this question, I am asking you to think about your teaching in each of three periods of time.

1. Before the pandemic (before March 2020)
2. During the pandemic (March 2020 - July 2021)
3. Since students' return to campus at SFSU (August 2021 - present)

For each row, in each column indicate your level of agreement with the statement.

<table>
<thead>
<tr>
<th></th>
<th>Pre-pandemic* (before March 2020)</th>
<th>Pandemic (March 2020 - July 2021)</th>
<th>Post-pandemic (August 2021 - present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt comfortable interacting with my students.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I worried about my students’ mental health.</td>
<td></td>
<td></td>
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<tr>
<td>I felt like my students needed motivational support.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I felt like my students needed academic support.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I felt disconnected from my students.</td>
<td></td>
<td></td>
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<tr>
<td>I think students are comfortable learning technical subjects through remote instruction.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: each box had a dropdown list with the following options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree, Not applicable.
Page 5 - Professional Info

What is your academic post at the university?

- Tenured faculty
- Tenure-line (untenured) faculty
- Full-time lecturer or adjunct faculty
- Part-time lecturer or adjunct faculty
- Teaching Associate or Assistant
- Other (please describe): __________

How many years of experience do you have teaching at the college level (to the nearest year)?

Note: there was a numerical sliding scale here.

Please check off the classes you have taught.

Note: there was a checkbox list of all mathematics classes offered at San Francisco State University.

Page 6 - Demographic Info

The design of the research requires me to ask the following questions. Please answer as many as you are willing to answer.

What is your gender identity?

- Male
- Female
- Non-binary
- Other: __________

What is your ethnicity? (check all that apply)

Note, hover over a category to find the U.S. Census description of that category.
- American Indian or Alaskan Native
- Asian
- Black or African American
- Native Hawaiian or Pacific Islander
- White
- Other: __________

Note: the hover feature was available on the Qualtrics version of the survey. Hover text was:

- **American Indian or Alaskan Native:** A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliations or community attachment.
- **Asian:** A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
- **Black or African American:** A person having origins in any of the Black racial groups of Africa.
- **Native Hawaiian or Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- **White:** A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.
Page 7 - Interview inquiry

Would you be willing to participate in a follow-up Zoom interview?

- Yes
- No

Please enter the following to be contacted for a follow-up Zoom interview:

Name: __________
Email: __________

*Note: this item only appeared if the respondent answered ‘Yes’ to the previous question.*
Appendix B: Interview Protocol

Intro: Hi [participant name]! Thank you for completing the survey and participating in this follow-up interview. My thesis work investigates how instructors’ thinking about their teaching shifted during the pandemic to post-pandemic pivot from online to on-campus instruction. This interview will help me explore that. If you are unsure of what I am asking in a question, please let me know and I can offer some clarification. Are you ready to proceed?

1. If you know, can you tell me how it was determined for Fall 2021 whether a course would pivot to be in-person, hybrid, or remain online? synchronous, asynchronous, or some combination?
   1.1. Potential follow-up: Why did you choose to teach (online/on-campus) for Fall?
   1.2. Potential follow-up: Were resources available to help guide you through this instructional pivot?

2. This next question is about how your roles as a teacher may have shifted between last year and this year.
   2.1. How did your course design differ last year from this year?
      2.1.1. Potential follow-up: in iLearn, in thinking about/creating the syllabus, beginning of semester course design vs. day-by-day?
   2.2. How did your thinking about facilitation differ last year from this year?
      2.2.1. Potential follow-up: monitoring and commenting on students’ postings and work?
      2.2.2. Potential follow-up: would you mind giving a specific example of each, on Zoom and on-campus?
2.3. How did your allocation for lecturing vs group work time differ last year from this year?

3. As you may already know, the term ‘classroom culture’ describes how safe and willing students are to participate in a classroom. Over the past few semesters, were there differences you noticed in your classes' classroom culture?

3.1. Potential follow-up: How did you manage the shift in classroom culture?

3.2. Potential follow-up: The differences you mentioned about classroom culture could have been caused by the shift from online to on-campus instruction and/or teaching a different course. How much would you attribute these differences to shift in type of course vs shift in course format (online or on-campus)?

3.3. Potential follow-up: Tell me a little bit more about what you did to establish and maintain your classroom culture online vs. on-campus instruction.

Outro: This interview allowed me to better understand your instructional experience. As a reminder, your responses for the survey and this interview will remain anonymous in my thesis. Was there anything I did not touch on in this interview that you’d now like to add or comment on?
## Appendix C: Demographics (Figure 3.1 Data Table)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Department</th>
<th>Surveys</th>
<th>Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>32</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Male</td>
<td>33</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Non-binary</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Department</th>
<th>Surveys</th>
<th>Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American or Black</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Hawaiian/Pacific Islander</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Latino/Latina/Latinx, Chicano/Chicana</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Native American/American Indian/Alaska Native</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>White</td>
<td>24</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Multi-group</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Post</th>
<th>Department</th>
<th>Surveys</th>
<th>Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTAs</td>
<td>18</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Lecturer faculty</td>
<td>25</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Tenure-line</td>
<td>22</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years of Teaching</th>
<th>Department</th>
<th>Surveys</th>
<th>Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>18</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>2-10 years</td>
<td>18</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>10+ years</td>
<td>28</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>
## Appendix D: Survey Results

### Instructor Preparedness (Figure 4.1)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Pre-pandemic</th>
<th>Mazur</th>
<th>Pandemic</th>
<th>Post-pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I personally felt well-prepared for teaching.</td>
<td>8,4,1,0,1</td>
<td>5,13,8,10,2</td>
<td>3,4,6,2,4</td>
<td>7,10,1,1,0</td>
</tr>
<tr>
<td>I learned about online tools for teaching and learning.</td>
<td>1,1,4,6,2</td>
<td>17,13,2,4,3</td>
<td>12,6,1,0,0</td>
<td>5,11,2,0,0</td>
</tr>
<tr>
<td>I was able to find sufficient resources for my teaching.</td>
<td>6,6,2,0,0</td>
<td>8,22,6,2,0</td>
<td>3,10,2,3,1</td>
<td>7,10,2,0,0</td>
</tr>
<tr>
<td>Online teaching conflicted with my personal identity as an instructor.</td>
<td>1,3,5,1,1</td>
<td>6,10,8,9,6</td>
<td>0,8,4,5,2</td>
<td>1,3,6,6,2</td>
</tr>
</tbody>
</table>

*Note, the data above is formatted as comma separated values of the “Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly Disagree” response counts.*

### Professional Values and Expectations (Figure 4.3)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Pre-pandemic</th>
<th>Mazur</th>
<th>Pandemic</th>
<th>Post-pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was able to stay true to my teaching values and objectives.</td>
<td>6,5,1,0,0</td>
<td>4,16,4,10,1</td>
<td>1,7,7,2,1</td>
<td>5,9,2,1,1</td>
</tr>
<tr>
<td>I felt overwhelmed by the time I invested in teaching.</td>
<td>1,3,4,2,3</td>
<td>19,10,4,2,1</td>
<td>6,6,4,2,1</td>
<td>3,6,5,3,2</td>
</tr>
<tr>
<td>It was difficult to teach.</td>
<td>1,2,4,5,1</td>
<td>12,11,6,3,3</td>
<td>6,7,3,3,0</td>
<td>3,4,6,5,1</td>
</tr>
</tbody>
</table>

*Note, the data above is formatted as comma separated values of the “Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly Disagree” response counts.*
Learning About and Using New Tools (Figure 4.3)

<table>
<thead>
<tr>
<th>Learning Tools</th>
<th>Pre-pandemic</th>
<th>Pandemic</th>
<th>Post-pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative documents (e.g., googledocs, online whiteboard)</td>
<td>5</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>LMS (e.g., Canvas, iLearn, Blackboard, Moodle)</td>
<td>13</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Online homework (e.g., Publisher, MyOpenMath, Webwork)</td>
<td>9</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Presentation Software (e.g., slides)</td>
<td>6</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Video conferencing (e.g., Zoom, Teams, Meet)</td>
<td>1</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Videos (e.g., youtube, pre-recorded myself)</td>
<td>3</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Website (e.g., personal, school, non-interactive site)</td>
<td>7</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>

Note, the data above are the response counts, i.e., the number of surveyors that indicated use of the online tool during the specified time period.

Perception of Student Expectations/Needs (Figure 4.4)

<table>
<thead>
<tr>
<th>Perception</th>
<th>Pre-pandemic</th>
<th>Mazur</th>
<th>Pandemic</th>
<th>Post-pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt comfortable interacting with my students.</td>
<td>6,5,1,0,0</td>
<td>5,10,13,7,1</td>
<td>4,4,3,5,1</td>
<td>9,5,3,0,0</td>
</tr>
<tr>
<td>I felt disconnected from my students.</td>
<td>0,0,2,6,4</td>
<td>14,15,5,1,1</td>
<td>3,6,4,3,1</td>
<td>0,2,3,9,3</td>
</tr>
<tr>
<td>I worried about my students’ mental health.</td>
<td>1,6,3,2,0</td>
<td>15,17,3,1,1</td>
<td>8,7,2,0,0</td>
<td>8,8,1,0,0</td>
</tr>
</tbody>
</table>

Note, the data above is formatted as comma separated values of the “Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly Disagree” response counts.