Team Harmony Before, During, and After COVID-19

by

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**Team Harmony Before, During, and After COVID-19**

submitted by Noa Heyl in partial fulfillment of the requirements for the degree of Master of Science in Computer Science.

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Abstract

This work looks at the team harmony experience of pairs in CPSC 310 a large (300 person) third-year Software Engineering class.

For the last seven semesters we asked students to regularly report their sense of equity relating to their contributions to group discussions, influence over task assignments, and overall contributions to their course project development.

We examine responses from four periods: prior to COVID-19, during the transitional period as restrictions were applied due to COVID-19, during COVID-19, and after the acute COVID-19 period had ended and restrictions were lifted. Overall, we saw that students experienced a decrease in team harmony during the transition to lockdown, that harmony recovered in subsequent semesters, with some measures gradually trending worse over time in the post-pandemic period (once the restrictions were lifted).
Lay Summary

The key goal of this work is understanding the effects of COVID-19 on student collaboration within a computer science course. We employed a regular survey across many terms of a large UBC course to gather student’s reflections on how well their team was working together. We contribute an analysis of questions we asked students throughout the pandemic and a discussion of how we understand this analysis in the broader context of the COVID-19 pandemic.
Preface

The work presented in this thesis was conducted in the Software Practices Laboratory at the University of British Columbia, Point Grey campus. All projects and associated methods were approved by the University of British Columbia’s Research Ethics Board [certificate #H17-02083]. This material is the result of ongoing research at the Software Practices Laboratory.

I was the lead author for this work, responsible for all major areas of concept formation, data processing and analysis, as well as manuscript composition. The data collected for this project is part of ongoing analysis of group harmony in CPSC 310. The surveys to collect these data were developed primarily by Elisa Baniassad. Elisa Baniassad was the supervisory author on this project and was involved throughout the project in concept formation and manuscript composition. Firas Moosvi assisted in creating code to generate some of the figures from data I provided. The material has not been published prior to this thesis.
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This work was funded in part by the Teaching and Learning Education Fund of UBC.

Thanks to Firas Moosvi for helping to generate figures. Thanks to Meghan Allen for providing comments on this thesis.

Thanks to Elisa Baniassad and Reid Holmes for being a wonderful supervisory team and helping me so much in completing my master’s.

Land Acknowledgement

Our campus is on the territory of the xʷməθkʷəy̓əm (Musqueam) nation. This thesis was written primarily on the territories of the xʷməθkʷəy̓əm, Skwxwú7mesh (Squamish), and səl̓ilwətaɬ (Tsleil-Waututh) nations. This territory has been stewarded by these nations since time immemorial.

I include this acknowledgement as a reminder of the colonial context in which this work was constructed and as a small attempt to attach it to place.
Chapter 1

Introduction

The COVID-19 period has been noted as stressful for individuals and groups: students have worked against technological, economic, and domestic barriers [1].

In our large, UBC third-year Software Engineering class, we ask students to complete a large project in teams throughout the course of the term. The project is completed in several checkpoints which has been found to improve course outcomes in a previous study [8]. This project is completed in teams of two (or sometimes three) students. Given the large scope of the project, we believe the harmonious collaboration between teams is important to student success. We worried that the impacts of COVID-19 would put additional strain on student teams and upset otherwise harmonious teams.

We regularly survey students about their group-health in terms of what we refer to as team harmony. For all semesters since January 2019 we have asked students to rate several measures: equity of contributions to project work, of influence over task assignment, and of contributions to meetings for all semesters. In the last three semesters, we also gathered student ratings about their sense of belonging in their team, their sense of feeling valued, and their sense of team functioning.

The original goal of the surveys was to determine, on a regular basis, the well being of the student and functioning of the team within a single semester (similar in intent to [7]). This allowed us to intervene and potentially repair poor team dynamics. Our surveys were not originally designed to be used longitudinally and they were not intended to formally measure harmony per se. The questions were those
we would have asked one on one had we not had hundreds of students. However, because we asked the same questions consistently (with one style change we will outline in Section 2.1), we can see whether the pandemic period had an influence on the answers to questions we asked.

It was our impression that team harmony must have been affected by the societal and work-structural changes imposed by COVID-19. In this work we determine whether this impression of the effects of the pandemic was correct. We do so by comparing aggregate team harmony (as measured by our survey instrument) across semesters, and by investigating how student harmony changes through the course of each term. We contribute our analysis and discussion of these results to provide a framework for understanding the impacts of COVID-19 on student and team well-being.

We first provide background about the survey instrument that we deployed in our course. We then present the results for individual metrics across the semesters. We take a closer look at each stage of the pandemic, discussing our impressions of the results. Finally, we discuss and compare our results to other research relating to student behaviour through the pandemic.
Chapter 2

Check-In Surveys

Students in our software engineering course work in pairs. Each semester, students were asked to individually submit status reports of their work. We gave similar, though not identical, questionnaires to students in several semesters. Students submitted surveys at three points in the semester, corresponding to the end of each team project stage. The response rates for these surveys were near 100% and are shown in Figure 2.1. Response rates are high, because students were graded on their participation.

For the rest of this thesis, each semester is labelled with the starting month of the semester. The semester teaching period spans three months from the start of the label month, with an exam in the fourth month. For instance, the Jan’20 semester spanned the start of January to the end of March, with final exams in April. The semesters Jan’19 and Sept’19 occurred entirely before COVID-19 restrictions were in place at our university. Partway through, Jan’20 classes moved online due to COVID-19. Sept 20 and Jan 21 were held entirely online. In Sept’21 and Jan’22 the majority of restrictions had been lifted.

2.1 All Semesters: Work distribution, Task influence, Talking in meetings

In all semesters, students were asked to individually review whether they felt their work was evenly distributed, whether they felt they got equal talk-time in meetings,
and whether they had equal influence over the assignment of work tasks in their projects.

In semesters Jan’19, Sep’19, and Jan’20, students were asked to report their responses using a slider scale to indicate whether a measure was equal, or skewed towards them, or skewed towards their partner (shown in Figure 2.2). Our coding for the slider-placement is indicated with arrows. The two extreme choices were coded as very unequal. The two mid-point choices were coded as somewhat unequal. The centre point was coded as equal. Students complained that the slider was confusing, and required thought to complete.

In semesters Sept’20, Jan’21, Sept’21, and Sept’22, we changed the slider approach to options students could select. For the purposes of this analysis, we coded these options to the same scale (shown in Tables 2.1-2.3).

### 2.1 Response counts and rate for all semesters.

<table>
<thead>
<tr>
<th></th>
<th>Jan 19</th>
<th>Sept 19</th>
<th>Jan 20</th>
<th>Sept 20</th>
<th>Jan 21</th>
<th>Sept 21</th>
<th>Jan 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Num responses</td>
<td>156</td>
<td>333</td>
<td>281</td>
<td>293</td>
<td>290</td>
<td>327</td>
<td>295</td>
</tr>
<tr>
<td>Response rate</td>
<td>99%</td>
<td>99%</td>
<td>100%</td>
<td>99%</td>
<td>100%</td>
<td>94%</td>
<td>94%</td>
</tr>
</tbody>
</table>

**Figure 2.1:** Response counts and rate for all semesters.

In reflecting on the Sept’20 semester, we felt that students may have felt more alienated from their teams than during in-person semesters. We wanted to keep an eye on how students were feeling about their sense of belonging in their teams, how much they felt their ideas were valued, and also how they felt their team was functioning overall. As such we added three more questions to the check-in surveys, provided in Tables 2.4-2.6. These questions were asked of students during the COVID-19 period in term Jan’21 and after the acute COVID-19 period in Sept’21 and in Jan’22.

### 2.2 Last Three Semesters: Added Belonging, Feeling valued, Team functioning

In reflecting on the Sept’20 semester, we felt that students may have felt more alienated from their teams than during in-person semesters. We wanted to keep an eye on how students were feeling about their sense of belonging in their teams, how much they felt their ideas were valued, and also how they felt their team was functioning overall. As such we added three more questions to the check-in surveys, provided in Tables 2.4-2.6. These questions were asked of students during the COVID-19 period in term Jan’21 and after the acute COVID-19 period in Sept’21 and in Jan’22.
Figure 2.2: Work Distribution Slider. Colored arrows indicate the ratings coded to responses.
<table>
<thead>
<tr>
<th>Rating</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneven</td>
<td>I did everything; They did everything</td>
</tr>
<tr>
<td>Somewhat uneven</td>
<td>I did most of the work; They did most of the work</td>
</tr>
<tr>
<td>Even</td>
<td>We split the work evenly</td>
</tr>
</tbody>
</table>

**Table 2.1:** What describes the distribution of work between you and your partner?

<table>
<thead>
<tr>
<th>Rating</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneven</td>
<td>I assigned the tasks for the team, and did so more or less alone; They assigned each of the tasks, and I did not feel included in that process</td>
</tr>
<tr>
<td>Somewhat uneven</td>
<td>I only felt somewhat included in decision making about who would do what</td>
</tr>
<tr>
<td>Even</td>
<td>I felt very included in decision making about who would do what</td>
</tr>
</tbody>
</table>

**Table 2.2:** How are work tasks allocated?

<table>
<thead>
<tr>
<th>Rating</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneven</td>
<td>I talk practically the entire time; They talk practically the entire time</td>
</tr>
<tr>
<td>Somewhat uneven</td>
<td>I talk most of the time; They talk most of the time</td>
</tr>
<tr>
<td>Even</td>
<td>We talk the same amount</td>
</tr>
</tbody>
</table>

**Table 2.3:** When you meet, who talks more?
### Table 2.4: How are you feeling about yourself within the team?

<table>
<thead>
<tr>
<th>Rating</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad</td>
<td>I do not feel like I belong in my team</td>
</tr>
<tr>
<td>Mixed</td>
<td>I mostly feel like I belong in my team; I sometimes feel like I do not belong in my team</td>
</tr>
<tr>
<td>Good</td>
<td>I feel like I belong in my team</td>
</tr>
</tbody>
</table>

### Table 2.5: How do you feel about how shared work is being carried out?

<table>
<thead>
<tr>
<th>Rating</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad</td>
<td>I am very frustrated with my team’s functioning</td>
</tr>
<tr>
<td>Mixed</td>
<td>I feel like my team is working well most of the time; I feel slightly frustrated with how teamwork is going</td>
</tr>
<tr>
<td>Good</td>
<td>I feel like my team is working really well</td>
</tr>
</tbody>
</table>

### Table 2.6: How are you feeling about how your team’s functioning?
Chapter 3

Responses

In this chapter we look at each of the measures in turn. We then look at how responses to each measure changed within each semester. Finally, we take a closer look at Jan’20 - the semester in which we transitioned to lockdown part way through the semester.

3.1 Individual Metrics Calculations

We use averages for each measure and response distributions to analyse student responses.

3.1.1 Averages

To compute averages for a measure in a semester, we took an average score for each measure for each student in the semester across their three surveys, and then took the average of all students’ scores. The scales for work distribution, task influence and talking in meetings metrics (uneven, somewhat even, even) were mapped to the values 0, 50, and 100, where 100 was even, 50 was somewhat even, and 0 was uneven. The scales for belonging, feeling valued, and team functioning were mapped to 0, 50, and 100, where 100 was good, 50 was mixed, and 0 was bad.
3.1.2 Response Distributions

To compute the distribution of responses for each measure, we took the average for each student’s response. Then we placed it into a bucket for either even, somewhat uneven, or very uneven bucketed based on which range the average fell into.

3.2 Work Distribution

We did not see any large response distribution impacts from the pandemic in terms of work distribution, as shown in Figure 3.2 (Work Distribution), though the transitional semester (Jan’20) looks slightly worse in that fewer students reported even work distribution than in other semesters.

Average work distribution (Figure 3.1) is visibly worse in the transition semester. Once the transition was made into lockdown, work distribution seemed to improve, and continued into the hybrid post-lockdown period, with a small worse-trending
Figure 3.2: Response Distributions Across Semesters
fluctuation in the latest semester for which we have data. However, given our scale is rated out of 100, it is worth noting that all these fluctuations are relatively small.

3.3 Influence over Task Allocation

Figure 3.2 (Task Influence) shows the changes in Influence over Task Distribution across the semesters in terms of response distribution. The two semesters prior to the transition semester are quite similar, with a drop in the even-rating in the transition semester. The Sept’20 semester recovers, but then influence seems to get less balanced as semesters progress.

The average scores for task influence follow the same pattern but are more pronounced, as shown in Figure 3.1.

3.4 Equal time to talk in meetings

We saw almost no change in this metric pre-, during-, and post-pandemic restrictions. Figure 3.2 shows all the bars remaining close to the same. This is somewhat surprising to us, because during the lockdown all meetings were conducted online. We expected to see some effect here: that the online meetings either equalised contributions, or that online meetings exacerbated existing problems where one member would dominate the discourse. Instead, at least in our data, no effect is seen other than, as we saw in other metrics, a fluctuation during the transition to lockdown semester (Jan’20).

3.5 Sense of Belonging

Students’ sense of belonging shifted slightly downward since Jan’21. We can see in Figure 3.2 (Belonging) that the overall proportion of students who reported positive belonging went down from 67% to 60%, and the proportion of students who reported negative belonging went up by 50% (rising from 6% to 9%).

3.6 Sense that Ideas are Valued

The response distribution for whether students felt their ideas were valued is shown in Figure 3.2 (Ideas Feel Valued). A large majority (hovering around 90%) of
students felt that their ideas and contributions were valued in all three semesters, though we do see a slight downward shift in those reporting a positive rating in the last semester. The averages for this measure also shows this downward move (Figure 3.1).

### 3.7 Team Functioning

Team functioning is the poorest performing metric both in terms of the proportion of students reporting a fully positive response (as opposed to mixed) and on average (Figures 3.2 and 3.1). This measure went up and down in the period for which we examined though the last semester has by a slight margin the lowest number of students reporting good team functioning at around 55%.

### 3.8 Within-Semester Changes to All Measures

We examined how students’ experiences of team harmony changed throughout each semester. For each student we determined whether their score had improved, degraded, and if it stayed the same, did it stay at very uneven, even, or somewhat uneven. The results are shown in Figure 3.3. The first series shows the combined measures for work distribution, task influence, and talking in meetings. The second series shows the combined measures for belonging, ideas feeling valued, and team functioning.

We see a striking difference for the transitional semester (Jan’20). The chart shows a big jump in students’ harmony getting worse, and more students stayed at a bad rating.

We can see a very slight uptick in things getting worse in the last semester in both the first group of measures, and the second.

<table>
<thead>
<tr>
<th>Metric</th>
<th>late Jan</th>
<th>late Feb</th>
<th>late Mar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work distribution</td>
<td>84.51</td>
<td>83.99</td>
<td>77.73</td>
</tr>
<tr>
<td>Task assignment</td>
<td>84.93</td>
<td>86.81</td>
<td>82.14</td>
</tr>
<tr>
<td>Talking in Meetings</td>
<td>91.88</td>
<td>93.36</td>
<td>89.37</td>
</tr>
</tbody>
</table>

**Table 3.1:** Average scores for each metric, for each survey in the transition semester
3.9 Transition Semester Changes to Work Distribution, Task Influence and Talking in Meetings

We are able to do more granular analysis on the impact of the start of lockdown by examining the changes in harmony over the Jan’20 semester. For this we looked at the distribution of students between the three response ranks, and the average score for each metric for each survey within the semester. To calculate the difference in averages we took the late March survey and subtracted the late January survey, and then got a percent change by dividing by the late January survey.
All measures took a downward turn after lockdown started. The biggest effect was on distribution of work, in that the fewest students reported that balance was even for that measure. Average score for work distribution balance worsened by 43.77% (details in Table 3.1). For task allocation influence, the percent of students who felt their influence was even with their partner remained the same, but more students indicated that their influence over task assignment was very uneven than before the lockdown. Average task influence balance worsened by 18.49%. Amount of talking in meetings did not change much, but we see the same slight shift of more students identifying with the very uneven rating than prior to lockdown. The balance of talking in meetings worsened by 30.84%.
Chapter 4

Discussion

In this chapter, we synthesize the four phases of the pandemic, discussing each in turn. We then briefly discuss the connection between harmony and grades, and describe threats to validity.

4.1 Synthesised Analysis of Pandemic Phases

In this section we pull together our results and discuss observations for each of the pandemic phases.

4.1.1 Prior to the Pandemic (Jan’19, Sept’19)

We have two semesters of data prior to the start of the pandemic to give us a sense of students’ experience in terms of team harmony. It’s not clear whether additionally including the first part of the Jan’20 semester as pre-pandemic would be fair since the pandemic had already started to have an impact at the beginning of the semester—students were already beginning to worry about their loved ones at home, and the world was bracing itself for change. As such we look at that in the subsequent section in the transition to lockdown analysis.

Focusing on the proportion of students selecting the most positive options, work distribution was around 80% for both semesters, task influence went from around 75% in Jan’19 to around 80% in Sept’19, and balance of talking in meetings remained the same for both terms around 90%.
4.1.2 The Turbulent Transition to Lockdown (Jan’20)

The Jan’20 semester, which involved the transition to lockdown, was a chaotic time. Some students were suddenly relocating back to their home countries, and some were engaging in online-collaboration for the first time. One can imagine that during the period of students suddenly collaborating online, one teammate may have had to take the reins of the project to keep things moving forward. All our harmony measures got worse during this semester.

The transition semester was by far the worst performer in terms of how harmony changed within semesters (shown in Figure 3.3), with 15.64% experiencing degraded harmony, and 2.91% experiencing bad harmony that remained bad. These groups taken together nearly doubled (a change of 179.02%) compared to the prior semester. Both of these groups were the largest during the transitional semester than any other semester.

As we discussed in Section 3.9, the harmony measures all worsened after the
start of lockdown. Comparing the late February 2020 responses to the March 2020 responses (shown in Figure 4.1) we can see that students reporting uneven work distribution jumped by 125%, uneven task influence balance jumped by 120%, and uneven talking in meetings doubled. Additionally, the average over all of the check-in points within the transition (visible in Figure 3.1) worsened from the previous term.

These data suggest that the transition semester posed its own unique difficulties to students, in that they were less able to recover from a disharmonious dynamic, and were less able to retain a harmonious dynamic.

4.1.3 Initial Team Resilience (Sept’20, Jan’21)

Immediately after the transition to lockdown, even while still fully online, we saw an improvement in all harmony measures. Work distribution returned to pre-transition levels, task influence balance returned to pre-transition levels, and so did balance in talking in meetings. These recoveries are visible in the during-COVID-19 semester bars in all measures in Figure 3.2, and show prominently in Figure 3.1.

We also saw resilience in the within-semester changes to harmony data displayed in Figure 3.3. Immediately after the transition semester, students had returned to pre-pandemic harmony shift levels, and subsequently improved further.

A threat to the validity of the observation of resilience is the change from one survey format to the other. It is possible that the altered question types, and even the presence of additional questions, altered or shifted responses around. We do see the resilience trend setting in prior to the survey change, however (in Sept’20), and the distribution of, in particular, talking in meetings, remained on the surface consistent with prior semesters. Supporting the case for resilience is the within-semester change (Figure 3.3), which is more robust against the question-style change: style of question would have less effect against whether someone changed their status, at least somewhat, even if the precise ratings they chose differed.

4.1.4 Post Restrictions Burnout (Sept’21, Jan’22)

Several measures showed downward shifts in harmony in the post-restrictions semesters: we saw a worsening shift in Figure 3.3. We saw a loss of balance in individual mea-
sures, most prominently in task influence in Figure 3.2. And we saw a downward move in the later metrics - most prominently in the sense of belonging in teams.

We considered whether the slight degradation in harmony could be because of within-course changes we made: To help students overcome the fatigue and strain they were feeling, we provided a very accessible accommodations mechanism, providing extensions and grade accommodations to students who reported needing support. We considered whether our accommodations made task allocation and work distribution more ambiguous. However we saw no correlation between teams who requested accommodations and overall harmony for either semester in the post-restrictions period. The other confounding factor we explored for those semesters was that we had relaxed the deadlines for the project somewhat to additionally reduce stress on students - we wondered whether this could have meant that teams who left their work later could have had degraded harmony. We did not, however, find any correlation between when students began the project and their overall team harmony.

Shifts could be because of increased stress and strain. As the pandemic wore on, we saw an increase in the number and severity of accommodations requested, especially in the latest semester. Though we saw no correlation between groups receiving accommodations and harmony issues, the rise in requests suggests that general strain was on the rise and does correspond with the timing of the latest worsening trend.

4.2 Harmony and Grades

We investigated the correlation between harmony and grades. We had grade composition data available for the most recent four semesters. This was the two semesters during the acute COVID-19 period, and the two semesters following. In Figure 4.2, we plotted the final grade a student achieved for the course project against their average harmony across the semester. To provide context to the distribution, many students in our course achieve 100% on the course project.

We expected to find that higher degrees of harmony would correlate with higher grades. As shown in Figure 4.2 many students who achieve high grades on the course project also have high degrees of harmony within their team. However,
students who had poor harmony also tended to score well on the project. And the students who scored lower on the project also tended to have high harmony in all terms. We found this pattern persisted both during the pandemic and following the lifting of restrictions.

One possible explanation for this is that students who recognize and communicate about a disharmonious dynamic are able to find ways to resolve it and succeed even if they are unhappy. While students who do not share issues as they come up in their team are unable to find ways to resolve them and this ultimately impacts their grades. This means that some teams who self-report as having high harmony may in fact be masking and failing to recognize disharmony. On the other hand, it may be that grades are independent of harmony entirely, and a team can be truly harmonious while still achieving a lower grade on the course project.
4.3 Threats to validity

In this section, we discuss the threats to internal validity, external validity, and construct validity.

4.3.1 Internal validity

• **Changes to survey format.** As discussed in Chapter 2 we changed our survey format partway through the pandemic. We defined our own normalization between the two formats, but we have no way to verify the validity of our normalization. As discussed in Section 4.1.3 this makes it especially difficult to draw any conclusions as our harmony metrics started to improve during the pandemic at the same time as we changed the survey format.

• **Changes to survey frequency.** In earlier terms we delivered the survey as three main surveys at defined points in the project. In later terms we asked students for information more frequently (and averaged the results into three main periods). Students may be more or less likely to share team issues on a form they fill out on weekly basis vs. a form they fill out only a few times per term.

• **Changes in instructor and project.** For the most part this course was taught by the same instructor for all terms we analyzed. However, for one term Sept 19, the course was taught by a different instructor. Furthermore, as time has gone on we have made changes to our course project (although it has remained broadly the same), these changes may have made certain periods of the project more or less difficult for students.

4.3.2 External validity

• **Our response to COVID was specific to our class.** We chose to provide a large amount of accommodations to students in our course and flexibility around deadlines as a response to COVID-19. We attempted to mitigate this threat by analyzing the harmony of students who requested accommodations, and did not observe any correlation. We also continued to offer our course
synchronous sessions over Zoom even when students had returned to campus for their other activities.

- **Our university COVID response was different from other institutions.** Evidently, our university had a specific response to COVID-19. This response may differ from that of other institutions who have conducted studies on the effects of COVID-19. To mitigate this, further work could survey across many institutions and classify them based on measures they took and the speed at which they implemented them.

4.3.3 **Construct validity**

- **Students may choose not to report a disharmonious dynamic.** Our only indicator of disharmony in teams is students choosing to self report it. This metric relies on students to both recognise and chose to share their disharmony with us. Further work could mitigate this by establishing an additional channel for measuring disharmony.
Chapter 5

Related Work

The effect of the COVID-19 pandemic and shift to online learning on students has been examined in various ways.

Several studies look at factors contributing to a positive team experience, identifying strong leadership and pedagogical supports as areas of intervention to improve team success during COVID-19 [5]. Some look at the functioning of graduate student teams (for instance [12]).

YeckehZaare et al. use interactions with a course resource as a proxy to determine how student study patterns changed during the pandemic [11]. They found that the study patterns were negatively impacted both in the amount of time spent studying and frequency between study times. Norris and Fenwick Jr also find that student engagement with course resources decreased in online sections [6]. They also find that student grades for the same exams were lower during the pandemic.

Just prior to the start of the pandemic, Basu et al. performed a study comparing behaviour between students in an online and an in person section of a large CS course [2]. They find students in the online section performed just as well as those in person across a variety of engagement metrics. Chen et al. have similar findings in a large survey taken during the pandemic of students at Chinese colleges [3]. They show that students spend the same or more time studying and have similar outcomes in both grades and mastery. This connects to our observation that for the most part teams maintained relatively high scores on our harmony metrics throughout the pandemic.
Similar to our paper, Wildman et al. studied student teamwork. They conducted a survey on students completing a course project during the COVID-19 pandemic [10]. Their respondents describe process disruptions as their project moved online, which in most cases negatively impacted their experience. However, they suggest that the pandemic may have had little overall impact on some teams or even a positive impact specifically to communication between team members. For the students in our class, we found that the move to online had a somewhat negative impact on all measures we studied, but especially on balance of influence over task allocation, and on balance of distribution of work between team members. However, we found that as the pandemic progressed the negative impact on these metrics lessened, potentially indicating that students developed alternative and effective modes of communication to suit the new online context as Wildman et al. suggest, and may be evidence of team resilience as described in Stoverink et al.’s work, in which teams employing an energetic approach can engage in practices that recover positive group dynamics and functioning after a setback [9]. We did not see that resilience within the transition semester (there was likely not enough time to be resilient), but we did see subsequent cohorts demonstrate resilience as a whole.

Goñi et al. found an increase in perceived efficiency in engineering student teams working remotely [4]. They suggest that this may be linked to students being more flexible and accommodating while working online. This corresponds to the effect visible in Figure 3.2 in which harmony measures recover after the transition to lockdown. We saw that students maintained relatively high degrees of team harmony through the pandemic, and particularly in the area of valuing of other student’s ideas. As seen in Figure 3.1 and Figure 3.2, students on aggregate said their ideas were most valued during the Sept’21 semester, though it degraded again the subsequent semester. Goñi et al. point out that this increased harmony may come at the expense of conflict and discussion which can be pedagogically valuable.
Chapter 6

Conclusions

We did not see the big reduction in harmony we were expecting in the acute COVID-19 period. Instead, we saw a turbulent transitional semester, and then an initial rebound in harmony. We do, however, see some indication that perhaps burnout is taking its toll after a long pandemic experience, and harmony may be suffering as a result.

One possible implication of this work is that students are readily able to adapt to new forms of learning, but that this adaptation comes at a cost of a turbulent transitional period. However, it is important to note that this turbulent transitional period was shared between students and course staff. If we as educators went into the COVID-19 pandemic already confident with remote teaching medium, we may have avoided or reduced the turbulent transitional period.

The other more disheartening implication is that as we continue through the pandemic students are becoming slightly less harmonious in their teams. We see this as linked to the burnout from multiple years of restrictions and the increasing uncertainty of collaboration methods between virtual and in person. Hopefully the combination of in person and remote methods reach a steady state which allows for harmony to increase again.

This analysis is informal and discursive, and does not provide hard evidence of why the measures changed. However, it is our aim to publish our observations so that they can be used in context with other studies that examine how teams were impacted by the pandemic.
Bibliography


