

Core CSC WDI Final Report 2021-2022

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Executive Summary

What we did: We added writing instruction and assessment in 5 core courses in the computer science program, including CSC148 (documentation), CSC236 (proofs), CSC209 (software “manual” page), CSC263 (take-home interview), and CSC258 (user guide). The additional instruction introduced a variety of genres and audiences. We shared writing TAs across some of the courses in the same term.

TA budget change: We used 847 TA hours—84 hours less than requested. We hired most of our TAs before actual enrollments were known, and enrollments were lower than expected. One of our TAs with an 84-hour contract became unavailable, and we did not replace this TA.

Objective Assessment results were generally positive.

- The RGASC assessment showed small but consistent improvements in all courses assessed.
- Analysis of grades suggests that student writing grades may be higher in “theory” courses (CSC236, CSC263) where students describe a solution to a problem, compared to “systems” courses (CSC148, 209, 258) where the students explain their software specification/use.

Instructor/TA Assessment results were generally positive. The WDI structure provided adequate support, and sharing a TA pool reduced overhead. Beyond small, course-specific improvements, these are some of the issues that came up in multiple courses:

- Many students (particularly in CSC148, but also in other courses) wanted examples of what they were asked to write. In cases where examples were provided (e.g., in CSC236), students asked for more.
- Grammar is a theme that was raised by the RGASC RA, TAs, and instructors.
- Conciseness was an issue in many courses. We intend to add a page/word limit to all assessments going forward.

We conducted a **student survey** (funded by a TDI grant) and are currently analyzing the results.

Next year, we would like to continue the project and add a writing assessment in CSC207, which is required for all CS students. We are requesting a total of 1,123 TA hours across the 6 CSC courses. The increase is due to adding CSC207 (+66 hours), training more unique TAs to help with grading turnaround (+40 hours), increasing CSC148 budget by 5 min/student (+80 hours), and enrollment changes (+84 hours). Please see [Justification for Budget Increase](#).

As is typical in our department, the course coordinators change from year to year. However, the new coordinators – and the department as a whole – are committed to the project, and the departmental-level leadership and coordination of this project will remain the same to provide continuity.

What did you do?

What happened with regard to the project—i.e., what did you do, what did your TAs do, etc.? Did you do what you planned to do, and if not, why not? Why? Did it change for reasons specific to this class/this year, or for reasons of general practicality given the context?

Writing Instruction and Assessment

The table below describes what each instructor did in their corresponding courses (CSC148, 236, 263, 209, 258). In addition, the instructors for the courses worked together, along with Prof. Michael Kaler, to create a shared rubric targeting three main areas of writing concern: Structure/Organization, Writing Mechanics, Audience Expectation. Each instructor adapted the rubric to their course.

Course	Writing Instruction	Writing Assessment
CSC148 (Winter 22)	<p>30 minutes of lecture instruction targeted the following CS-specific writing issues:</p> <ul style="list-style-type: none"> ● Logical structure ● Effective use of transition expressions ● Having complete sentences (subject-verb main clause, plus object if applicable, or secondary clause if needed) ● No excessive use of bullet points, and when used, it is clear how their contents relate to sentences/paragraphs around them ● Avoiding unclear pronoun antecedents ● Sentences focused on a single idea and not too long ● Using descriptive/technical language (e.g. verbs) rather than generic ● Avoiding slang, text-speak, verb abbreviations, contractions, and other informal phrasings ● Using gender-neutral and inclusive language ● Using impersonal rather than personal language <p>Examples were provided in class for each of the above and students were engaged in determining what the problems are in each example.</p>	<p>Students wrote a documentation for three Python classes that model phone contracts for a fictitious phone company, intended to be read by a technical audience.</p> <p>Students received TA assessment and feedback targeting the three rubric criterias.</p> <p>Students used this feedback and submitted a revised version of their documentation. The revised documentation was re-graded (without comments).</p>
CSC236 (Fall 21)	Video module describing how to write a proof, with emphasis on	There are three written problem sets in this course, submitted in groups of 1-3

	<ul style="list-style-type: none"> ● Define terms ● Use transitions ● Use complete sentences ● Avoid (unclear) pronouns ● Structure: paragraphs, outline ● Simplify; Refine <p>Lecture exercise on “What, if anything, is wrong with each of the following proofs?” that asks students to identify logical and writing issues.</p>	<p>students. These problem sets solutions/proofs are intended to be read by the TAs.</p> <p>Students received TA assessment and feedback of the writing quality of one random question in each of the three problem sets.</p>
CSC263 (Winter 22)	<p>One hour lecture instruction and exercise that targeted the following CS-specific writing issues:</p> <ul style="list-style-type: none"> ● Ordering ideas logically ● Writing paragraphs with Topic Sentences ● Avoiding unclear pronoun antecedents ● Sentences reading well “left-to-right” ● Using descriptive/technical verbs ● Annotating symbols with their “types” 	<p>Students wrote a response to a take-home interview problem in the form of an email, intended to be read by a technical/professional audience.</p> <p>Students received TA assessment and feedback targeting the three rubric criterias.</p> <p>Students used this feedback and submitted a revised version of their email. The revised documentation was graded for substantial revision based on the TA feedback.</p>
CSC209 (Winter 22)	<p>The format of “man” (manual) pages was introduced in lecture and then reviewed in lab, so that students were familiar with the genre and the expected content, organization, and tone of the document.</p>	<p>Students wrote a “man” page (documentation), intended to be read by a technical audience.</p> <p>Students received TA assessment and feedback targeting the three rubric criterias.</p> <p>Students submitted a revised version of their “man” page in the form of a “diff” file, often used in our field to document/communicate changes. The revised submission was graded for substantial completion for bonus credit.</p>
CSC258 (Winter 22)	<p>20-minute exercise in a lab setting to identify common elements of user documentation and to explain the importance of writing for the target audience. Students were provided with examples of user documentation for similar software and worked collaboratively to identify common sections and to reason about why they were included.</p>	<p>Students wrote a user manual for a piece of software that they built, intended to be read by a general (non-technical) audience.</p> <p>Students received TA feedback targeting the three rubric criteria.</p>

TA Training and Budget

We hired 3 unique TAs in the fall term for CSC236, and 10 unique TAs in the winter term for the remaining courses. As is typical in CSC courses, all but one TA was an undergraduate TA. These TAs were trained through the WDI training program run by Prof. Michael Kaler. Moreover, we held benchmarking sessions prior to grading each assessment. When the TA grading diverged, we asked the TAs to continue benchmarking on an asynchronous basis. All TA hours were used for grading.

The TA hour breakdown in our courses are:

- 193 TA hours used for CSC236
- 323 TA hours used for CSC148
- 331 TA hours used for CSC209/258/263

The total of 847 TA hours used is 84 hours less than we requested. Our CS course enrollments were below what we initially expected. We hired most of our WDI TAs before the actual enrollments were known, and would normally not be able to reduce the TA hours after the fact. However, one of our TAs with an 84 hour contract was no longer able to TA, and we did not attempt to replace this TA due to the reduced enrollments.

We were fortunate to have slightly more TA hours per student than originally budgeted. This additional time was helpful, since:

- We did not institute a word count for most of our assignments. Many students in the winter term submitted much longer written work compared to what we expected. Since we did not target conciseness in our courses this year, many written submissions were much longer than we anticipated.
- **In particular, the CSC148 assignment took more than 15min/student to grade. Next year, we would like to increase CSC148 budget to 20min/student to better reflect the grading needs.**
- Most of our TAs were undergraduate TAs, and many of them were first-time WDI TAs. We used a handful more benchmarking hours than anticipated, and continued to have grading discussions asynchronously via Slack. **We would like to increase the benchmarking budget to 2 hours per TA for each course.**

How did it work (objective)?

*What do you know about the project's results **with regard to the learning objectives** from objective testimony (e.g., analysis of student writing produced)?*

RGASC Assessment

The RGASC assessment showed improvements in writing in all courses: the effects were small, but were almost always positive. This is true even in CSC236, where there was not a resubmission process, and student writing was reassessed based on a different problem set. Tables 1-4 shows the average score assessed by the RGASC RA.

Table 1: Average scores (on a scale of 1 to 5) for the eight criteria assessed here, divided between two submissions. Averages based on 72 students.

Submission	CSC148	CSC148 Resubmit	Difference
Complete Sentences	3.5915493	3.66901408	0.07857143
Grammar	3.27464789	3.3943662	0.12142857
Clarity	3.36619718	3.42957746	0.06428571
Organization	3.53521127	3.61267606	0.07857143
Transition Expressions	3.21830986	3.38732394	0.16428571
Contractions/Slang/Informal Language	4.27464789	4.4084507	0.13571429
Impersonal Language	4.07746479	4.36619718	0.29285714
Pronoun Antecedents	3.93661972	4.04929577	0.11428571

Table 2: Average scores (on a scale of 1 to 5) for the seven criteria assessed here, divided between two submissions: PS1 and PS3. Averages based on 60 students.

Sample	CSC236 (PS1)	CSC236 (PS3)	Difference
Complete Sentences	3.066667	3.144068	0.042373
Grammatical Correctness	2.908333	2.983051	0.067797
Sentence Intelligibility	3.225	3.245763	0.025424
Organization of Ideas	3.666667	3.728814	0.067797
Use of Transition Expressions	3.158333	3.220339	0.042373
Informal Language	3.791667	4.432203	0.661017
Impersonal Language	3.983333	4.525424	0.559322

Table 3: Average scores (on a scale of 1 to 5) for the eight criteria assessed here, divided between two submissions. Averages based on 36 students.

	CSC209	CSC209 Resubmit	Difference
Complete Sentences	3.61111111	3.61111111	0
Grammar	3.43055556	3.61111111	0.18055556
Clarity	3.26388889	3.45833333	0.19444444
Organization	3.375	3.45833333	0.08333333
Transition Expressions	3.51388889	3.59722222	0.08333333
Contractions and Slang	4.875	4.93055556	0.05555556
Impersonal Language	4.91666667	4.875	-0.0416667
Pronoun Antecedents	4.625	4.72222222	0.09722222

Table 4: Average scores across five criteria (on a scale of 1 to 5) for 42 students from CSC263.

	CSC263	CSC263 Resubmit	Difference
Grammar	3.47619048	3.5875	0.1025641
Clarity	3.61904762	3.7	0.07692308
Organization	3.5952381	3.6875	0.08974359
Transition Expressions	3.61904762	3.65	0.03846154
Professional Language	4.73809524	4.725	0

One common theme in the qualitative assessment is the amount of grammatical issues: spelling in CSC209, grammar/word choice in CSC148, 209, 236, 263, particularly plurals and possessives. This is not surprising, especially since we did not target grammar in this year’s WDI project.

The type of improvement differed across the different courses that were assessed. Below, we quote the “Summary” section of the WDI assessment written by the RGASC RA Daniel G. Dick.

CSC148: Overall, there was some noticeable improvement in terms of the quality of writing between the first and second submissions, although the difference was often quite subtle (Table 1). TA/Instructor feedback seems to have effectively eliminated issues surrounding colloquial/conversational language, and similar interventions would likely improve most of the remaining issues. In particular, student writing in CSC148 would markedly improve if students made better use of standard writing software (e.g., spell-check)

CSC236: Overall, there was limited improvement in the quality of student writing between PS1 and PS3, barring the substantial reduction in the amount of colloquial/overly personal language. Most students dramatically shortened the amount of written material included in their second submission, seemingly due to the structure of the third assignment making it more amenable to the use of point-form answers. Based on the values seen in Table 1, encouraging students to more carefully check the spelling and grammar of their submissions using standard spell-checking software would have the most immediate impact on the quality of writing seen in CSC236.

CSC209: Student writing in CSC209 showed a greater degree of improvement across the two submissions than I have seen in similar second year courses. Further improvements would likely occur if students were encouraged to write their initial submission using a word processors with built-in spelling and grammar features, before transferring the material over to Notepad.

CSC263: Overall, the writing in CSC263 was stronger than what I normally see in a second-year science course, with consistent improvement in terms of grammar and organization across most submissions. Better implementation of transition elements and introductory material would have improved most submissions, as would correcting the minor LaTeX errors.

Writing Grades

Table 5 shows the grade assigned by TAs in each assessment.

We observe that CSC236 writing grades are increasing, suggesting possible improvement. However, it is also possible that weaker students are more likely to drop the course, thus increasing the average writing grade. In a separate analysis, we confirm that CSC236 students who submitted all of three problem sets improved slightly in PS2 (+0.25 out of 12 compared to PS1), and then again in PS3 (+0.77 out of 12 compared to PS1). We did not test whether this increase is statistically significant.

Assessments that ask students to describe software specification (rather than describing a solution to a problem) may be more challenging to students, reflected in lower writing grades in CSC148, CSC209, CSC258. However, it is challenging to compare grades across different assessments and courses since grading criteria differ in each course (e.g. the definition of “Audience Expectation” differs in each assessment). Also, in CSC209 TAs were asked to come up with a cumulative grade rather than a grade per rubric item. In CSC258 TAs separated the grade by category, but the information is only recorded in the PDF annotations.

Table 5. TA assigned writing grades in each assessment. The “R” postfix refers to “Resubmission”. For CSC209 and CSC263, resubmission was graded for substantial completion.

	Structure (/4)	Mechanics (/4)	Audience Expectations (/4)	Overall (/12 or %)
CSC148 Documentation	3.03	2.95	3.22	9.2
CSC148 Resubmission	3.59	3.47	3.80	10.87
CSC236 PS1	3.43	3.12	3.60	10.15
CSC236 PS2	3.51	3.21	3.67	10.38
CSC236 PS3	3.65	3.62	3.60	10.87
CSC209 "Man" page	-	-	-	8.55
CSC209 Resubmission	-	-	-	77%
CSC263 Take-Home Interview	3.31	2.99	3.44	9.74
CSC263 Resubmission	-	-	-	85%
CSC258 User Guide	-	-	-	9.23

Writing Grade Changes

In CSC148 and CSC236, we can measure the change in student grade over time. Table 6 shows the writing grades of CSC148 students *who submitted both the documentation and the resubmission*. Likewise, Table 7 shows the writing grades of CSC236 students who submitted all three problem sets.

Consistent with the RGASC assessment, we see evidence of improvement across most of the rubric categories.

Table 6. TA assigned writing grades in the CSC148 documentation and resubmission, **across students who submitted both the documentation and resubmission**.

	Structure (/4)	Mechanics (/4)	Audience Expectations (/4)	Overall (/12 or %)
CSC148 Documentation	3.03	2.95	3.22	9.2
CSC148 Resubmission	3.69	3.54	3.87	11.10

Table 7. TA assigned writing grades in the CSC236 problem sets, **across students who submitted all three problem sets**

	Structure (/4)	Mechanics (/4)	Audience Expectations (/4)	Overall (/12 or %)
CSC236 PS1	3.44	3.14	3.60	10.17
CSC236 PS2	3.51	3.23	3.68	10.42
CSC236 PS3	3.67	3.65	3.61	10.94

How did it work (subjective)? What have you learned?

*What do you know about the project's results **with regard to the learning objectives** from subjective testimony, potentially including 1) instructor's assessment, 2) TA assessments, 3) student assessment? What worked best? What didn't work? What do you know now that you didn't know at the start of the year? How do you feel overall about the project? Did it accomplish the goals that motivated you to propose it?*

Coordination (Lisa Zhang, Bogdan Simion)

We believe that the way that this WDI project was structured contributed to its success. We thank the WDI committee, and particularly Prof. Michael Kaler, for being open to structuring this project in particular ways to work with our unique needs, and the needs of each instructor.

In particular, sharing WDI TAs across multiple courses (CSC148, 209, 258, 263) worked particularly well, and allowed us to

- Hire and train fewer TAs. Hiring TAs is a challenge in CSC courses, and all but one of our TAs were undergraduate TAs.
- Maintain consistency across the various courses.
- Adjust TA hours across different courses as needed. For example, we moved some TA hours when we lost a TA for CSC148, and needed to spread the work across more unique TAs. We were also able to allow TAs to swap hours, providing much-needed flexibility to undergraduate TAs during an uncertain term.
- Reduce the workload for individual instructors, so that instructors can focus on pedagogy rather than TA hiring and management.

We would like to continue with this approach of sharing TAs across multiple courses.

Instructor Assessment

Overall, instructors feel positively about the project. We include notes/comments from the individual course coordinators:

CSC148 (Bogdan Simion)

- The course evaluations had no comments from students about the writing assignment
- Almost no questions were asked about the writing component of A1 while students were working on it, either in lecture or on Piazza, with one exception. The question that 2-3 students asked was to give them an exact fixed "template" of the document to write where they can just fill in the descriptions of the classes. We explained that aside from the structure guidelines from lecture, one of the learning goals here was for them to define a good structure by using sections, headings, etc., and that feedback will be provided on how to improve on that before resubmission.
- After the resubmission, the students did not have much to object to the TA feedback and mostly were concerned just with how much they needed to fix from the comments/annotations on their write-up. Some were asking whether their grade can go down after resubmission, which in retrospect we had not made clear from the get-go. We clarified that we will take the highest grade on the write-up, so as to not discourage students who had an almost perfect grade, from

still improving the few issues pointed out in the TA feedback.

- After the resubmission grades were back, we got only 2 remark requests, one where the student had not actually fixed the problems and had submitted the same write-up by mistake, and one where the student disagreed with the TA's re-assessment despite leaving some issues unfixed.
- The assessment was worth 10% of A1, which was 15% of the final grade, so basically a 1.5% of the course grade. Given that CSC148 is required for POST, students seemed to take this task seriously as even a small percentage could make the difference in getting the required mark for POST. That being said, I did notice quite a few students who did not get a high grade on the write-up, not attempting at all to resubmit their write-up. This may be due to this coming at a busy time during the term or potentially not seeing the gain as worth the time to fix the problems highlighted in the TA feedback.
- Some of the take-aways from CSC148 were that:
 - a. students in first year seem to want exact templates on what to write, so incorporating more unrelated examples on what is good structure and what is not, may be a good addition to this intervention in CSC148.
 - b. first-year students are taking ISP100 this year which seems to already address some of the things that I was worried that might pop up excessively and which we were not assessing explicitly (such as grammar, typos, verb tenses, etc.). That being said, the WDI assessment did point out some concerns with plurals, possessives, preposition choice (e.g., "for" vs "of"), occasional awkward phrasing, some inconsistency of verb tenses, and improper use of commas, on a few samples of student writing. While these were not explicitly in the writing issues described in the writing guidelines from lecture, they may be added for next year, if the instructors decide it is something worth underlining. One suggestion from the WDI assessment was to get students to use spell-checking tools, which should virtually eliminate a large portion of these issues.
 - c. One of the things that I think we probably did not emphasize as well as we intended, as part of the audience expectations aspects of writing during lecture, was the use of conversational/colloquial writing. This was pointed out in the WDI assessment, that some students claimed that a function "simply" does something, or "just" returns a given result, "essentially" performs a given task, etc. Such examples would be worth emphasizing more next year as part of the audience expectations aspects. Other issues like addressing the reader with "you are allowed", "you need to", etc., were observed in the first submission despite explicit examples in the lecture instruction. Nevertheless, the WDI assessment noted that both the colloquial writing and addressing the reader issues were fixed after TA feedback in the resubmission, indicating that the TA feedback was effective.
 - d. Finally, an observation from the writing assessment was that some sentence fragments had similar wording, indicating potential academic integrity violations. While the similarities were not glaring and we could not find entire sentences or paragraphs to be virtually identical, it is still concerning that some sentence fragments had considerable similarity. On the one hand, some fragments may be attributed to wording from the handout, which is a concern that students may take wording from the handout in formulating their own write-up. On the other hand, *some* unauthorized collaboration may have been possible, although not actionable at this time. This may be something to watch out for in future iterations.

CSC236 (Michael Miljanovic)

I would say that I definitely noticed that students never asked any writing related questions on Piazza, which suggests to me that either a) students are overconfident with their writing skills or b) students think it's impossible for them to improve those skills, neither of which are great things. If there was 1 thing I would change it would be that I think it might have been good to have some additional components of the course that focus on writing; either by being stricter about marking student lecture

work, or by adding some content to the tutorials (none of them had any focus on writing). Since the only grades associated were from the 3 problem sets, there weren't many opportunities for students to build their skills in that department.

Reviewing the course evaluations, students had almost no comments about the writing aspects of the course, except to say that they would have preferred more examples of formal proofs vs informal proofs in the lectures. Otherwise there was no feedback from students about the writing development initiative in summary.

CSC263 (Lisa Zhang)

Overall, the experience was positive. Students were engaged in the writing lecture, which was announced in the syllabus as a lecture covering "PS2 and Midterm Review". Attendance was on par with other lectures, although I intentionally hid the fact that this lecture would cover writing.

There was one course evaluation comment related to the weight of the writing portion of the grade (40% of one problem set, which is worth 10% of the course).

Conciseness is an issue that we didn't really discuss, that was a consistent issue across all students. All students wrote more than they could have, so much so that I asked the TAs to ask students to improve on conciseness if the student's writing is otherwise good.

There were some questions somewhat related to writing that came up on Piazza independently from the project that gave instructors opportunities to discuss writing issues. Since there were several questions about how to write "informal" or "less formal" proofs compared to what they were used to in CSC236, there were many times when the topic of writing came up naturally throughout the course. The WDI project provided an opportunity to discuss issues like use of figures, audience expectations, how to write for an audience, and allow these issues to be discussed throughout the course.

There were questions about how to book Prof. Kaler's office hours on the last day that it was possible to do so. Computer Science courses don't use Quercus as often as other courses, so instructions on how to book appointments on Quercus may help students make better use of these office hours.

Finally, one thing I would do differently next year is to set up the grading software to make it more clear whether a comment came from a WDI TA, or a course TA. There were many student questions about what

CSC209 (Andreas Bergen)

- The course evaluations had no comments from students about the writing assignment.
- Almost no questions about the writing assignment from students while they were working on it.
- Most common interaction with students after the first feedback was released was along the lines of "I understand why the TAs are providing me with this comment, but I disagree". Whether this means that students think too highly of their own writing skills or students aren't motivated enough to work on a 5% writing assignment while the course also is a necessary step up in terms of workload and complexity compared to their previous courses, is unknown.

- Even though this component was worth 5% of the students' grade, I did not see any of the usual behaviour where some students appear to "stress" over assessments worth even as little as just 1%.
- One thing I might change or try is to add a component of peer review/grading in addition to TA grading.
- I am under the impression that office hours with a writing specialist were barely used.

CSC258 (Andrew Petersen)

The instructors reviewed the documents and projects as part of grading. I was impressed by how effectively some of the students mimicked similar documents given their lack of prior experience with writing for a user audience. They provided appropriate sections (including effective headings) and, in general, appropriately integrated visual aids into their documents. The use of jargon and technical terms needs more emphasis in future terms, as students did not recognize hardware elements like "d-pad" as needing introduction. I would also like to find a way to provide feedback to students prior to submission. This year, we chose not to schedule office hours with writing specialists, as they may not understand the documents, but grammar and use of jargon are both issues they could address – perhaps more effectively than us, since they have the expected "non-technical user" perspective.

During the assignment itself, few students asked questions on the discussion board about the writing assignment. The few that posted asked about whether specific components or instructions should be included or not, and one specifically asked about the experience of the intended audience. These questions reflect the focus of the lab activity, which reminded students to write for a specific audience and which asked them to identify specific sections to include (or not include) from similar documents.

The instructors received little feedback from students about the writing assignment (in office hours, the course evaluations, or on Piazza), suggesting that students did not find the writing instruction to be a major component of the course. The only related feedback was a complaint about project grades being returned late (about a month after submission). That comment referred to the writing component of the project, as the assembly component was returned earlier.

TA Assessment

We asked TAs for feedback at the end of the fall term and winter term. Not all TAs responded, but TA assessments were generally positive. TAs noticed improvements in student writing (, but also noticed areas where student did not improve as much (e.g. grammar, structure).

CSC236

At the end of the fall term, the three TAs were asked the following questions:

1. Do you feel like the student writing changed over the course of the term? If so, how?
2. Do you feel like your grading changed over the problem sets? (i.e. do you feel like the grading standard shifted?)
3. Do you feel like your use of annotations changed between PS1 and PS2? (i.e. did your standard for adding these annotations change?)
4. Is there anything that you feel we should do differently for next term's WDI project?

Here are the TA responses:

TA1:

1. I noticed students were putting more effort into their responses around pset2. e.g. Even if their answers were short, they were making a point to use transition words.
2. I tried to keep my standards pretty consistent. The last pset felt different to grade though, since the answers were usually only 1 page long (compared to the up-to-5-page answers in pset1) and it was more of a mix of words and math.
3. For annotations, at the beginning I tried to include both positive and negative comments. I think for pset2 I switched to mostly adding negative comments (i.e. reasons for deducting marks).
4. While I'm not sure about this, I think it wasn't hard to guess which question was going to be graded. I'd be curious to know whether students put in the same effort communicating their other answers.

TA2:

1. I agree that more students were using transition words in their responses. Students were also organizing their ideas into paragraphs rather than one long piece of text.
2. By PS3, I had higher grading expectations than I had during PS1. This was because the students had received feedback throughout the term, so I expected them to incorporate our suggestions into their work.
3. I don't think my use of annotations changed between PS1 and PS2
4. No suggestions (for now)

TA3:

1. It felt like student writing was improving steadily. However, a lot of things remained the same. Things such as where a comma should go, spelling, and other grammar mistakes did not improve at all. This is probably due to the fact that we didn't penalize this. Another thing to note is that while I felt like there was an improvement in writing overall, this could also be due to the fact that a lot of students drop the course between the beginning of the semester and the end.
2. My expectations of cs student writing went down from ps1 to ps3. I felt I got a bit less strict when it came to grading.
3. I kept my use of annotations the same between ps1 to ps2. I don't really focus on adding positive comments but rather where a student could be better at. This is something that I would have to improve on.
4. I feel like for the next WDI project, we should focus on covering grammar more. As mentioned in the first point, I felt like that was where students were lacking the most. To be honest, I found this surprising since there are a lot of grammar checkers out there so I thought that most of the problems would be found elsewhere.

CSC148

At the end of the winter term, the TAs were asked the following questions:

1. Do you feel that the student writing changed between the initial submission and the resubmission? If so, how?
2. ...in particular, did students fix the issues that you pointed out? Did they introduce new mistakes?

3. Do you feel that your grading changed between the initial submission and resubmission? (i.e. do you feel like the grading standard shifted?)
4. Is there anything that we should do differently for next term's WDI project?

TA1:

1. I think most students showed improvement between the first and second submission. Most change showed by students was positive and included more extensive documentation and better communication of ideas.
2. Students did a fairly good job with applying feedback. I think the part that students had the most trouble applying feedback was structure/layout of the documentation. Some students also missed fixing some instances of their old mistakes. I can't think of any notable new mistakes that were created in the second submission.
3. I don't think my grading changed between the first and the second time.
4. I think the criteria was a bit insufficient. I wish there was a section that marked how complete the student's documentation was.

CSC209/258/263

At the end of the winter term, the TAs were asked the following questions:

1. Do you feel that the student writing changed throughout the term, across the different courses/submissions?
2. Do you feel that your grading changed across the different courses/submissions? (i.e. do you feel like the grading standard were different?)
3. Do you feel that your use of annotations changed across the different courses/submissions? (i.e. did your standard for adding these annotations change?)
4. Is there anything that you feel we should do differently for next term's WDI project?

TA1:

1. I feel that clarity is lacking more on the CSC209 man page assignment compared to CSC258 or CSC263. Maybe the instructions given to the students weren't clear in CSC209? Otherwise, I didn't really notice any significant changes, but this may be because I've only marked WDI in the second term.
2. Yes. I think I graded much more harshly for CSC209 compared to CSC258 or CSC263. I think this is mostly because of the benchmarking session anchoring my standards, but also I have considered that writing a good man-page is more difficult than the other assignments.
3. To some extent. I was more detailed in my annotations for CSC209 and CSC258, and pointed out many problems using one-time annotations. On the other hand, in CSC263 I felt that I was more inclined to skim through their assignment and identify high-level problems. Maybe this is because the writing length in CSC263 was generally longer, and a lot of the writing consisted of mathematical explanations which I only briefly looked over instead of checking for mathematical correctness.

4. I would really encourage students to seek feedback on their writing before submission. If courses are in-person next term, I would probably have Michael Kaler physically come to class to announce RGASC support hours.

TA2:

1. Across different courses, there seemed to be similar issues in terms of the type of issues and how frequent they were. I did not feel like any particular course had more writing issues than another
2. The grading standard felt consistent to me, though when some assignments were out of 6 whereas others were out of 12, we could of course be more specific with our scores with the latter
3. I would say no; I tended to use similar annotations for all the assignments.
4. Nothing that comes to mind

TA3:

1. I felt that students writing changed the most when assignments had the editing and resubmission component. Most students diligently when through the TA feedback and made sure the suggested changes were implemented.
2. Yes, I found that the CSC258 marks (at least the ones I marked) had a higher average compared to CSC209 and CSC263. It could be because students were familiar with user guides (CSC258) compared to take-home interview (CSC263) or man-pages (CSC209).
3. No, I felt because the rubric for all the 3 courses had common elements I was mainly commenting on transitions, paragraph structure, clarity, grammatical issues, etc.
4. Perhaps, have one tutorial on writing expectations to raise attention to the writing components in courses. However, I'm not sure if it's feasible it is for all 3 courses, maybe have a generic writing tutorial for 2nd year courses, or have one in 236. (edited)

TA4:

1. Student writing mostly improved in the resubmissions. Most students made a genuine effort in incorporating feedback in their resubmissions.
2. My grading did not change across the different courses. For the resubmissions, my grading was lenient as long as the student made an attempt to listen to the feedback given to them.
3. My use of annotations did not change.
4. It would be nice if the assignments were spread out evenly throughout the term.

Student Survey

We worked with Prof. Michael Kaler to obtain a TDI Fund to further assess the WDI results. In addition to the quantitative analysis of grades presented in the "How did it work (objective)?" section, we ran a survey asking students for feedback, and received 84 responses from first-year students and 49 responses from second-year students.

We are in the process of analyzing the survey results. To provide a taste of the type of student feedback we collected, we present a non-representative set of quotes from these surveys.

Quotes from the CSC148 Survey

Observation: Students discussed learning about documentation, with some generalizing to other writing tasks.

- “I learned that documenting code is both very useful but also relatively difficult to do”
- “I learned the importance of documentation, and that it is an essential skill to have as a computer scientist”
- “I learned to convey my thinking and thought process in a professional manner. This kind of explaining can help with technical interviews for future job interviews.”

Observation: several students discuss wanting to see examples and/or templates.

- “Maybe give more examples of well-written documentation”
- “Finding examples for what technical writing and documentation is helpful (as taught in ISP100)”

Observation: Writing feedback was helpful for some students, but there is room for improvement. This is challenging since CSC courses typically hire undergraduate TAs. Most of the CSC148 WDI TAs were new as of this year.

- “The feedback pointed out a few mistakes however when I resubmitted my mark only increased by a bit.”
- “the feedback was very minimal, in the sense that it did not contribute to what/how something should change.”
- “The flaw in my documentation is precisely pointed out”
- “Given that the feedback I received was rather limited, and in my opinion minor, the changes I made were consequently not drastic. I would have liked to get general feedback on what worked well (and what didn't) in the documentation but given the class size I can understand why this would be quite challenging.”
- “I was told that my document was poorly organized and is hard to navigate at the first submission, so i fixed that and along with a few suggestions in the first submission. However, my second submission has no improvement on it's mark.”

Observation: Students sometimes disagree with the TA feedback. There may be an opportunity to help students read and respond to subjective feedback, and treat this feedback as a learning opportunity.

- “The advice given to improve the submission made sense, however, I feel as if, based on what we are told to do, my documentation got the job done, even though it was not what was expected.”

Quotes from the Second-Year Survey

Observation: Writing feedback was helpful for some students, but there is room for improvement:

- “The feedback allowed me to get a higher mark on the resubmission. Also, using the feedback on the 209 manpage, I was able to get a better initial mark on 258 user guide and the 263 ps2.”
- “I have a tendency for run-on sentences and it often causes my subject/object clarity to take a hit, so I appreciated the advice on how to break things up and make it more clear what was happening to what.”
- “Feedback was often unclear. Feedback on writing content and style was scarce. I felt like I was not given many pointers for how to improve.”

- “I felt like some of the comments were unnecessary and forced. But others were helpful.”
- “They were not happy with things irrelevant to the man page”
- “Most of the feedback that I received from writing portion of assignments were very pedantic and made me lose marks for silly reasons like writing personal pronouns in proofs for CSC236....”

Observation: Several students want to see examples.

- “Have an example or a guide/manual to explain how to write properly.”
- “More examples of writing in a professional setting so that students can understand the formatting and syntax of professional writing.”
- “Gives students an idea on how to universally guide through all sorts of documentation they will explore throughout their path in CS jobs. Perhaps documentation on their own code should be encouraged.”
- “Teach what it is before asking to do a documentation. Show students how its done”

What would you change?

a) Do you intend to run this project again, and if so, will there be b) changes to the course and/or c) changes to the project based on your experience running it?

The Department of Mathematical and Computational Sciences is interested in running this project again in the 2022-2023 year. One notable issue is that the coordinators of the courses often change from year to year. However, the new coordinators – and the department as a whole – are committed to the project, and the departmental-level leadership and coordination of this project will remain the same to provide continuity.

WDI Project Coordination

We would like to continue to share writing TAs across different courses occurring in the same term. Lisa Zhang and Bogdan Simion will continue to be the main points of contact for the WDI project, and in particular TA hiring.

One change we would like to make is to avoid giving a WDI TA a contract of more than 54 hours. We found that doing so required us to assign a large chunk of writing grading to a TA, and sometimes delayed grading. This change means having more unique TAs who may require RGASC training. **We anticipate hiring:**

- **5 TAs in the fall term (for CSC236, 207)**
- **15 TAs in the winter term (for CSC148, 209, 258, 263).**

We believe this change will be beneficial to students as it could improve turnaround time, allowing students to receive and respond to writing feedback more quickly.

Courses and Projects

Course	Old Coordinator (21-22)	New Coordinator (22-23)	Project Change	Budget
CSC148 S	Bogdan Simion	Andreas Bergen	<p>Same project framework and TA logistics as last year.</p> <p><i>We would like to increase the budget to 20 min/student (up from 15min/student requested last year), since this figure turned out to be more realistic.</i></p>	<p><i>2 hour benchmarking per TA (15 TAs) + 20 min/student</i></p> <p>x960 students</p> <p>= 350 hours</p>
CSC207 F *NEW WDI	(no WDI project)	Sonya Allin	<p>New project. Students will write a software design document to describe a piece of software they will build in this course. This document will be ~10 pages in length, and will be written in groups of 3-4. The design document will be graded for Structure/Writing Mechanics/Audience Expectation. Anticipated deadline Oct 31-Nov 7.</p> <p>Students will revise their software design document based on the writing TA feedback, and also changes to the software made throughout the term, and submit a revised software design document at the end of term.</p>	<p><i>2 hour benchmarking per TA (5 TAs) + 25 min/group (8min/student)</i></p> <p>x420 students</p> <p>= 66 hours</p>
CSC236 F	Michael Miljanovic	Michael Liut	<p>Same project framework and TA logistics as last year.</p>	<p><i>2 hour benchmarking per TA (5 TAs) + 20 min/student</i></p> <p>x560 students</p> <p>= 197 hours</p>
CSC209 S	Andreas Bergen	Arnold Rosenbloom	<p>Same project framework and TA logistics as last year.</p>	<p><i>2 hour benchmarking per TA (15 TAs) + 20 min/student</i></p> <p>x420 students</p> <p>= 170 hours</p>

CSC258 S	Andrew Petersen	Andrew Petersen	Same project framework and TA logistics, but we would like to add a resubmission stage.	<i>2 hour benchmarking per TA (15 TAs) + 20 min/student</i> x420 students = 170 hours
CSC263 S	Lisa Zhang	Tingting Zhu	Same project framework and TA logistics as last year.	<i>2 hour benchmarking per TA (15 TAs) + 20 min/student</i> x420 students = 170 hours
			TOTAL BUDGET	1123 hours

Justification for Budget Increase

Last year, we spent a total of **853 TA hours** (See [TA Training and Budget](#) for more details). We are requesting a budget increase of **270 TA hours**. The justification of the increase are as follows:

- **+66 hours** for running a WDI project in CSC207. This increase will expose students to yet another genre commonly used in our field, namely writing and updating software specification. This genre is especially relevant for students interested in working in the industry.
- **+40 hours** of additional TA training cost from having more unique TAs shared between different courses. This increase will help us attempt to improve turnaround time on WDI assessments, and allow students to receive more timely feedback (turnaround time on some projects were ~1 month for some assessments, due to the smaller number of unique TAs).
- **+80 hours** of grading support in CSC148 to be in line with this year. This year, the CSC148 assessment took ~20min/student rather than the 15min/student we requested last year. Note that last year, we did not have a resubmission process in CSC258, and thus were able to supplement CSC148 hours from those budgeted for the second-year CSC courses. (We are not requesting additional grading time for CSC258.)
- **+84 hours** due to expected enrollment changes. This number is in line with the 84 hours that we did not spend this year due to lower-than expected enrollments in the winter-term courses. As the university slowly returns to normalcy, we do not anticipate another drop in enrollment this year (nor for another TA to suddenly not be able to complete their contract).

Reflecting on Writing Instruction

We would like to reflect on how to approach grammar in this WDI project. We avoided emphasizing grammar last year for many reasons, one of which is that we have many ELL students in our courses. However, we could consider providing tools/resources on grammar, proofreading, and tool use that could help students.

Many students asked for more examples of quality work in multiple courses. This is another area that individual course instructors may choose to act upon—especially now that we have some sample student work from a successful WDI year.

Finally, there are some opportunities in our courses to address specific issues. For example, discussing filler words/impersonal language in CSC148, discussing conciseness in CSC263, and discussing audience expectations and the use of jargon in CSC258.