

One-on-One Review Intervention for Students Struggling in Discrete Mathematics



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Context and Intervention

Discrete Math, as first non-programming course, often represents a first struggle for students.

Students in Discrete Math were given the opportunity to meet 1:1 with a TA for 30 minutes.

TAs would not discuss the current homework assignment, but they could discuss any other topic.

Meetings were available to all students, but we actively contacted students struggling on homework to suggest signing up.

We ran the intervention for 4 academic quarters.

DFW-Rate During Intervention

| Term | C or better | D grade | F grade | With-drew | DFW % |
|--------------------|-------------|-----------|-----------|-----------|-------------|
| Sp 22 | 192 | 2 | 4 | 8 | 6.8% |
| Wi 23 | 122 | 5 | 0 | 4 | 4.2% |
| Au 23 | 291 | 4 | 3 | 7 | 6.9% |
| Wi 24 | 159 | 4 | 3 | 0 | 4.6% |
| Total | 764 | 15 | 10 | 19 | 5.5% |
| Wi 22 (control) | 114 | 7 | 1 | 4 | 9.5% |

DFW-rate was lower when running our intervention than in the prior quarter. A χ^2 -test gave a test statistic of 7.01, for a p -value of 0.072.

While not statistically significant, we take the decreased rate of D grades, F grades, and withdrawals to be an indication of success.

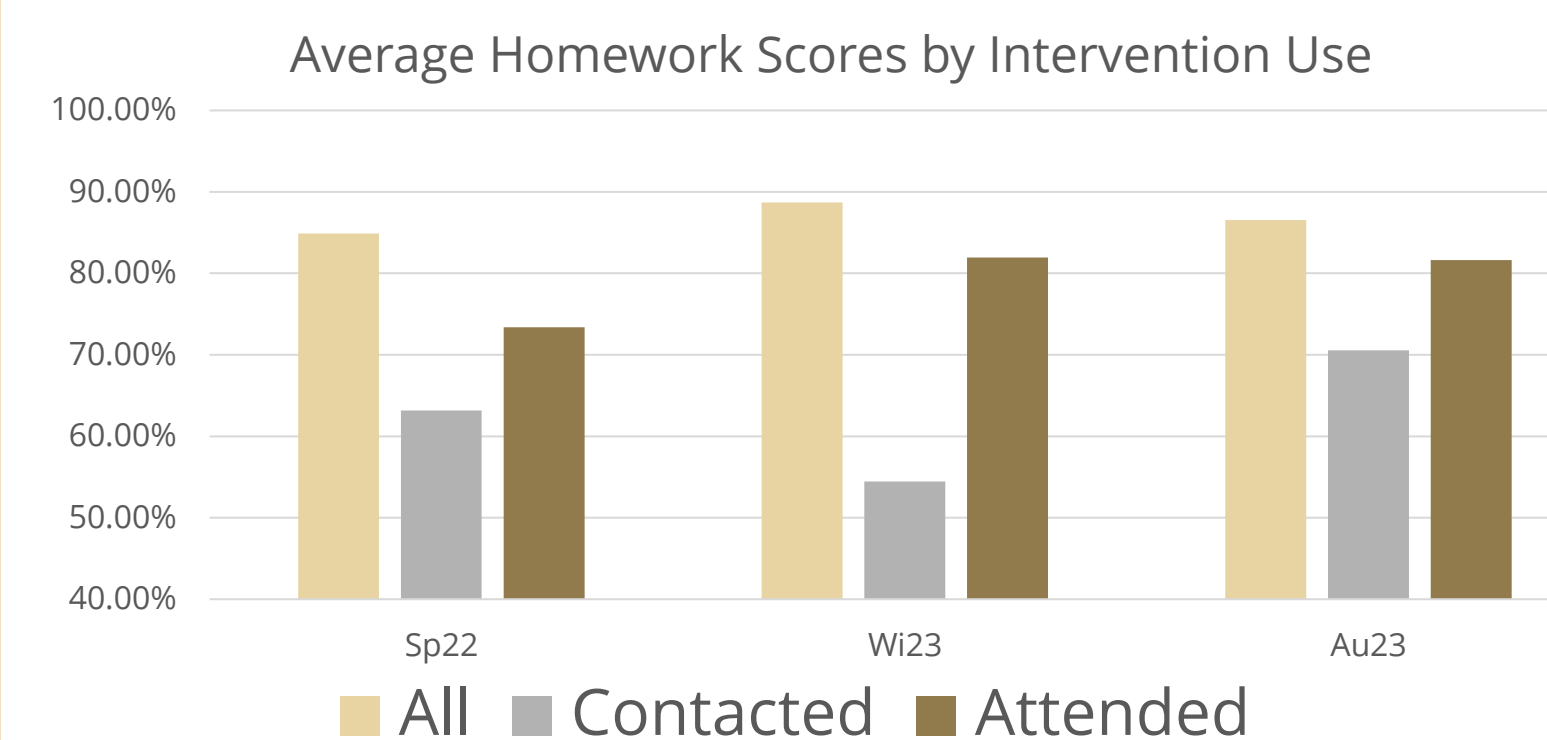
Limitations

- Remote start to control quarter
Due to covid cases, first few weeks of control quarter were conducted on zoom.
- Varying student population
Number of transfer students and first-year students varied substantially by quarter.
- Other policy changes
Other course updates, including adding post-lecture quizzes and section attendance requirements may have had impacts.

Homework Scores

Students with low scores on a homework (usually less than 70%) were contacted to suggest a meeting.

Homework scores were higher for those who attended than those who were contacted but did not attend.



Contacted students received an email encouraging them to attend a session (due to low HW score).
Attended students went to at least one session.
All shows average scores for the entire course.

| Term | All | Contacted | Attended |
|-------------------|--------|-----------|----------|
| Sp22 | 84.89% | 63.18% | 73.39% |
| Wi23 | 88.71% | 54.45% | 81.94% |
| Au23 | 86.52% | 70.55% | 81.62% |
| Wi24 | 89.60% | 73.97% | - |
| Wi22 (control) | 87.37% | N/A | N/A |

Further Questions

- Does contact from a TA make students feel included in the program/university?
- Do pre-scheduled non-homework-help office hours have similar effects with less effort?

Takeaways

- **Gentle and Clear Invitation** from a TA, not the instructor, made students less anxious and more likely to attend.
- **Clear Ground Rules** not allowing discussion of current homework kept schedules manageable and meetings useful.
- **Automatic Scheduling** using appointment slots (e.g., on Google Calendar) saved TA time.
- **Group Sessions** could be used for students scheduling repeatedly.
- **Low Follow Through** relatively few students signed up (64 of 139 contacted, many contacted repeatedly), making this a feasible intervention, but also meaning some students still do not get needed help.

More Information



- Additional course context
- More data
- Sample email to students
- Longer writeup

Acknowledgements: Thanks to Crystal Eney for helping assemble DFW-data. Thanks to Jacob Berg for organizing intervention in Wi24 and other quarters.

Key Results

- DFW-rate was lower (5.5%) in quarters with 1:1 meetings than control (9.5%).
- Students who signed up for meetings ended the quarter with higher grades than those who did not respond.