

## Motivation

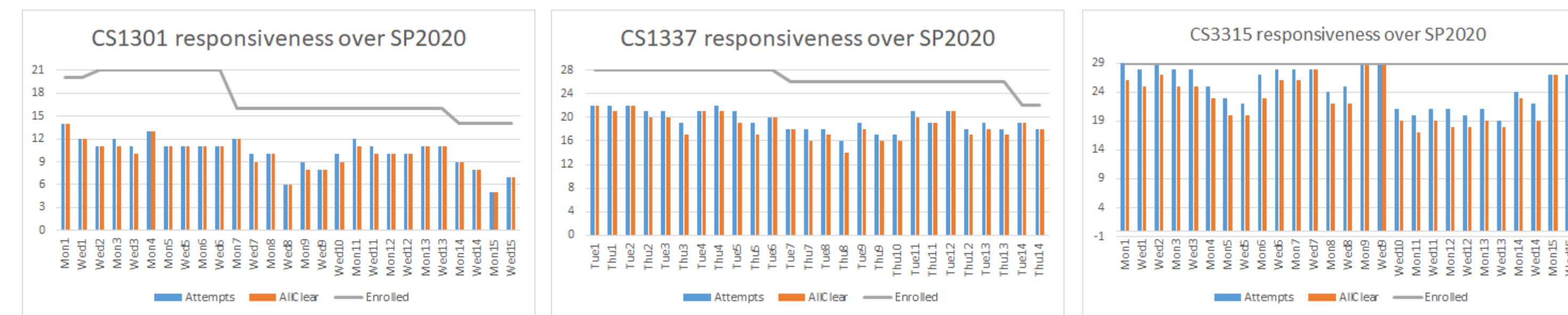
- Hope that some version of normality will be restored by Summer
- WT has had a wonderful response to pandemic and we are ready
- We should try to see what influence pandemic has on CS education
- Our response to COVID19 pandemic caused
  - Switch to online learning
  - Extensive use of online tools
  - Change in how we perceive and deliver information
- Online and masked up environment
  - Lost non verbal cues
  - Gained much more (un)necessary data
- Necessary online component is strain and opportunity for CS
  - Data could tell us effectiveness of the tools we use
  - We could also gauge the effects of the change
- Data analytics driven mechanisms have a big role to play in
  - Uncovering and understanding students' learning patterns
  - Guiding educators how to influence said learning patterns

## Setup

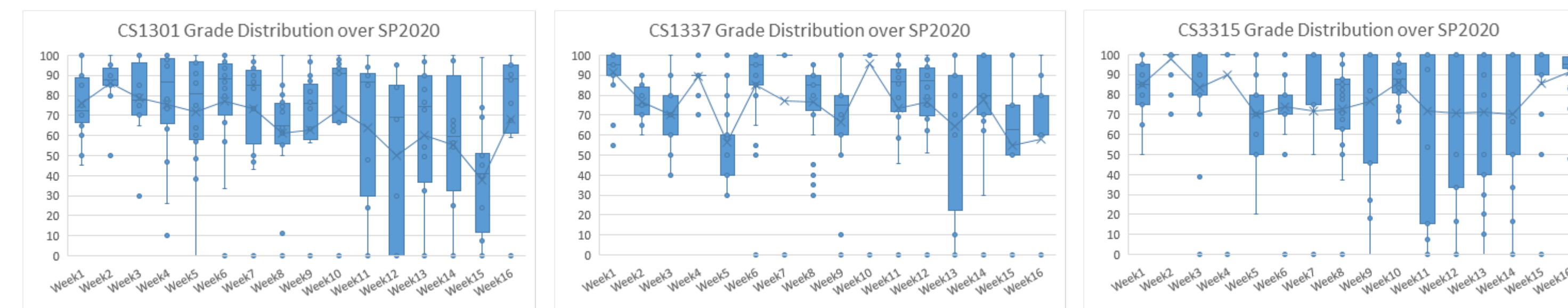
- We collected the following statistics about students
  - Experience level before and after the class
  - Claimed time spent every week working on a particular class
  - Responsiveness to weekly surveys, journals, forums, tests, labs
  - Grades every week
  - Overall grades
- That data has been gathered over 3 semesters
  - For 2 lower level classes (group 1)
  - For 1 upper level class in 2 Fall semesters (group 2)
  - For a group of upper level students in different classes (group 3)
- Data analytics has been used to adjust the teaching methods
- We will show here data
  - From the semester when the switch to online happened
  - For 2 lower level classes and one upper level class
- Remaining data will be shown during the presentation for 2 reasons
  - We are aware that meaningful conclusions can't be drawn
  - To spark discussion to better define a research problem

## Switch To Online Semester Data

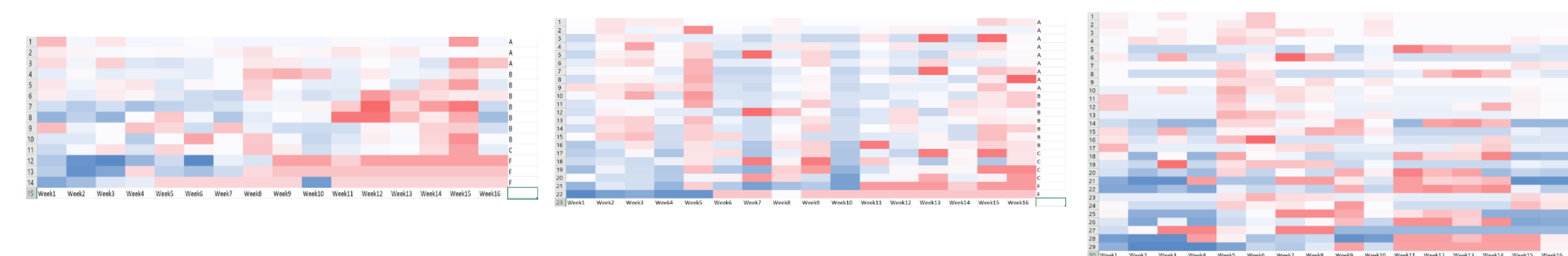
- **Responsiveness graphs** combine each week student response of :
  - If they learned something/would recommend class session
  - Whether all their questions were answered
- Axis and colors show the number of
  - Gray – enrolled, Blue – attempted; Red – all above satisfied



- Responsiveness graphs show no negative effects of the switch
  - Visible dynamic of less interest as we progress through semester
  - Switch to online rather brought back the interest in class
- **Grade distribution graphs** show
  - Average grades over the week when the deadline was
  - Box whisker plot - all the points, inclusive median and mean line



- Grade distribution graphs show no negative effects of the switch
  - Visible dynamic of decreasing as we progress through semester
  - Switch to online rather brought back some grades
- **Grade heatmap graphs** show
  - Color intensity as the week grade moves away of final grade
  - Blue – better grade; Red – worse grade; White – the same



- Grade heatmap graphs show no negative effects of the switch
  - Visible dynamic of decreasing as we progress through semester
  - Switch to online rather brought back some grades

## Is There Any Influence Of Pandemic

- Our reaction to pandemic greatly influenced the ways we teach
  - There is no clear indication of negative influence
  - Rather it intensified whatever underlying process was going on
  - We have adjusted tools and grading systems
  - We have included analytics to help us adjust
- Computer Science might be the field that benefits the most
  - Goal of this poster is to get your attention
  - Are you willing to share your data to see the influence
- All students in examined group 3 have internships/jobs lined up
  - It is interesting to see their very different progression
  - It is more interesting to uncover whether our reaction helped
- Even before pandemic and switch to online we were able to
  - Identify patterns of behavior that would lead to unwanted results
- With the switch to online we are able to
  - Faster identify patterns
  - Provide a supporting data evidence of said patterns

## Conclusions And Future Work

- This research helped in establishing better teaching practices
- Poster is envisioned as a next step in defining a research problem
- We are aware that no meaningful conclusions could be drawn
  - We need more data before and after pandemic
- By identifying the factors of students' successful learning we want
  - To be able to adjust to whatever external influences we face
  - To be able to quantify that adjustment

## References

- Ramljak, D. "Data Driven High Performance Data Access", PhD Thesis, 2019
- Borckardt, Jeffrey J., et al. "Clinical practice as natural laboratory for psychotherapy research: a guide to case-based time-series analysis." American psychologist 63.2 (2008): 77.
- Nash, Michael R., et al. "How to conduct and statistically analyze case-based time series studies, one patient at a time." Journal of Experimental Psychopathology 2.2 (2011): 139-169.
- <https://www.acm.org/education/curricula-recommendations>
- <https://csab.org/cc2020-final-draft-report-published-comments-sought>
- <http://dstf.acm.org/>
- <https://www.wtamu.edu/academics/college-engineering/programs/undergraduate/computer-science/index.html>
- <https://www.abet.org/>