

How students spend their time when taking exams

Retrospective analysis of online exam logs

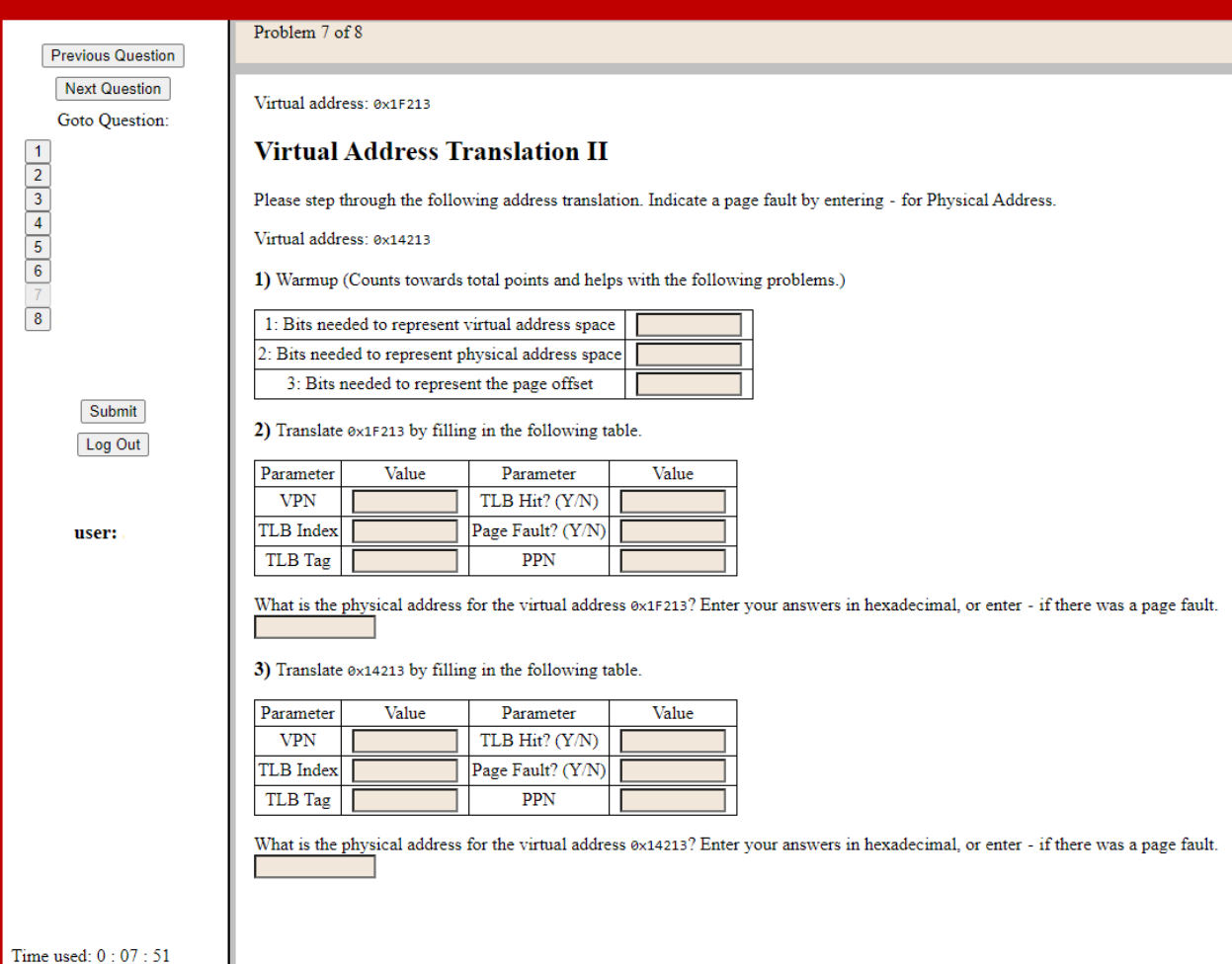
Project Design

Students in Introduction to Computer Systems took a midterm and final exam using an in-house online exam system. The exam system would autosave their answers whenever they would switch between questions.

Student
Logs in

Exam created
out of common
question pool

Exam



Student
Submits
Exam

Research Questions

RQ1 – What benefit do students have from taking more time on an exam?

RQ2 – Do students have different approaches to starting the exam? What, if any score differences result from this choice?

Context

- 1700 undergraduate students
- 7 semesters of midterm and final exams (2016-2019)
- Common Exams

Project Evaluation

The autosave logs were anonymized and made available for analysis. Autosave logs provide a sequence of question events, where each event represents the time a student spent working on a question before switching to a different question. The exam server is able to autograde the question, so the log tracks the student's score throughout the exam.

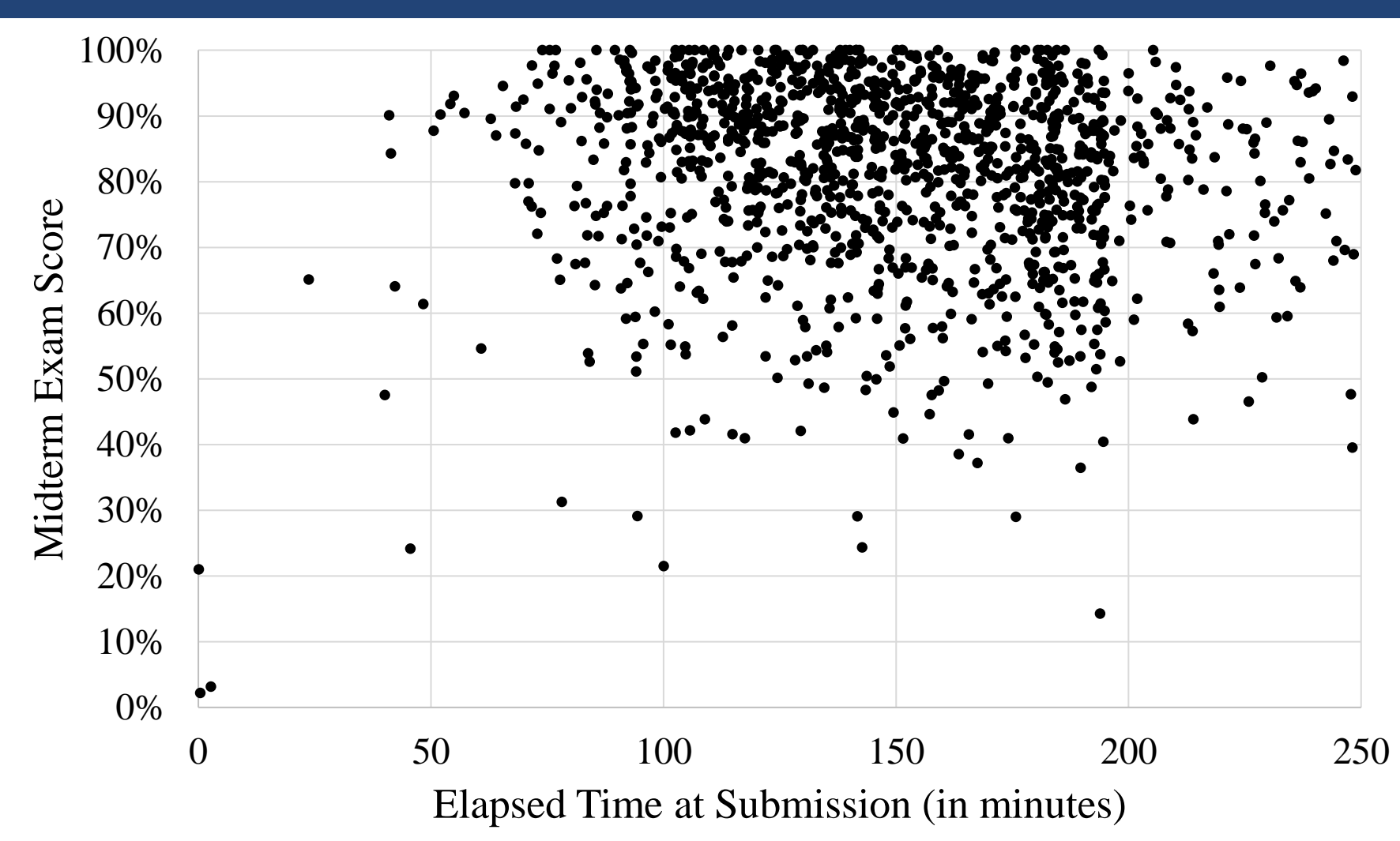
(time in ms)	student	Autosave log question	score on question)
...			
9515907	11760	q3_7	0.967741935484
9518628	11760	q4_7	0.928571428571
9521921	11760	q5_5	0.307692307692
9524140	11760	q6_9	0.630434782609
...			

Study Results

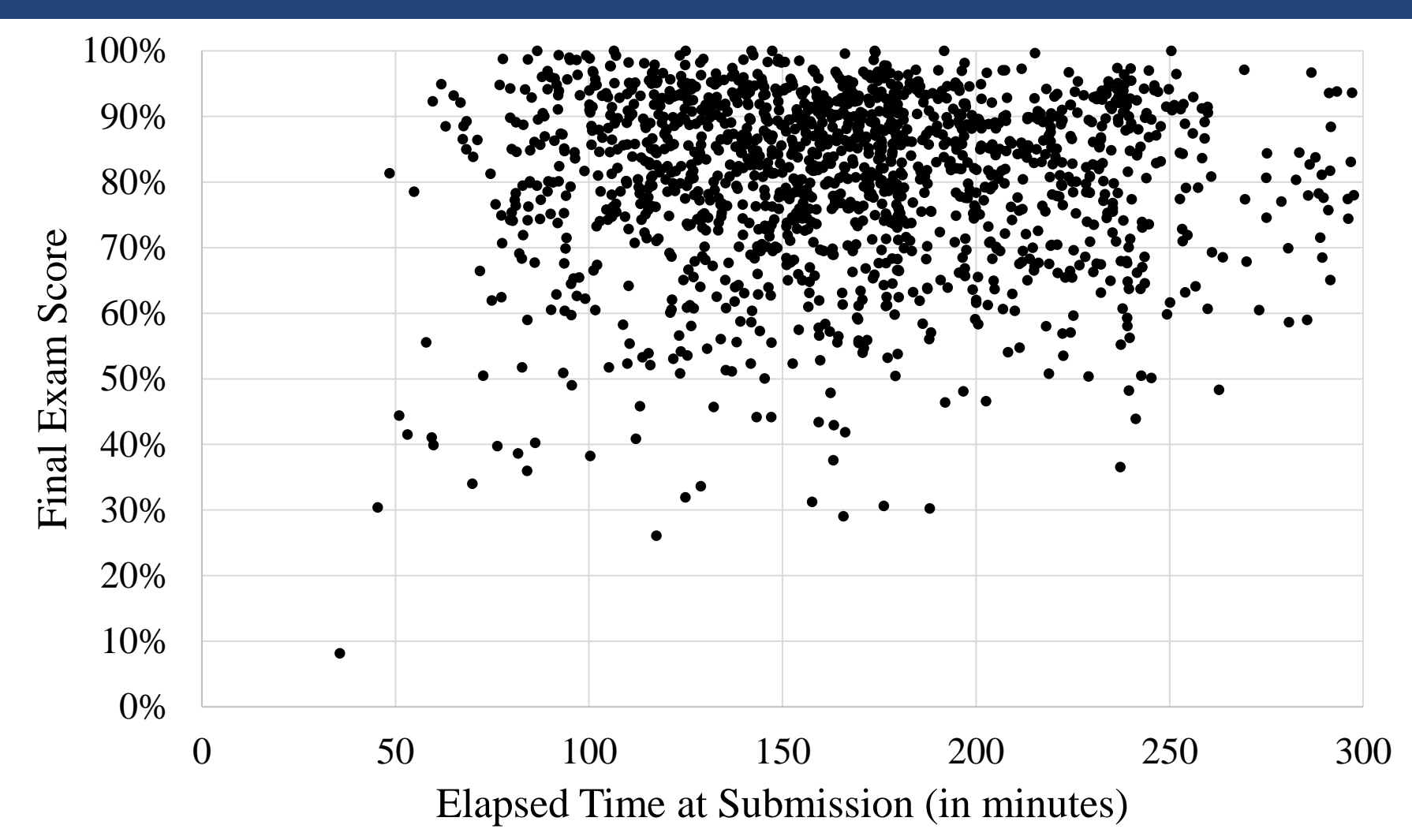
- Minimal correlation between time on exam and final score
- Choice of starting question is a differentiator in score
- Unclear how to determine quantitatively when a student is revising answers
- Logs and scripts are available - <https://github.com/bprail/exam-time>

The human subjects research in this work was covered by the IRB approved Exempt protocols for STUDY2016_00000148 - Studying Impacts of Educational Interventions at Carnegie Mellon University

RQ1 – Time on Exam



Midterm exam score (out of 100%) versus the time students took in minutes before submitting. Exams were designed to take less than 3 hours (180 minutes), though some instructors would permit more / unlimited time.



Final exam score (out of 100%) versus the time students took in minutes before submitting. Exams were designed to take less than 3 hours (180 minutes), though some instructors would permit more / unlimited time.

RQ2 – Starting Question

Starting Question	Average Exam Score	Percentage of Students
1	86.0	53.2%
2	77.0	19.4%
3	71.0	10.1%
6	78.1	9.5%

Starting Question	Average Exam Score	Percentage of Students
1	81.2	38.4%
2	83.0	8.0%
3	82.0	18.9%
5	71.1	6.8%
8	80.0	24.4%

Relation of which midterm (left) and final (right) exam question students start solving first (defined as when a question score is above 50% possible) and their exam score.

Future Work

- Within the time spent on an exam, how much is “working” and how much is “reviewing”?
- What determines a student's starting question?
- What patterns of student behavior exist during the exam, based on question and current action?

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