

Virtual Exam Wrappers: Evaluating Exam Wrappers in an Online Context

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Introduction

Exam wrappers are a reflection activity that students self-perform after an exam has been marked and returned. The student reflects to determine what contributed to their performance, encouraging them to determine their strengths and shortcomings in the context of study habits. Exam wrappers are hypothesized to improve student learning, by increasing reflection and metacognition. In this work, we expand upon existing studies[1], by evaluating exam wrappers delivered online.

Methodology

The exam wrappers were delivered in alternate weeks, following either a quiz or term test.

Students were divided into one of 3 groups.

- **Placebo:** Students were given questions related to interest in and enjoyment of CS.
- **Problem Solving:** Students were given programming problems similar to the ones on their tests.
- **Metacognition:** Students were asked questions which would help them reflect on their performance, plan for future tests and monitor their progress throughout the course.

Results and Discussion

Performance by Group

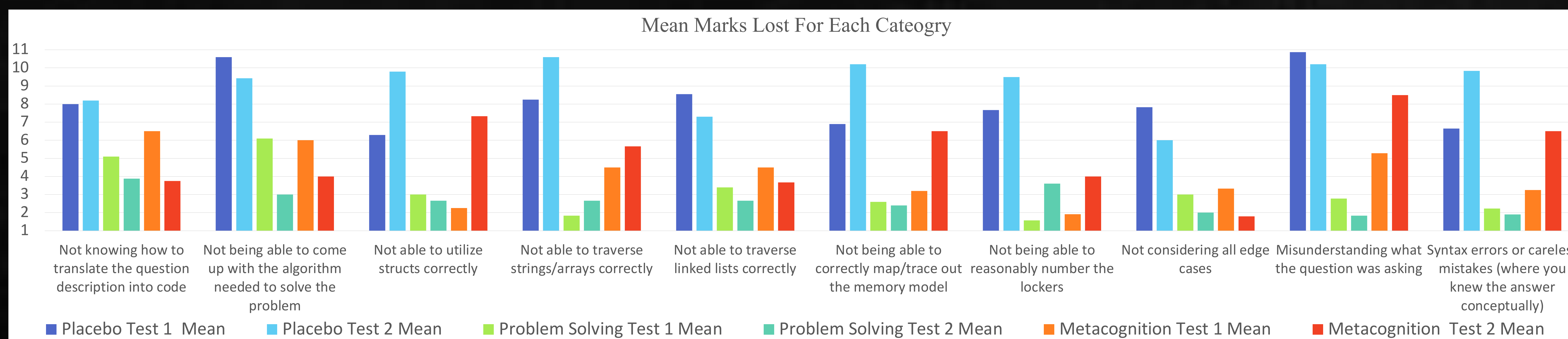
We used the weighted average of the final exam, term tests, and weekly test marks for the 3 different groups. The measure only consisted of students who completed all the required wrappers.

A one-way ANOVA found that there was not evidence for a statistically significant impact of group allocation on grades ($p=0.10730037$)

One-Way ANOVA Analysis of Group vs Course Grade						
Source of Variation	df	Sum Square	Mean Square	F	P-Value	F crit
Group	2	0.208460465	0.104230232	2.33921681	0.10730037	3.19072734
Residuals	48	2.138771892	0.044557748			

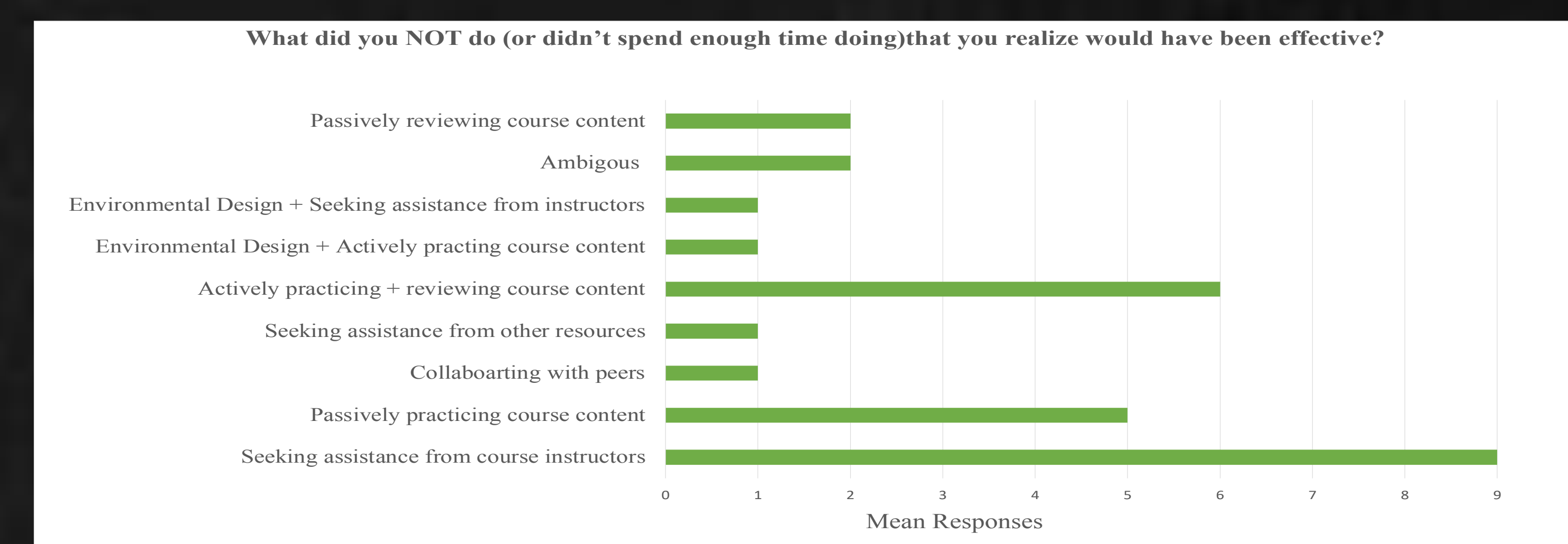
Students' Reflection On Lost Marks

The term test wrappers included questions about where students lost marks. Some of the most common mistakes were syntax errors or the inability to understand specific structures and programming nuances. While analyzing the mean marks lost for different categories on term tests as reported on the term test wrappers, it was found that group 2 (content) students lost the least marks on average followed by group 3 (metacognition) and group 1 (placebo) lost the maximum marks on average for each category.



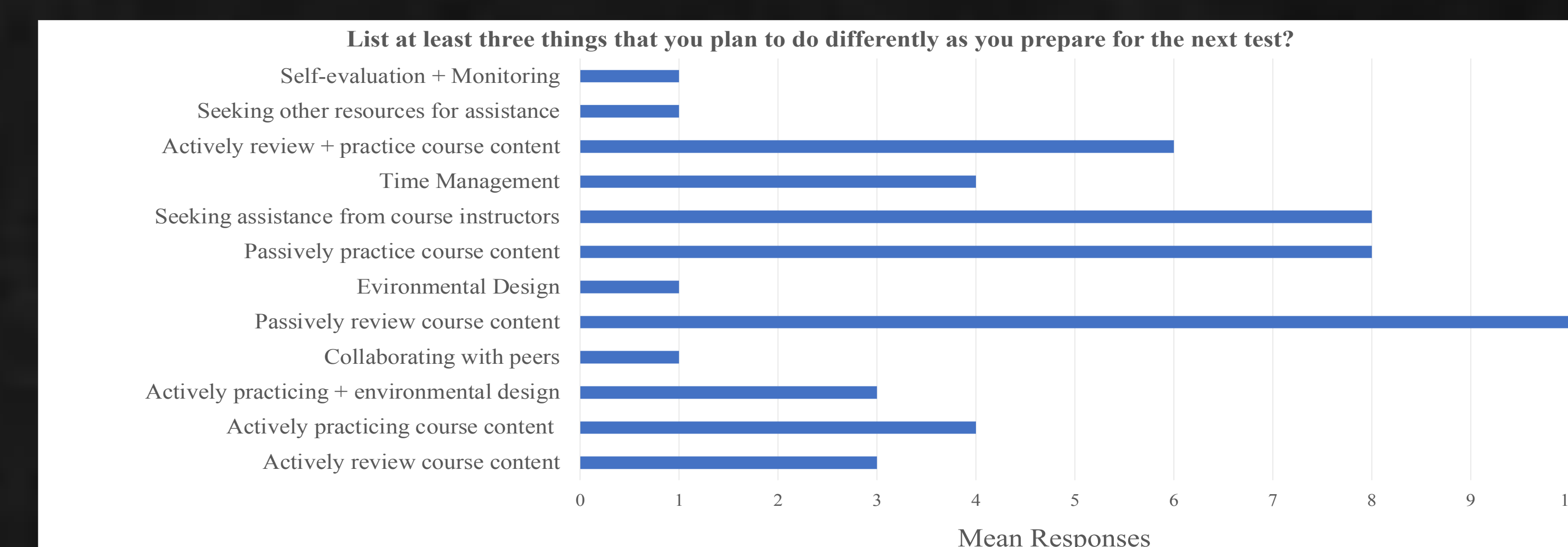
Students' Reflection: Cause of Errors

The metacognition wrappers included self-reflection questions of where students felt they could have improved. Seeking to engage with instructors more and engaging more with course content were the most commonly cited reasons.



Students' Reflection: Areas for Improvement

The metacognition wrappers included questions of how students may change their study habits moving forward. The overall theme of which was to engage more with course content and instructors.



Conclusion

While virtual exam wrappers showed no statistically significant impact on grades, they are a no-cost way to encourage students to reflect on how they may self-improve in a guided manner. The subject warrants further study into how virtual exam wrappers could be used to improve student performance.

References

- [1] Ben Stephenson, Michelle Craig, Daniel Zingaro, Diane Horton, Danny Heap, and Elaine Huynh. 2017. Exam Wrappers: Not a Silver Bullet. In Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education (SIGCSE '17). Association for Computing Machinery, New York, NY, USA, 573–578.