Benefits of Teaching with the Classroom as a Third Educator

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Abstract. The differential benefits of teaching in a SCALE-UP environment are investigated for a class that moved from a combination of Peer Instruction and Just in Time Teaching to a spatial setting typical for SCALE-UP.

1 Introduction

The educationalist Loris Malaguzzi referred to the room as the third educator. The first educator within this counting scheme, *i.e.* the instructor being in charge of the class, certainly is considered to be important in any teaching philosophy. The second educator, the peer student, is usually at the core of many innovative methods of pedagogy. In fact, many research based instructional strategies developed or refined within Physics Education Research make good and targeted use of the second educator. Among these are Peer Instruction (PI), Tutorials and to some extent Just in Time Teaching (JiTT), all described in [1].

The role of the spatial environment and, hence, the third educator, receives special attention in studio formats. For instance, in SCALE-UP [2] students are seated at group tables. This removes spatial barriers to students' interaction and collaboration which are typical for traditional classroom settings. Moreover the spatial arrangement signals to the students that cooperation and co-construction of knowledge is essential in this class. It also signals that the instructor is not the central and upfront resource for learning since in a SCALE-UP room there is no front anymore.

SCALE-UP has recently gained considerable popularity [3] and has proven to be effective for student learning [2]. Using such an environment as a third educator, however, comes with considerable cost and effort for creating and equipping a suitable classroom. This is in contrast to only involving the second educator, like in PI, which typically does not mandate spatial requirements. In fact, pedagogies are often designed to be compatible with traditional classroom settings.

2 Motivation

The author has adopted JiTT and PI about a decade ago. Recently he has been able to establish a SCALE-UP environment in his department which allows hosting 48 students in groups of six. This environment has been inaugurated in 2017 with a class having regularly an enrollment of about 50 students.

The author's motifs for moving to a SCALE-UP environment have been driven by a desire to teach in an environment which signals certain messages to students as described in the introduction. It has to be emphasized that in terms of pedagogy the author's current implementation of SCALE-UP is rather light. It does not involve fixed groups as advocated in [2] and is best described as using JiTT and PI in a spatial environment typical for SCALE-UP.

3 Research Questions and Methodology

This work addresses the following question: Are there and what are differential benefits of teaching in a SCALE-UP environment compared to teaching with JiTT and PI in a traditional classroom? In order to answer this question the class taught by the author in 2017 in a SCALE-

UP environment serves as data source. Available data includes total scores on the exam, class attendance, and performance on JiTT warm-ups and puzzles. The control group consists of previous implementations of the same class taught in 2015 and 2016, *i.e.* using JITT and PI in a regular classroom.

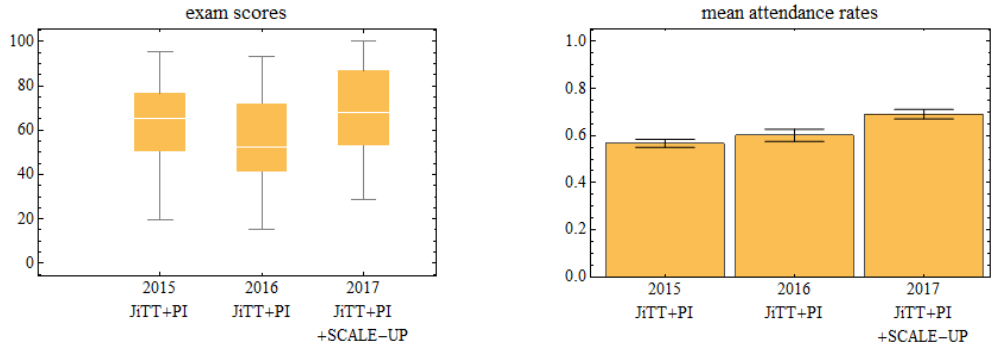

Fig. 1 Exam scores (left) and attendance rates (right) of the investigated classes. Error bars in right panel indicate standard errors.

4 Findings

No differences could be observed in terms of students' performance on the JiTT warm-ups for all courses and on the JiTT-puzzles for the 2015 and 2016 courses. While not statistically significant, students of the 2017 class performed about 5% better on the JiTT puzzles than the other two groups. Average class attendance increased statistically significantly (p<0.01) from about 60% in both 2015 and 2016 to about 70% for the 2017 SCALE-UP class. Final exam scores increased noticeably (Fig. 1) with a passing rate of 86% reaching an all-time maximum.

5 Discussion and Conclusion

It seems reasonable to conclude that the observed changes are mostly due to the spatial environment of SCALE-UP, *i.e.* the "presence of the third educator." While all student cohorts came roughly equally prepared to their classes as indicated by performance on JiTT warm-ups, students appear to have gained more from attending the SCALE-UP class on a short and longer time scale than their peers in previous years as indicated by the better performance on JiTT puzzles and the exam. Class time in the SCALE-UP environment seems to be particularly valuable for student learning. Students might actually perceive this, leading to the observed higher attendance rate. Indeed in the final course evaluation six out of 41 participating students stated in an open ended question that the room environment supported their learning.

References

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