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Paving the Way to Digital Learning: A case study in Engineering (0335)

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1. Introduction

The effective use of digital tools in class is considered as an innovative way to reinforce traditional teaching and increase student engagement[1]. The fact that student engagement and student success are highly connected[2] brings the need to create a teaching and learning environment in which the students will be willing to interact. Studies have shown that Student Response Systems (SRSs) can motivate students of all class sizes to be engaged[3-5], however clear evidence that these systems may result in better student performance is not apparent yet[6]. The present study focuses on the investigation of the effectiveness of the use of an advanced SRS, known as Top Hat, as a way to: improve student performance, to enhance understanding of the subject area and to increase student engagement.

2. The Method

Top Hat was used in core engineering undergraduate modules for the Academic Year (AY) 2017-2018. Participants belonged to three different groups according to their year of study (Year 1, Year 2 and Year 3). Each student group used Top Hat during their weekly 2 hours scheduled lecture session. The weekly Top Hat content included revision questions from the previous lecture and additional questions covering the topic of the current lecture. Taking advantage of the advanced features of Top Hat, 7-10 questions of different type were released per session. An example is shown in Figure 1. The questions were set as non-anonymous and a grade of 1 mark was assigned to each question. An online survey was created in *Qualtrics* in order to evaluate the students experience.
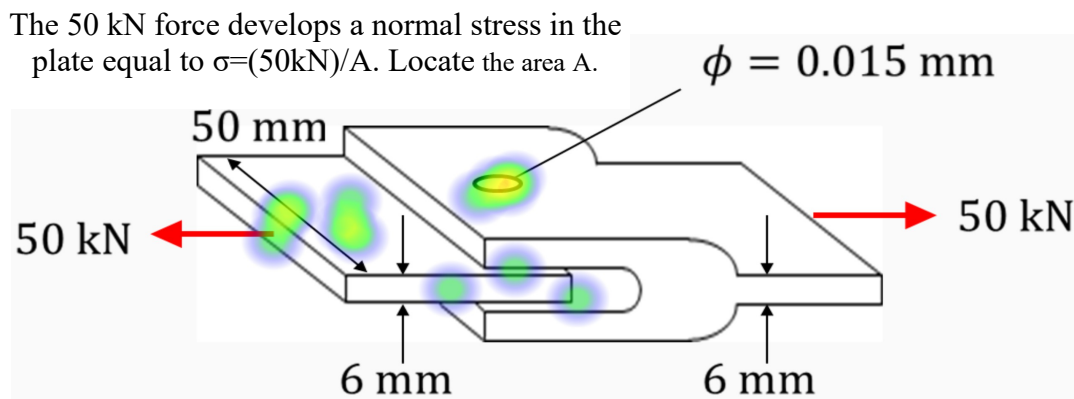

Figure 1: An example of the '*click on the target*' type of question used for 1st Year students.

3. Results

The % of students with outstanding performance in the exam (>70%) has been recorded and compared with the previous AY's results (AY 2016-2017). Similar content was taught in both AYs. As it can be seen in Figure 2, 30%, 55% and 73% of Year 1, 2 and 3 students respectively, have shown outstanding performance in the AY 2017-2018. As far as the AY 2016-2017 is concerned, these numbers are significantly lower (12%, 22% and 25% respectively).

In addition, the students' participation in Top Hat based questions has been monitored. As it can be observed from Figure 3, the percentage of engagement in Year 1, 2 and 3 groups was 52%, 69% and 74% respectively.
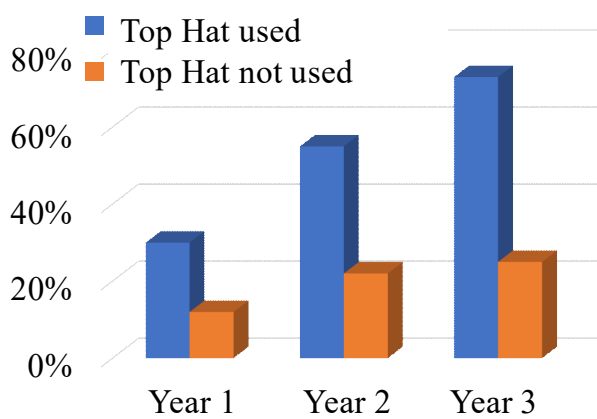
Figure 2: A comparative representation of the % of students with greater than 70% performance in the exam.
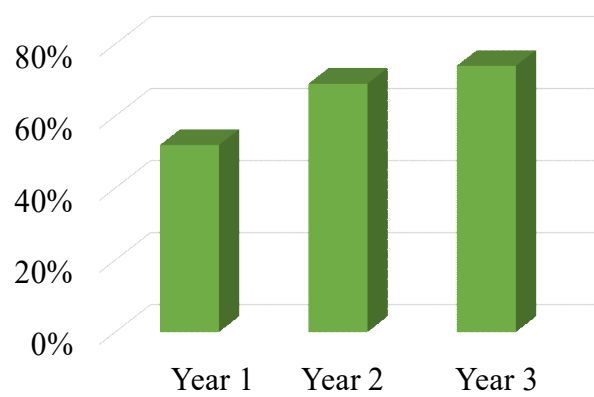
Figure 3: The % of student participation in Top Hat based questions.

4. Discussion and Conclusions

❖ The use of Top Hat improved significantly the students' performance, demonstrating the effectiveness of the use of advanced SRSs in the class. More specifically, the use of Top Hat increased **the number of students with outstanding performance by more than 60%.**

❖ According to the online survey results, **95%** of the students enjoyed the interactive app, while **80%** of them felt that it enhanced their understanding of the subject area.

❖ The level of engagement appeared to increase with increasing year of study. **The percentage engagement in Year 3 was 30% higher compared to the one in Year 1.**

❖ Similar results have been obtained with the use of alternative innovative teaching methods[7]. This indicates that students who are at their early years of study need more motivation to participate in class. As a result, further investigation needs to be made in order to find how this can be achieved with the use of SRSs.

6. References

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With the advancement of digital technologies, the effective use of digital tools is being considered as an innovative way to reinforce traditional teaching and increase student engagement in classroom activities[1,2]. The use of Student Response Systems (SRSs) has been studied in the existing literature, however, clear evidence is required to demonstrate that such systems facilitate better student performance[3-7]. In this study, the impact of the use of an advanced SRS, known as Top Hat, on student performance, engagement and understanding level is investigated. Top Hat was used during classroom for core engineering undergraduate modules at different years of study and an online survey was conducted to obtain feedback. After using Top Hat in classroom, students' performance in examinations was monitored and significant enhancement was observed. Moreover, the use of Top Hat resulted in high level of student engagement.