

Effects of Online Versus Three Different Assessment Approaches on Engineering Students' Exam Performance

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Abstract. This paper identifies and describes the effects of online versus different assessment approaches on student performance when incorporated into a large service teaching Engineering Physics topic, using three years of data. (MAXIMUM 100 WORDS)

1 Introduction

In many Australian Universities, first year engineering mechanics courses usually record a high failure rate of up to 50% and are a continuing concern [1]. Apparently, this is the case at our university as well. The high failure rates point out that many students often struggle to find the relevance of content they learnt when traditional teaching methods and assessments are used. A study by [2] reveals that engineering students were predominately motivated with the assessment tasks just to gain high marks rather than understanding the content. Due to higher workloads, high failure rate and limited teaching academic assistance, we looked at developing more efficient assessment methods without compromising student performance and consequently reduce our workloads. The higher workload is associated with generating feedback to students. Other motivations behind implementing different assessments include: engaging students with the content through assessments and immediate feedback, involving students actively in evaluating assessment criteria and requires them to provide grades and feedback to their peers [3]; and guiding them through their sticking points with the use of online resources and e-learning platforms.

2 Method

This engineering mechanics topic consisted of Statics and Dynamics parts. The content was delivered through conventional lectures, laboratories and tutorials (13 x 2 hour lecture, 12 x 2-hour tutorials, 4 x 3-hour laboratories) which itself ran for 13 weeks of a semester. For the pilot study in 2015, students were assessed using traditional methods for the Statics part i.e., students handed-in five assignments that have problems relating to the content for marking. Their competence in the Dynamics part was assessed through weekly online WileyPLUS tasks. The WileyPLUS system provided students with self-paced tutorials in an individualized coaching mode and instant feedback. In 2016, we used similar assignments for the Statics part, but introduced peer assessment [3] to place more emphasis on student-centred learning, engagement, performance and to move away from traditional lecturer or tutor grading [4]. The assignments submitted for assessment through LMS and distributed randomly among students for peer marking.

In 2017, we introduced an Adaptive e-learning platform [1] for the Statics part and made all the assessments online for both Statics and Dynamics. Five Statics assignments were implemented within the Smart Sparrow adaptive learning interface. The assessment questions were structured to guide students through the problem and to provide additional information if incorrect answers

were supplied. We used the same exams for both parts in 2015, 2016 and 2017 to analyze the student learning outcomes.

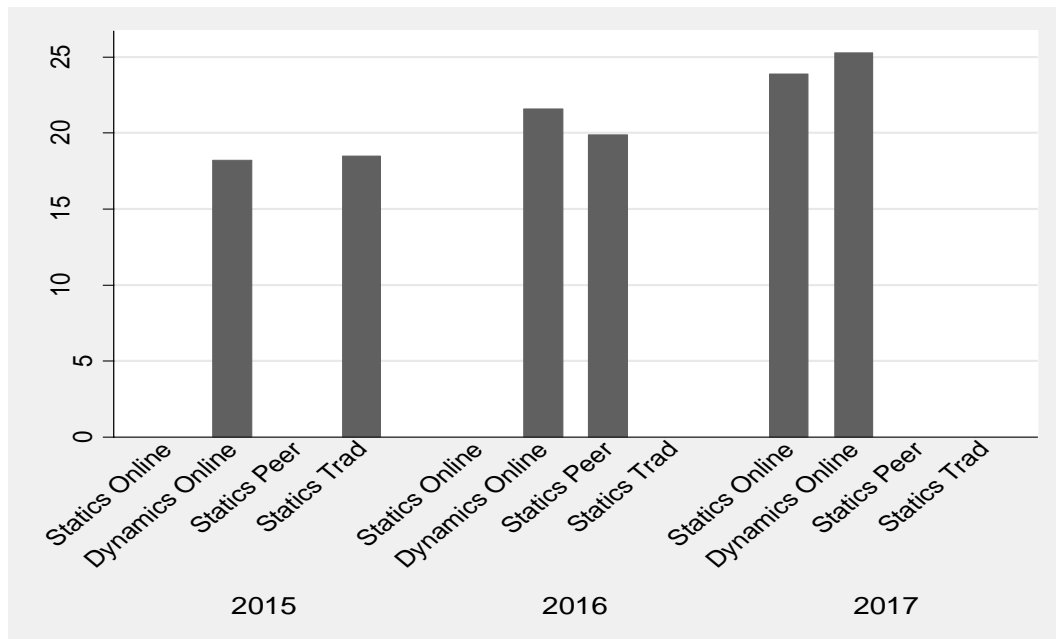


Fig. 1 Distribution of the written final Exam Scores (out of 25 for each Statics and Dynamics) versus type of Assessments in 2015 (n=147) 2016 (n=190) and 2017 (n=226)

3 Conclusion

Fig 1 shows that mean Exam scores for 2017 and 2016 were clearly higher than for 2015 ($p < 0:001$). Nonetheless, it appears that the 2016, exam results do not invalidate those from the pilot study. Overall, the exam results did not shift significantly though we found a slight improvement in the exam scores for Dynamics and Statics. Even though the level of student engagement gone up with the introduction of peer assessment, there were some critical issues (plagiarism, over inflated confidence etc.). Our findings/observations are in agreement with the results of [3]. We found that students that actively engaged in the peer assessment performed better in the Statics exam.

An examination of the data for three years reveals that the effects of assessment methods are small when compared with the year. However, we are seeing an improvement in exam scores year-on year. This presentation will discuss challenges, interesting insights into the experiences of trailing different types of assessments and the results of our different assessment approaches.

References

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