

Abstract Submitted
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Impact Assessment of Active Learning in Physics and Comparison with Meta-Analyses A. IBRAHIM, Sultan Qaboos University and GWU, N. SULIEMAN, I. ALI, Sultan Qaboos University — We investigate the impact of a 2-year implementation of active learning in five undergraduate physics courses. The study involves 2105 students from various majors and colleges in a total of 18 course offerings, 8 in active learning and 10 in traditional teaching (as reference), taught by 14 course instructors and 37 tutorial and lab staff. The courses covered introductory, mid-, and upper-level courses, with a class size in the 50-120 range in introductory-level and 10-20 in the upper-level. All the interactive teaching is carried out using freely available technology. We find an overall enhancement in the student performance at a Hedges' g effect size of 0.48 0.04, corresponding to a GPA enhancement of 0.37 that would shift the overall average from C to C+. The average failure rate is significantly reduced from 21.49% under traditional teaching to 7.21% under active teaching, which corresponds to an Odds Ratio of failure of 3.52. Our results on g are comparable to the meta-analysis studies by Ruiz-Primo et al (2011) and Freeman et al (2014), but our reduction of the failure rate is larger. We find a negative correlation between the Risk Ratio and the effect size with the lowest risk occurring at the highest effect size. Our study shows that while active learning benefits most students, low-performing students appear to benefit the most. The results of this study have economic and policy implications and may give impetus for implementing active learning within regional institutes. -/abstract- Freeman S et al (2014), Active learning increases student performance in science, engineering, and mathematics, PNAS 111 (23) 8410. Ruiz-Primo M A et al (2011) Impact of undergraduate science course innovations on learning. Science 33

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