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| **Useful learning, teaching and assessment research****Research Summary 1: Freeman et al (2014)** |

**Active learning enhances student performance**

**Summary**

In this highly cited work, Freeman et al (2014) carried out a meta-analysis of 225 studies from science, engineering and maths that reported data on undergraduate students’ performance when comparing traditional lecturing and active learning. Active learning varied within the studies but included group problem-solving, worksheets, tutorials during class, electronic voting systems, and workshops. They reported substantial benefits for students who experienced active learning in terms of enhanced academic performance and lower failure rates and they extrapolated what this would mean in terms of cost savings for higher education from lower failure rates in STEM subjects if active learning were more widely adopted. Many of the studies the authors examined, only involved active learning for 10-15% of the lecture time, but were still able to demonstrate positive outcomes.

**Key message**

The authors argue that if their research results, which highlight the positive benefits of active learning, had been found in a randomised control trial for a medical treatment, the control condition (lectures with little or no interaction) would be discontinued. They demonstrate that even a small increase in active learning of 10% of the lecture time leads to beneficial outcomes.

**Quote**

“…active learning leads to increases in examination performance that would raise average grades by a half a letter, and…failure rates under traditional lecturing increase by 55% over the rates observed under active learning. The analysis supports theory claiming that calls to increase the number of students receiving STEM degrees could be answered, at least in part, by abandoning traditional lecturing in favor of active learning.” p8410

**Provocative question**

Are we negligent for withholding a teaching approach from students that has proven to be effective?

**Original Source**

**Freeman, S., Eddy, S.L., McDonough, M., Smith, M.K., Okoroafor, N., Jordt, H. & Wenderoth, M.P. (2014) Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Association of Sciences* (PNAS), 111 (23) 8410-8415**.

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