

**Thomas the Tank Engine significantly improves the understanding of oxygen delivery and hypoxaemia.
JF Cosgrove#, ID Nesbitt#, DJ Kennedy*, M Sawdon**, K Fordy###, P Laws#, J Green#**

Perioperative and Critical Care, Newcastle upon Tyne Hospitals NHS Trust, Newcastle upon Tyne, UK

*Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK

**School of Medicine and Health, University of Durham, Stockton-on-Tees, UK

###Perioperative and Critical Care, Sunderland Royal Hospitals, Sunderland, UK

Despite apparent adequate background knowledge many physiological concepts are poorly understood¹. Analogous imagery can describe such concepts^{2,3}. Thomas the Tank Engine has previously demonstrated an enhanced understanding of hypoxaemia^{4,5}. The effectiveness of such imagery has not been evaluated in medical student education.

Two 30-minute Microsoft Power Point lectures entitled “Oxygen delivery and hypoxaemia” were delivered to Year One Medical Students at the Universities of Newcastle and Durham. The control lecture was a conventional presentation; the study lecture contained additional images of Thomas the Tank Engine^{4,5}. Local Research Ethics approval was advised as being unnecessary and HiT Entertainment UK granted permission to use the imagery of Thomas the Tank Engine.

Course tutors randomised students into 4 groups (A-D.) Groups A and B received the control lecture, C and D the study lecture. A and C undertook a pre-lecture multiple choice questionnaire (MCQ) of 20 questions on oxygen delivery and hypoxaemia to assess background knowledge and monitor for “priming.” Pre and post-lecture MCQ scores for groups A and C were compared to assess for lecture effectiveness (A vs. A and C vs. C) and for differences between the control and study lecture (pre-MCQ A vs. C and post-MCQ A vs. C.) The effect of priming was assessed by comparing post-lecture MCQ scores (A vs. B and C vs. D.) Students also completed a post-lecture qualitative evaluation of eight aspects of lecture quality scored 1 to 5: strongly agree/ agree/ undecided/ disagree/ strongly disagree (figure 1.) All scores were collected using an ARS-KEEpad system and compared using the Mann-Whitney U-test for non-parametric data. A p value <0.05 was regarded as significant.

Group numbers were A n=73, B n=56, C n=59, D n=53. Both lectures significantly improved post-lecture MCQ scores (p<0.001) with group A having significantly higher pre-lecture MCQ scores compared to group C (median 16 vs. 12, p<0.001), there was no difference post-lecture (median 18 vs. 17, p=0.4). Post-lecture MCQ scores were not different between A and B (median 18 vs. 18, p=0.14) or C and D (median 17 vs. 17, p=0.6.) The imagery also made the lecture significantly more organised (p=0.006), interesting and stimulating (p<0.001) and improved qualitative understanding (p<0.001.) Figure 1.

Images of Thomas the Tank Engine can significantly improve the understanding of oxygen delivery and hypoxaemia in Year One Medical Students. A pre-lecture MCQ does not create a priming effect.

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References.

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