Reviewer’s report

Title: The impact of feedback during formative testing on study behaviour and performance of (bio)medical students: a randomised controlled study

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Reviewer: Gary Velan

Reviewer's report:

This manuscript describes a randomised controlled trial to compare the effect on study behaviour and study performance in medical and biomedical students (n=463) of detailed feedback versus correct / incorrect feedback using an online app for formative assessment. The trial utilised an e-Learning app ('Physiomics to the next level') to provide formative assessments within a Year 1 Circulation and Respiration course in Physiology.

The study was very well designed, although the Methods section in the manuscript is inexplicably located after the Conclusions section. The Methods section needs to immediately follow the Background section. It is stated that the educational advisory board of the Radboud university medical centre provided approval for this study. However, no Ethics approval reference number is provided. The Ethics approval reference number needs to be included in the manuscript.

While it is unsurprising that heavy users of the app performed better in examinations than 'none-users' (this term is ungrammatical and should be changed to 'non-users' in the manuscript text, tables, figures and figure legends), the main findings of the study are interesting, in that no statistical difference was found in study behaviour or examination performance between the intervention (detailed feedback) and control (correct/incorrect feedback) groups. The authors ascribe the unexpected lack of difference between groups to a ceiling effect. However, if that was indeed the case, one might expect that low-moderate achieving students randomised to the intervention group might have outscored low-moderate achieving students in the control group. Although the authors don't show the analysis, they assert that previous study behaviours did not alter the results of the analysis. As a suggestion, perhaps segregation of the analysis to compare the effect of detailed feedback vs. correct/incorrect feedback on known low-moderate achieving students might help to confirm: a) whether detailed feedback is helpful for study behaviour and/or exam performance in that group; and b) whether a ceiling effect is indeed the most likely cause of the lack of difference in exam scores between the intervention and control groups.
The authors have otherwise drawn appropriate conclusions from the data obtained and have carefully stated the limitations of this study, including potential contamination of the control group by obtaining access to the detailed feedback intended for the intervention group.

Aside from the issues raised above, there are several grammatical errors in the manuscript which need to be addressed, e.g.

Page 4 Line 3: "during incorrect answers" should be "in response to incorrect answers";

Page 5 Line 8: "Students scored a 6.6 +/- 1.1" should be "Students achieved a mean score of 6.6 +/- 1.1";

Page 8 Line 5: "4% higher exam score compared to previous year" should be "4% higher mean exam score compared to the previous year";

Page 8 Line 6: There is a redundant extra comma following "e.g.";

Page 8 Lines 11-12: "the correct answer has demonstrated" should be "the correct answer has been demonstrated".
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

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If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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