Author's response to reviews

Title: Evaluating a hybrid team-based and lecture-based learning method for neurology clerkship in China

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Author's response to reviews: see over
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Dear editors and reviewers,

Thank you very much for your precious time to review the paper, detailed explanation of the questions, and kind suggestions for improvements!

We have studied the questions one by one and modified the manuscript accordingly. Each question and its answer are listed below in Section Answers. In addition, the changes to the manuscript are listed separately in Section Changes, with references to the corresponding questions. At the end, a copy of the decision letter for the ethics review is attached. Thanks again for your time to follow up with the review!

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Answers

[Jennifer-Q1]: The authors contradict themselves regarding ethics. Page 5 states ethics approval was not formally sought because medical students were not perceived to be vulnerable. This is not consistent with views of ethics committees in many countries and would be problematic for publication. However, on page 9 the authors provide and application number for a formal ethics application. Please state what actually happened. Offering different teaching to groups of medical students with the expectation that one form will result in improved test scores should at the least be acknowledged as an issue and the action justified.

[Answer-JQ1]: Thank you for pointing out this issue. The current description, especially the sentence “we did not seek formal approval”, is confusing. The fact was, before conducting the research we did submitted a formal application to Department of Education, SYSU and the Ethics Review Board of Sun Yat-sen Memorial Hospital. At that time they waived ethics approval so we did not get a formal review decision. Later
when we submitted the manuscript to BMC Medical Education Journal, we were told a formal ethical review decision was required even if the approval for it had been waived. At our request, the Review Board issued a formal decision in writing corresponding to the application we had made before. Attachment 1 is a copy of the review decision which explains the reason why the approval was waived. Please refer to [Change-1] for the manuscript change.

[Jennifer-Q2]: Was the sample the whole class?

[Answer-JQ2]: Yes. Please refer to [Change-2].

[Jennifer-Q3]: Please describe what a clerkship involves in your university and how many years in the medical program i.e. are 4th year students in their final year?

[Answer-JQ3]: The clerkship in SYSU covers many medical specialties. For each specialty, many important types of diseases will be studied in clinical setting. For each type, the instructor will first demonstrate major clinical procedures such as medical history inquiry, physical examination, etc. When LBL is chosen, the instructor also gives lectures to explain the important topics in the textbook, e.g., the cause and the characteristics of the disease, as well as the diagnosis and treatment for the disease. When TBL is chosen, the same important topics are learnt in the team-based environment instead. The learning follows the TBL procedure described in the manuscript. We will clarify this by [Change-3,4,5]. The medical program in SYSU consists of 5 years. The fourth year is clerkship, in which two weeks are dedicated to neurology clerkship. Please refer to [Change-2].

[Jennifer-Q4]: The curriculum contained within the teaching for the three groups doesn’t appear to be the same. The content of the practical and theoretical examination not provided. It may be that the content was better covered in one or the other and more closely aligned to the exam. It appears only one group was provided with learning objectives. Please describe the curriculum content addressed in the three groups, and describe the assessments.

[Answer-JQ4]: Thank you for pointing this out. [Change-3,4,5,6] will explain that the curriculum, the instructor, the learning objectives, the time spent with the instructor, and the content of theory and practice tests were all the same for the three groups. In addition, before the clerkship started, all the students also had gained similar knowledge of related courses. Although the patients being diagnosed in the demonstrations were different for different groups, we carefully chose the patients so that their disease types, symptoms and diagnosis results were similar, in order to minimize the difference in learning experiences. The reason why we could not use the same patients was that the majority of the patients stayed in the hospital for less than two weeks, while different groups were assigned to different two-week sessions. Thus the patients seen by a
group usually had left before the clerkship session for the next group started. By the way, the content of the tests were equally covered for the three groups, except that the learning methods applied were different. [Change-6] will explain the content of the theory and practice tests.

[Jennifer-Q5]: The teaching methodology for the LBL group is unclear. The students went into the patient’s room and the teacher demonstrated history taking and examination. Were all 43 students in the patient’s room? How often did this occur? It appears that only the LBL involved a demonstration of how to take a history and do an examination. Perhaps this explains the difference in scores between the groups.

[Answer-JQ5]: The demonstration was not conducted in a normal patient’s room. It was a bigger room instead dedicated for teaching in the Department of Neurology of the hospital. The room can hold all the 43 students. The patient was temporarily moved to this room before the demonstration. During each demonstration, all students of the same group were in this room. [Change-3] will explain the above as well as that at the beginning both LBL and TBL involved a demonstration of how to take a history and do an examination. The difference was, during and after the demonstration, with LBL the instructor gave lectures to explain the diseases and the procedures, while with TBL the students spent more time in team-based learning of these topics.

[Jennifer-Q6]: How much instructional time was provided to each of the three groups? Was this time comparable?

[Answer-JQ6]: The three groups spent the same amount of the time with instructors. However, with LBL the majority of the time was spent for lectures while with TBL majority was spent for team-based learning and discussions. Please refer to [Change-3, 4, 5].

[Jennifer-Q7]: Only the TBL and combined group completed a questionnaire. This seems like a methodological flaw as no comparisons can be made between the groups to answer any of the differences raised by the authors between TBL and LBL. Perhaps the LBL group were very satisfied with their experience.

[Answer-JQ7]: Thanks for pointing this out. Though the results of the questionnaire indicated that Group A and Group C experienced increased motivation and teamwork spirit, the base of comparison was their past experiences with lecture-based learning for other subjects. Without comparison with the satisfaction of Group B, the results of the questionnaire were less convincing than with it. To make them more comparable, we should have let LBL group complete the questionnaire too and compared the results across the three groups. When we carried on the study, since TBL+LBL was a very new learning method, we mainly focused on exploring the benefits of it but ignored the importance of comparing the students’ satisfaction level with traditional LBL. This is a major limitation of this study and definitely one thing we should improve in further research. [Change-7] will state this limitation.
[Jennifer-Q8]: How do the authors account for the lower scores in all groups for the theory test following the clerkship compared to the pre-test?

[Answer-JQ8]: Thank you for pointing this out. We should have clarified that the test scores before and after the clerkship were not comparable since they were of different difficulty levels. The test after the clerkship covered more content learnt in the clerkship and was more difficult. Please refer to [Change-8].

[Jennifer-Q9]: This tends to repeat the introduction and doesn’t say what this adds to the existing literature. Unfortunately, the results of this study shed no light on the advantages and disadvantages of TBL / LBL as no comparative data has been obtained apart from test scores in TBL vs LBL and I am concerned that the LBL is not actually a lecture, but a very explicit demonstration of how to take a history, examine a patient, and make sense of the findings.

[Answer-JQ9]: Thank you very much for pointing us the direction for further improvement. As you mentioned, a major limitation of this study is that no comparative data has been obtained apart from test scores in TBL vs LBL. [Change-7] will formally state the limitation following your kind suggestion. In addition, we are very sorry that the original unclear description of methods confused the reviewers. For the confusion of LBL, [Change-3,4,5] will explain that demonstrations were done similarly for the three groups. And with LBL, for each case under study, the instructor did spend the majority of time in giving lectures, to explain the cause, fundamental concepts and clinical characteristics of the disease, as well as the special examination, disease identification, diagnosis and treatment for the case. In contrast, with TBL, these important topics were covered in team-based learning. Apart from this, the curriculum, the instructor, the learning objectives, the time spent with the instructor, and the content of the theory and practice tests were all the same for the three groups.

[Jennifer-Q10]: The authors contradict themselves again on page 13 – suggesting that TBL students spend longer on study and discussion and consequently tend to spend less time on class preparation, but on page 12 they claim that in LBL, students learn passively without proactive preparation. However the authors provide no evidence to support either position so this isn’t relevant to the study really. The last paragraph of the discussion is purely conjecture, with no evidence to support the claims.

[Answer-JQ10]: Thanks for pointing this out. [Change-9] will delete the claim on page 13 since it does not have sufficient data or logic support. It will also delete the first point from the summary of TBL+LBL experiences, i.e. “time and content should be carefully assigned between LBL and TBL ...”. As you said it is lack of support. For the second point, we think it might be useful to stress the importance of the instructor with the new teaching method so we still leave it there.

[Jennifer-Q11]: The authors need to add a limitation section which should include: comparability of interventions – the TBL / LBL combined group received more instructional input; the LBL wasn’t really a lecture and the literature quoted may not be
relevant; the content provided to the different instructional groups was different and may have advantaged one group; the authors don't know what the LBL group thought of their teaching so no comparisons can be made on student perspectives.

[Answer-JQ11]: Thanks for the suggestions. [Change-7] will add a limitation section including: a) the authors don't know what the LBL group thought of their teaching so no comparisons can be made on student perspectives. b) There might be possibility of bias in student self-reports on the evaluation questionnaires (corresponding to [Matt-Q10]). For the #1, #2, and #3 limitations you pointed out, we are very sorry for the confusion our description led to. We think if we can clearly describe the methods applied and explain the similarity and difference of the learning experiences across groups, these might not be real limitations. [Change-3] will describe LBL in more details and explain that LBL did involve considerable amount of lectures. [Change-4,5] will explain that the majority of the factors were all the same for the three groups.

[Jennifer-Q12]: The conclusion is not aligned with the methods or results - all that can be said is the group called LBL (who received an expert demonstration of neuro history and examination) performed better in the practical skills test than the groups that didn't receive this, and that two interventions were better than one.

[Answer-JQ12]: [Change-10] will modify the conclusion to align it with the methods and results.

[Jennifer-Q13]: Table 2 – state the p value for non-significant findings rather than p>0.05.

[Answer-JQ13]: [Change-11] will state the p values.

[Matt-Q1]: The research question is suggested in the final paragraph of the introduction, but should be articulated more clearly, and should also appear in the abstract. No formal hypothesis is described. If there was a formal hypothesis this also needs to be stated clearly at the outset.

[Answer-MQ1]: Thanks for your kind suggestions. [Change-13] will articulate the formal hypothesis and the research question. The hypothesis is as follows. “According to the literature, LBL excels in breaking down difficult subjects, logically organizing them in a clear hierarchy, and presenting them systematically; while TBL excels in motivating students to learn proactively and promoting team collaborations. The strength of each method may cover the shortage of the other.” The research question is “we think complementing TBL with LBL is an effective way to yield better learning outcome than applying TBL or LBL alone.” [Change-13] also modifies the rest of the last paragraph of introduction to align it with the methods more accurately. [Change-17] updates the abstract accordingly.

[Matt-Q2]: Description of the methods requires more detail. Particularly with respect to
Group B, it is not clear where the lectures took place, or how many hours of lectures there were. Did students attend a series of patients or just one? Was the number of hours work that students engaged in with each method comparable? Did group A receive half as many lectures as Group B? And were the topics the same, with reduced content, or were a reduced number of topics covered? Similar questions remain for the team component of Group A.

[Answer-MQ2]: Thanks for pointing this out. [Change-3,4,5] will be made to describe the methods in more details. The curriculum, the instructor, the learning objectives, the time spent with the instructor and the content of the theory and practice tests were all the same for the three groups, except that the learning methods applied were different. All groups had similar demonstrations too. For each type of cases, the instructor first demonstrated major clinical procedures such as medical history inquiry, physical examination, etc. When LBL was chosen, the instructor also gave lectures to explain the important topics in the textbook, e.g., the cause and the characteristics of the disease, as well as the diagnosis and treatment for the disease. When TBL was chosen, the same important topics were learnt in a team-based environment instead. The learning followed the TBL procedure described in the manuscript.

For Group B the lecture took place in a big room dedicated for teaching in the Department of Neurology of the hospital. The patients were temporarily moved to this room before the demonstration.

The curriculum consisted of many case studies that covered 7 major courses. The students attend a series of demonstrations since there was a demonstration for each type of cases.

The numbers of hours that the students engaged in with each method are exactly the same. The time spent with the instructor is also the same.

For Group A, as described in Subsection *TBL+LBL Method*, seven courses were divided into two parts. The more complex and systematic part containing four courses was learnt with LBL in the first week, while the other part containing three courses was learnt with TBL in the second week. For the first part Group A received the same teaching as Group B, while for the second part Group A learnt exactly the same way as Group C.

[Matt-Q3]: Furthermore, why was a weighting of 40% practice test and 60% theory test chosen? This is relevant because combined scores are reported, and it is not clear that the statistical significance of the group differences for the combined scores would remain under different weighting regimes. Was the weighting determined a priori?

[Answer-MQ3]: The weighting of 40% practice test and 60% theory test was determined according to the teaching guidelines of SYSU. It had been used for many years so we followed the tradition of SYSU. Please refer to [Change-6].
[Matt-Q4]: Were the practice and theory tests standard and well established in the programme? Or were they developed for the purposes of evaluating this intervention? If so, is there evidence of reliability or validity that can be presented?

[Answer-MQ4]: The practice and theory tests standard were well established in the medical program. Please refer to [Change-6].

[Matt-Q5]: Do the 127 participants represent the entire 4th year class and if not, how were they selected. How were they randomized to the 3 groups? Was a sample size calculation done?

[Answer-MQ5]: Yes, the 127 participants represent the entire 4th year class. Thus the sample size is all the fourth year students. Though students had the right not to participate in the study, all the students chose to join. The random assignment was done by drawing lots. Please refer to [Change-2].

[Matt-Q6]: It would be useful to have a copy of the questionnaire that was used in the end-of-course evaluations, could the actual questions be incorporated into Table 3?

[Answer-MQ6]: Sorry for the confusion. We should have clarified that the entries listed in Table 3 were the actual questions used in the questionnaire. Please refer to [Change-14].

[Matt-Q7]: In the results it would be useful to report the effect sizes of the significant inter-group differences, as the raw scores, though significantly different, have a narrow range across groups.

[Answer-MQ7]: Thanks for the suggestion. Table 2 will be updated with the effect sizes reported too. Please refer to [Change-12].

[Matt-Q8]: The final column in Table 2 is not useful. This is because the total score is an amalgam of 40% practice test and 60% theory test, given that there are different relationships between the method of course delivery and scores on practice test, from those in theory test, it seems more appropriate to report just the two individual kinds of test. A cursory glance at the table suggests that there may be a significant difference between LBL and TBL if practice and theory were weighted 50% each. Is this the case?

[Answer-MQ8]: Thanks for pointing this out. We reported the total score mainly to follow the teaching guidelines and tradition of SYSU. The instructors were required to formally report the total scores for the university to archive and to use for students performance evaluation. Please refer to [Change-6].

[Matt-Q9]: This reviewer found it difficult to interpret the results purporting to demonstrate increased motivation and teamwork spirit of the students (a claim prominently made in the abstract), given that no similar data was reported for the
Does TBL-LBL or TBL alone foster these or would all students regardless of course methods report excellent scores in these aspects?

[Answer-MQ9]: Thanks for pointing this out. Based on the results of the questionnaire, Group A and Group C reported they experienced increased motivation and teamwork spirit. However, the comparison was not strong enough since the base of comparison was their past experiences with lecture-based teaching for other subjects. We should have let LBL group complete the questionnaire too and compared the results across the three groups. When we carried on the study, since TBL was a very new learning method, we mainly focused on exploring the benefits of it but ignored the importance of comparing the students’ satisfaction level with traditional LBL. This is a major limitation of this study and definitely one thing we should improve in further research. We will state this limitation in [Change-7].

[Matt-Q10]: In general these and other limitations of the study could be addressed more formally. In particular was there any possibility of bias in student self-reports on the evaluation questionnaires? If so, how was this managed?

[Answer-MQ10]: Thanks for the suggestions. [Change-7] will add a paragraph to formally state the limitations. You are right, there might be possibility of bias in student self-reports on the evaluation questionnaires. To minimize this, the questionnaires were sent to the students only after the theory test and practice test had finished.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

[Matt-Q11]: The title could indicate that the research was an experiment comparing three methods of teaching the clerkship.

[Answer-MQ11]: Thank you for the suggestions. [Change-15] will change the title to “Evaluating a hybrid team-based and lecture-based learning method for neurology clerkship in China”.

[Matt-Q12]: p. 5 Results should be removed from the introduction.

[Answer-MQ12]: Thanks. [Change-2] will remove them.

[Matt-Q13]: p. 12 #LBL is suitable for neurology which is known to be less accessible and user friendly than others# # other what?

[Answer-MQ13]: Sorry for the confusion. [Change-16] will replace “others” to “other specialties”.
[Matt-Q14]: p. 13, #These factors often result in lower than expected learning outcomes# # what were the expected learning outcomes in this study? Is there data using the same tests from previous classes for comparison?

[Answer-MQ14]: Sorry for the confusion. The claim including this sentence will be deleted from the new manuscript since the claim lacks data or logic support. Please refer to [Change-9].

**Changes**

[Change-1]: The second paragraph in Section *Methods* is deleted. All ethics approval related statements are organized in the “*Ethics Approval*” subsection. (For [Jennifer-Q1])

[Change-2]: The first and the third paragraphs in Section *Methods* are rewritten. (For [Jennifer-Q2], [Matt-Q5, Q12])

[Change-3]: Subsection *Methods-LBL Method* is expanded with more details, especially with the description of the curriculum and the teaching process. (For [Jennifer-Q3, Q5, Q6, Q9, Q11], [Matt-Q2])

[Change-4]: A paragraph is added to the beginning of Subsection *Methods-LBL Method* to describe the learning process in more details and discuss the similarity between Group B and Group C. (For [Jennifer-Q3, Q6, Q9, Q11] , [Matt-Q2])

[Change-5]: At the end of Subsection *Methods-TBL+LBL Method*, a sentence is added: “Note that among the three groups, the curriculum, the instructor, the learning objectives, and the time spent with the instructor were all the same”. (For [Jennifer-Q3, Q6, Q9, Q11] , [Matt-Q2])

[Change-6]: Subsection *Methods-Performance and Satisfaction Evaluation* is expanded to explain the content of the assessments and the weighting regime for the final scores. The need for total scores is also explained. (For [Jennifer-Q4], [Matt-Q3, Q4, Q8])

[Change-7]: A paragraph is added to the end of Section *Discussion* to describe the limitations of the study. (For [Jennifer-Q7, Q9, Q11], [Matt-Q9, Q10])

[Change-8]: A sentence is added to Subsection *Methods-Performance and Satisfaction Evaluation*: “Note that this test and the pre-test before the clerkship were of different difficulty levels so their scores were not comparable”. (For [Jennifer-Q8])
[Change-9]: In Section Discussion, in the paragraph discussing the disadvantages of TBL, the first disadvantage is deleted. In addition, in the paragraph summarizing our experiences with TBL+LBL, the first point is deleted too. (For [Jennifer-Q10], [Matt-Q14])

[Change-10]: The conclusion is modified to be aligned with the methods and the results. (For [Jennifer-Q12])

[Change-11]: The p values for non-significant findings are stated in the footnotes of Table 2. (For [Jennifer-Q13])

[Change-12]: The effect sizes for significant findings are reported in the footnotes of Table 2. (For [Matt-Q7])

[Change-13]: The last paragraph of Section Introduction is modified with formal hypothesis and research question added. The rest of this paragraph is also modified to be aligned with the methods more accurately (For [Matt-Q1])

[Change-14]: Subsection Results-Questionnaire is modified to indicate that the content of the questionnaire is shown in Table 3. (For [Matt-Q6])

[Change-15]: The title is changed to “Evaluating a hybrid team-based and lecture-based learning method for neurology clerkship in China”. (For [Matt-Q11])

[Change-16]: In p.12, in the sentence “LBL is suitable for neurology which is known to be less accessible and user friendly than others”, “others” is replaced with “other specialties”. (For [Matt-Q13])

[Change-17]: Align the abstract with the updated methods, results, and conclusions. (For [Matt-Q1])
Ethical Review

September 30, 2013

The Local Institutional Review Board at the Sun yet-sen memorial hospital of Sun Yet-sen University waived ethics approval (application number: 20120928), as the study protocol was not deemed to represent bio-medical or epidemiological research, and no personal data were used. Procedures complied with data protection rules, and all data were anonymised prior to analysis.

Yours Sincerely,

Prof. Yan Li
Chair of The Local Institutional Review Board
Sun yet-sen memorial hospital
Sun Yet-sen University

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证明

兹证明，神经科杨炼红副教授于临床见习教学中开展 TBL 教学改革研究，研究中不涉及生物医学及流行病学相关研究，未使用任何个人数据。

特此证明。

项目负责人：
医学伦理委员会主任：

[印章]