Author’s response to reviews

Title: Effectiveness of flipped classroom combined with team-, case-, lecture- and evidence-based learning on ophthalmology teaching for eight-year program students

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Version: 1 Date: 18 Sep 2019

Author’s response to reviews:

RE: MEED-D-19-00449

Title: Effectiveness of flipped classroom combined with team-, case-, lecture- and evidence-based learning on ophthalmology teaching for eight-year program students

Dear editor:
Thank you very much for allowing us to resubmit this revised manuscript as a candidate for publication in BMC Medical Education. We carefully examined the comments of the two reviewers, and performed a series of improvement to address the criticisms. Below we give details on what we added to the revision and how we changed the manuscript to satisfy the criticism of the reviewers. In our view the manuscript is enormously strengthened by the revise and we have addressed all the major issues raised by the reviewers.

In brief, we have made several major changes in the manuscript as requested. 1) we have provided more high quality graphics. 2) The Background has been significantly revised by added a lot literature references. The FC has been described in detail. 3) In the Method, we have added a flowchart to clarity the detail of the study design and data collection. 4) We provide a point-by-point revise according to the reviewers' comments in the Result and Discussion section.

We included a point-by-point response to the comments of the two reviewers.

Thank you very much for your consideration.

Sincerely yours,

Chun Ding
Shengguo Li
Baihua Chen
Detailed response to reviewers.

We thank the reviewers for their thorough evaluation of our manuscript and for the opportunity to improve our paper. We worked very hard to provide here a point-by-point response to the reviewers' comments that we believe thoroughly address their concerns. The questions or comments of the reviewers are cited in italic, and our responses follow.

Reviewer #1

Comment: The paper lacks of literature. Furthermore all of the graphs at the end are hardly readable due to a poor quality/resolution. Please provide more accurate graphics. In this current state the paper cannot be published. I will be gladly conducting another review, if all the graphics are correct.

Response: We apologize for the poor quality of the images. We have provided more high quality graphics and added a lot of literature references in the revised manuscript.

Comment: The background features a lot of aspects without literature references. Please rework the whole section. The FC should be more described in detail. The reader does not get enough information about the core aspects of the method (e.g. the interrelation of factual and transitional knowledge). Please also provide some definition of the concept citing Lage et al. 2000.

Response: The FC have been more described in detail in the revised background. And we added a lot of literature references, including some definition of the concept citing Lage et al. 2000.

Comment: A good variety of methods, however it seems that the whole study design should be revised. What is the research question? To prove that the FC in addition with case-based and team based learning is more effective than the traditional lectures? Or is the research question more about the aspect, that the FC + case- and team based learning activities is more effective in terms of the learning outcome? The authors describe the flaws of the FC at the end of page 5. Should the research question not be to analyze the better performance of FC + TBL and CBL in comparison to the Fc without the added methods?

The online phase should be described in more detail and more precise. What content did the students get prior to the face-to-face phase?

Response: We thank the reviewer’s advice. The main goal of this research is to prove that the FC in addition with case-based and team-based learning is more effective than the traditional lectures. According to reviewer’s advice, we have improved the whole study design. We have added a flowchart to illustrate study design and data collection.

Comment: The FC-TCLEBL is compared to traditional lectures. It is not possible to separate the effects of the FC and the effects of the TBL and CBL in the study. Which aspect had the most impact on the students? The FC, the CBL or the TBL approach?

Response: The purpose of our study is to compare the effects between FC-TCLEBL and LBC. We are sorry that we did not separate the effects of the FC and the effects of the TBL and CBL in the study. So we can’t say which aspect had the most impact on the students.
Comment: At the end of the FC-TCLEBL the teacher briefly recapped the content in class (which did not happen in the control group). Maybe the students learned everything from the additional summary of the teacher?
Response: We are sorry not to mention that both groups of students had given a class summary. There were no different between the two groups.

Comment: In the group of the FC-TCLEBL the students had higher rankings in team work ability scores. This is not a miracle due to the fact, that the students in the control had no team work activities.
Response: We recognize that the students in the control had no team work activities. This is the LBC's weakness. The FC-TCLEBL teaching method can cultivate students' teamwork ability.

Comment: In the discussion the term case-based learning pops out and is described in detail. This aspect should be moved to the background section.
Response: We thank the reviewer's advice. We have moved the term case-based learning pops out and is described in detail to the background section.

Reviewer #2
Comment: This paper describes the evaluation of a flipped classroom model using a combination of team-, case-, lecture, and evidence-based learning. The paper is relatively clear, however it could benefit from some editing for word-choice in some places.
Response: We thank the reviewer's evaluation.

Comment: The conclusion section of the abstract suggests that the study compared the TCLEBL model to a FC, which is not accurate. Suggest a reword to more accurately align with the design of the study.
Response: We thank the reviewer's good advice. We agree with the reviewer, and I will change it to “FC-TCLEBL teaching model is effective and suitable for ophthalmology teaching.”

Comment: There are numerous statements in this section that need citations (e.g. pg 5, line 14; page 6, line 50) to support the claims that are made by the authors. The FC does not necessarily require multimedia information technology and Internet/LAN use. While these are common modalities for facilitating flipped learning, they are not required. This statement should be updated accordingly (pg 5, line 33) Similarly, a key element of flipped learning is students completing self-study prior to class, which should be noted in addition to 'free time' (page 5, line 34).
Response: Thank the reviewer for pointing out my omission. We added a lot of literature references. We delete the “The FC is a novel teaching mode supported by multimedia information technology and Internet/LAN use.” And we have described the FC in detail in the revised manuscript.

Comment: The claim that students "often complain" about pre-class preparation strikes me as overstated. While there are some studies to suggest this happens in some FC models, the authors need to provide more evidence or criteria to defend use of the word "often" (pg 5, line 56).
Response: I am sorry that my description is inaccurate. I will delete the “often”. And I will add five references to support that student complain that they spend much more time before class.

Comment: The purpose statement in the last paragraph in this section is difficult to interpret. Is this study about teachers "communicating ophthalmology knowledge to medical students”, which sounds very passive and unidirectional, or about student learning of ophthalmology?
Response: I am sorry to make this mistake, my description is inaccurate, I agree with the reviewer. I will delete “This study can provide guidance to ophthalmology teachers for implementing and developing better practices for ophthalmology teaching in the future.”

Comment: This section could benefit from additional clarity and detail. consider adding a flowchart or table that illustrates study design and data collection (including instruments used and timing of data collection).
Response: I have added a flowchart to illustrate study design and data collection in the revised manuscript.

Comment: In addition, detail would be helpful for: Page 7, line 39-45: How were students allocated to groups? Randomized? Stratified?
Response: This study was a comparative study. It is neither randomized nor stratified.

Comment: Page 9, line 25-34: Feedback questionnaire scale is ill-defined. What is the magnitude of the scale? 1-5? Is the scale set with 1 = excellent (best) and 5 = poor (worst)?
Response: I will add the magnitude of the scale. 1= strongly agree, 2=agree, 3= neutral, 4= strongly disagree, 5= disagree.

Comment: Page 9, line 50-54: No information is given as to how/when the data for "time needed for preparation before and after class" was collected. How long after the review period was this data collected? There might be concerns for recall bias.
Response: Thank you. I add the time point for collect "the time needed for preparation before and after class" in the added flowchart.

Comment: Page 10, line 19-22: Students were broken down into teams of 3 for the evaluation of clinical practice but there is no description of how they were assigned. What were the formats and scales of measurement for the quizzes and theoretical examinations?
Response: Student was assigned by draw. Detailed and uniform scoring points are set for each exam (100 points).

Comment: Page 26-28: In the questionnaire, prompts refer to "the course". As per the study design, only one class section (on DR) had 2 different methods of teaching. Can you detail how much time the course/class in this study covered? was it a one-hour course/class session? An 8-hour class session? Over one day? Over multiple days? etc. Were any analyses used to examine changes from any of the pre- to post- measures? There isn't anything in the text about a paired-analysis. It is not clear what scores are being used in the Post-test. Only the theoretical examination scores? Both clinical and theoretical?
Response: Sorry, it is a clerical error. I will change it to “class”. It was a four-hour class session on DR. The students’ self-evaluation of their critical thinking, clinical thinking ability,
and independent learning ability before and after class were analysed using a paired t-test. Both clinical and theoretical used 100 points.

Comment: Page 13, line 22-21: It is unclear as to how a decrease in score (clinical thinking ability: 57 vs 50) and an increase in score (independent learning ability: 139 vs 147) both represent improvement for the students. Is there a typo in this sentence?
Response: I want to clarify that in the scale of clinical thinking ability, lower scores represent better clinical thinking ability, while in the scale of independent learning ability, higher scores represent better independent learning ability.

Comment: Table 2: please include median (range) in the descriptive statistics since non-parametric tests were used to analyze the data from the questionnaires. Inconsistent number of significant figures are used.
Response: Thank you for the advice. We have added “effect size” in the table 2 and 3.

Comment: Page 30-31: Resolution of graphs is too low; figures are illegible
Response: We are sorry for that. We have provided more high quality graphics in the revised manuscript.

Comment: In general, the discussion could benefit from additional citations and softening some claims. Some of the statements seem to draw from data that is not provided in the results section. For example: Sentence 1 (page 13, line 31) needs citations. Sentence 2: some students have complained about the learning burden. and add citations. Sentence 3: "reduce the learning burden" when compared to what? other FC models? the lecture model?
Response: We have deleted this paragraph in the discussion section, and we described FC in detail to the background section. We added two references to support that some students have complained about the learning burden. We admitted that reduce the learning burden is compared with the other FC models, but our study design was to compare FC-TCLEBL with LBC, So "reduce the learning burden" was inaccurate here. We have deleted it in the revised manuscript.

Comment: Page 13, line 47: this claim (reducing the learning burden) is not supported by the data in the results. What is the comparison group for this statement? The FC students reported spending more time preparing for class, not less. in addition, what aspect of your study design enables you to tie the reduced learning burden (if that's true) to the team-based learning and not some other part of the model (e.g. evidence-based or case-based)? There is not enough control in your study design to attribute any outcomes to specific elements of the TBLEBL model. You may hypothesize, but you cannot make strong claims.
Response: I am sorry that I made a mistake which induced a misunderstanding. our study design was to compare FC-TCLEBL with LBC, So "reduce the learning burden" was inaccurate here. We have deleted it in the revised manuscript. We could say that FC-TCLEBL didn’t increase the learning burden compared with LBC.

Comment: page 13, line 56 "admitted" may not be the right word here...suggest using "believed" or "perceived"
Response: Thank you for reviewer's advice. We have changed it to “believed”.
Comment: Page 14, line 1-17: Again, these statements do not appear to be supported by the data in the results. There is no statistically significant difference between the groups in any of the questionnaire questions related to reduction of workload. The FC group spent more time pre-class than the LBC group. While the team aspect might have reduced time spent if they each had to do everything individually, this is not what was measured or tested.

Response: Sorry again. To avoid making a misunderstanding, we deleted that “Second, the team based learning was able to reduce the workload. The teacher assigned the coursework to the students before class and divided the learning contents of a chapter into four groups for preparation. The pre-class learning task required a clear division of the work and mutual cooperation among the group members, which effectively reduced the individual time for pre-class learning and the complaints about the learning overburden of an FC class. So as compared to LBC group, the students in the FC-TCLEBL group felt that the workload for preparation was not too heavy, and the preparation time before class was much shorter than that of the other FC models reported in the literature[21]. In addition, in the FC-TCLEBL classroom, the teachers briefly recapped in class the anatomical and pathological mechanisms of the disease, its clinical manifestations, diagnosis, treatment, and prevention, and specified the key and difficult points in learning about the disease in order to facilitate the systematic and accurate mastery of the disease by the students. Thus, the time required for a review of DR after class was significantly shortened.” And we have rewritten it as “Second, for FC-TCLEBL group, although the preparation time was significantly longer, the review time after class was significantly shortened compared with LBC group. There are no significantly difference on total time between FC-TCLEBL group and LBC group. So as compared to LBC group, the students in the FC-TCLEBL group didn’t complain that the workload was heavy.”

Comment: Page 14, line 17-21: Although both groups are ophthalmology students, we don’t know enough of each class and the material given to make this time comparison.

Response: Ok. We have deleted “So as compared to LBC group, the students in the FC-TCLEBL group felt that the workload for preparation was not too heavy, and the preparation time before class was much shorter than that of the other FC models reported in the literature[21].”

Comment: Page 15, line 22-35: It was a surprise to read that the content in the FC-TCLEBL model was supplemented, since the methods state that the content was the same in both groups. Could this supplement have influenced differences in outcomes between the two groups?

Response: Sorry, it is a clerical error. We want to clarify that teachers also supply the same medical evidence in LBC group. We just want to emphasize medical evidence is the part of EBL in the FC-TCLEBL mode. Avoid to make misunderstanding, we will delete this passage.