Author's response to reviews

Title: Virtual microscopy system at Chinese medical university: an assisted teaching platform for promoting active learning and problem-solving skills

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Author's response to reviews: see over
Dear Dr. Peter Anderson

On behalf of all my colleagues, I’d like to thank you very much for your positive decision on our manuscript. We found that both your and the referees’ comments are constructive and helpful. Therefore we have addressed all the questions. Below is our point-by-point response to your and the referees’ comments. The amendments were showed coloured text in.

**Reviewer 1#'s report:**

This manuscript demonstrates the benefits of virtual microscopy for active learning in an educational setting in which there are large numbers of learners. There are no major compulsory revisions.

**Minor Essential Revisions:**

1. Background, second paragraph: Need to define acronyms (PBL, CRL, TRAD).
   
   **Response:** We do appreciate this constructive comment. We corrected abbreviations and "complete form" in the manuscript. (PBL: Problem-Based Learning; CRL: Case-Reinforced Learning; “TRAD” meaning traditional, is deleted)

2. Methods, first paragraph: Last sentence in this paragraph states "VM group and CTL group". Not clear what "CTL group" is not clear here. I think this needs to be replaced with "LM group".
   
   **Response:** We do appreciate this constructive comment. "CTL group" is replaced with "LM group".

3. Also correct group labels in Figure 3 legend and Table 1 with regards to CTL group vs LM group.
Response: We do appreciate this constructive comment. "CTL group" is replaced with "LM group".

4. Results, third paragraph: Be careful not to overstate findings from survey of VM group as fact. These are subjective. For example, "VM system improved students' communication ability" is not proved but an opinion. Consider "Students believed the VM system improved their communication ability". The following sentence should be edited similarly.

Response: Thank you for the correction. We accepted Reviewer's suggestions.

5. Discussion, third paragraph: Correct duplicate commas in second sentence.

Response: Thank you for the correction. We deleted the second commas.

Discretionary Revisions:

1. Background, first paragraph: Suggest rephrasing 'number of students is too high'. Perhaps just 'the number of students is high...'. The number of students is purposely high, and using 'too high' is confusing.

Response: Thank you for the correction. We accepted Reviewer's suggestions.

2. Background, third paragraph: Strongly suggest replacing "The Virtual Microscope system (VM)" with "Virtual microscopy (VM)" throughout the text. "The Virtual Microscope" makes it sound like a specific product or brand when I think the more generic term 'virtual microscopy' is more appropriate.

Response: Thank you for the correction. We accepted Reviewer's suggestions.

3. Discussion, third paragraph: It is not virtual microscopy alone but also different curriculum that led to 'learning critically'. Therefore, suggest adding to third sentence to clarify. "But virtual microscopy can provide an opportunity to learn critically in the setting of limited physical resources."

Response: Thank you for the correction. We accepted Reviewer's suggestions.

Quality of written English: Acceptable

Response: Thanks

Reviewer 2#'s report:

Major compulsory revisions
1. explain abbreviations: Background: educational methodologies: CRL, TRAD?
Methods/Participating students: (Table1)?

Response: We do appreciate this constructive comment. We corrected abbreviations and "complete form" and "CTL group" in the manuscript. (PBL: Problem-Based Learning; CRL: Case-Reinforced Learning; "TRAD" is deleted. "CTL group" was replaced with "LM group")

2. third semester? there are only 2 semesters in an academic year.

Response: "third semester" means the first semester in the second academic year.

3. add the company and/or trademark of the Virtual Microscopy system being used in the research.

Response: We do appreciate this constructive comment. We added the company of the Virtual Microscopy system in the manuscript.

4. Teaching Methods:
what about the (equal) prior knowledge in the 2 groups (VM/LM)? Is this assessed? Or is the possible influence eliminated afterwards? If not, mention this limitation in the discussion.

Response: The 229 students who enrolled for the course entered the Third Military Medical University directly from high school in the autumn of 2011. Based on the academic record in the first academic year, the students were assigned into two groups. A pre-test before the course were organized. Results showed there was no difference among two groups' pre-test scores prior to the course.

We also added more information about the teaching in the LM group.

5. Evaluation Methods: examination of tissue structure: tissues or whole organs to be recognized? Observation of slides with VM or OM or another method e.g. prints of microscopic structures on paper? Mention in the discussion the possible favouring of one of the groups by the observation method used.

Response: Whole organs were recognized by using LM in examination of tissue structure. We added the possible favouring details of the used observation method in the
discussion section.

6. Statistical analysis: SE or SD? Paired t-test: difference between pre- and posttest per student in each group? Mention the version and the company of the SPSS software.

**Response:** We do appreciate this constructive comment. I’m apologized for my mistake. In statistical analysis, SD was used. We added the version and the company of the SPSS software in the manuscript.

7. Results: mention in the Evaluation Methods section that there was also a questionnaire on preferences for VM or LM in both groups, not only a questionnaire on satisfaction with VM only in the VM group

**Response:** We do appreciate this constructive comment. We added a questionnaire for LM group. Data of questionnaire was showed in result section of the manuscript.

8. Results: what are the results of the questionnaire on preferences for VM or LM? Are they the ‘95% said they would prefer to use virtual microscopy’ of the Discussion section? Mention this already in the Results section.

**Response:** The results of the questionnaire on preferences for VM or LM was in result section and table 3. In discussion section, the number of students was counted when they selected “satisfaction with VM system”. But in Results section, “five-point Likert scales” scores of total students was analyzed. The results in discussion section and result section is different.

9. Results: explain the Pre- and Posttest- design already in the Evaluation Methods section. Was the pretest comparable/analogous to the posttest, same components (written examination, tissue structure identification,...)?

**Response:** An independent 2 samples t-test between the 2 groups was used. The pre-test between the 2 groups was organized, and results showed there was no difference between the 2 groups. The posttest results between the 2 groups was also organized. The contents of pre-test and posttest was different, but the differences between the pre- and post-test in each group was not checked.

10. Results:

... 'no difference among the student’s PRETEST scores'...: do you mean an independent 2 samples t-test between the 2 groups? Add t- and p-value.

... 'but POST TEST results displayed a significant difference between'...: do you mean
the PAIRED DIFFERENCES between pre and post test results in each group or did you only check the differences between the posttest results themselves between the 2 groups? If so, you cannot speak of a paired t-test, and then the pre-test results show only a kind of equivalence in prior knowledge between the 2 groups. Please state this more clearly and add t-value.

Response: An independent 2 samples t-test between the 2 groups was used. The pre-test between the 2 groups was organized, and results showed there was no difference between the 2 groups. The posttest results between the 2 groups was also organized. The contents of pre-test and posttest was different, and the differences between the pre- and post-test in each group was not checked. The details of Statistical analyses was added in the manuscript.

11. Questionnaire on student satisfaction: is there also a narration tool comprised in the VM system? Mention this already in the Teaching Methods section.

Response: A questionnaire on preferences for VM or LM in both groups was given, and details of results was in result section and table 3.

12. Discussion: explain what rote learning is exactly? The discussion is kept too general, it has to go deeper and further in discussing some aspects of the own research results.

Response: We do appreciate this constructive comment. We added details of rote learning and discussion in some aspects.

Minor essential revisions

1. Abstract:

The present study aims to describe a virtual microscope system for undergraduates and TO evaluate the effects of promoting active learning and problem-solving skills.

The questionnaire results indicate that THE VM system improves students’ productivity and promotes the learning efficiency.

Response: Thank you for the correction. We accepted Reviewer’s suggestions.

2. Background:

Mostly because of its history and culture, medical education in China faces OTHER problems than in MOST developed countries. Such as?
The VM system for basic medical education and quality control overcomes several traditional problems, such as faculty shortages and a lack of resources [5-7]. There are some published studies addressing VM in different countries, particularly in North America and Europe;...

New teaching methodologies are required to achieve the purpose of the current educational system to improve...

We designed our VM system as an open assisted platform that would empower our learners to develop independent learning and problem solving skills to overcome the limitations facing the traditional lecture-based learning.

Response: Thank you for the correction. We accepted Reviewer's suggestions. The details were added in the manuscript.

3. Methods:
in the autumn of 2011.
The entire collection of glass slides was scanned.

Users can zoom into the image on the screen using the toolbar (4×, 10×, 20×, 40×, 100× and X× (Fig. 1b)) in the upper left hand corner on top. The user can also adjust for contrast and brightness with the button in the right hand corner (Fig. 1c-f).

Clicking on the marker title in the sidebar will center the marker on the map and magnify the image to the level...

Furthermore, advanced features, including a search function, site usage tracking, and listing of all used slides, were made possible with the database structure.

Through discussion boards, the students clarified their doubts on content to the teachers and other students, which intended to increase the amount of mutual reflection.

Response: Thank you for the correction. We accepted Reviewer's suggestions.

4. Teaching methods:
The descriptive data of the group are displayed in Table I. The group of 115 students was randomly divided...

Students viewed slides through the VM system.
Individual group discussions were not supervised and were SUBSEQUENTLY followed by an open classroom discussion...

LM Group#The DESCRIPTIVE data of the group are displayed in Table I.
...provided by THE same staff AS IN THE VM group.
...after FINISHING the course.
The SCORING staff was blind to the identity AS WELL AS TO THE group of the students.
...identification of TISSUE structure : 15 organ SECTIONS were fixed AND STAINED on GLASS slides (Hematoxylin and Eosin (HE) staining).
Students observed the slides by OPTICAL OR VIRTUAL microscope and identified the...

**Response:** Thank you for the correction. We accepted Reviewer's suggestions.

5. Results:
Subtitle: Results of the HISTOLOGY examination of the two groups
Questionnaire: The students’ profile evaluation results were shown IN Table 3.
**Response:** Thank you for the correction. We accepted Reviewer's suggestions.

6. Discussion:
Our VM system can be exploited to INCREASE students’ basic knowledge and problem-solving skills despite the lack of available space, equipment and instructors IN THE TRADITIONAL LM SETTINGS.
Through this, students are able to learn key histopathological skills , SUCH AS...
Thus, virtual microscopy is a reliable and more reproducible: EXPLAIN THIS technology
Due to the fact that there are more students than teachers and equipment available, , (REMOVE COMMA) Chinese teaching usually relies...
The PARTICIPANTS STUDIED histology using the VM during ONE semester, and of the 115 ...
Students indicated that the VM helped TO stimulate their interest in the topic before the discussion, enhancED their ability to memorize the information and helpED them TO become more active participants.
...more complex levels of knowledge (i.e. on the comprehension or analysis level):
MORE EXPLANATION

This is a controversial topic for many schools who recognize that students...
...assist or assisted? platform, you used assisted teaching platform in the earlier abstract section

Response: Thank you for the correction. We accepted Reviewer's suggestions. The details were added in the manuscript.

7. Conclusions:
...against the limitations facing traditional optical laboratories,...
Students can use the VM system regularly and augment their basic knowledge and problem-solving skills TO......

Response: Thank you for the correction. We accepted Reviewer's suggestions.

8. Notes on contributors:
They teach (2x)
...at the college...and take part in evaluations...
REMOVE: 'have worked for some years'

Response: Thank you for the correction. We accepted Reviewer's suggestions.

9. Figures:
CHANGE the symbols NS and *
Fig. 3: Y-axis: Mean TATLE scores?

Response: Thank you for the correction. We accepted Reviewer's suggestions. The symbols “NS and *” was changed. In fig. 3, Y-axis: mean scores of examination.

Quality of written English: Needs some language corrections before being published

Response: We have checked the manuscript carefully to find the grammar and phrase mistakes throughout the paper. And we got some help from a professional language company.

Reviewer 3#'s report:
Major Compulsory Revisions

Response:
I read your paper with great interest, which summarizes the education method
development of histology in Chinese medical university. And I have some questions for you as the following:

1. When depicting the data, you use the expression of mean ± SE, not Mean ± SD, would you tell me your reason? As far as I know, mean ± SE and Mean ± SD are very different. The SE is always an estimator of a population characteristic; it is not a descriptive statistic - it is an inferential statistic. The SE is an estimate of the interval into which a population parameter will probably fall. SD is a measure of data variability around mean of a sample of population.

   **Response:** Thank you for the correction. I’m apologized for my mistake. Like you said, SD is a measure of data variability around mean of a sample of population. When depicting the data, we corrected the expression of mean ± SD.

2. How do you explain the random selection of your larger sample? Did you employ the random number table of statistical textbook?

   **Response:** The 229 students who enrolled for the course entered the Third Military Medical University directly from high school in the autumn of 2011. Based on the academic record in the first academic year, the students were assigned into two groups. A pre-test before the course were organized. Results showed there was no difference among two groups’ pre-test scores prior to the course.

3. You aim to prove the VM is better method in histology teaching, but as for the test paper set up, the proportion of identification of tissue structure is only 15 points, which is not enough to demonstrate the teaching effect of VM. Additionally, when the VM group attend the lab examination, they use light microscope, did they could use light microscope correctly?

   **Response:** Students viewed slides through the VM system based on the materials and questions. They also were allowed to view glass slides by LM. So students of VM group could use light microscope correctly.

4. Fig 3 shows that the pre-test before the course is no different, and I want to know what content are occurred in their paper?

   **Response:** The contents of the paper were in appendix.

**Quality of written English:** Not suitable for publication unless extensively edited

   **Response:** We have checked the manuscript carefully to find the grammar and
phrase mistakes throughout the paper. And we got some help from a professional language company.

We hope we have addressed all the questions and are willing to re-revise if we were asked to do so.

Looking forward to hearing from you.

Yours sincerely,
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Appendix

The contents of the paper

1. HE staining (hematoxylin-eosin staining) is a common histological techniques. The nucleus and ribosomes are stained blue with hematoxylin. What function of ribosomes? (  )
   A. Synthesis of proteins  B. Synthesis of nucleic acid
   C. Synthesis of fatty    D. Synthesis of DNA
   E. Synthesis of RNA

2. The cell junction specialized for cell-cell communication is called a (  )
   A. Zonula adherens  B. Zonula occludens
   C. Gap junction   D. Macula adherens
   E. Hemidesmosome

3. Many people are allergic to pollen. Which of the following cells is involved with allergy (  )
A. Plasma cell  B. Mast cell  
C. Fibrocyte  D. Fibroblast  
E. Gland cell

4. Strenuous exercise can lead to ligament injury. Which of the following tissue is component of ligament?  
A. Dense regular connective tissue  B. Dense irregular connective tissue  
C. Adipose tissue  D. Reticular tissue  
E. Ground substance

5. Bleeding may affect people's life. Which type of cells is associated with the allergic reaction and serves as an anticoagulant?  
A. Platelets  B. Monocytes  
C. Neutrophils  D. Basophils  
E. Eosinophils

6. The main function of red cell is oxygen transport. Which of the following structures is associated with this function?  
A. Nuclear protein  B. Actin  
C. Spectrin  D. Hemoglobin  
E. Albumin

7. Parkinson's disease (PD) is a degenerative disorder of the central nervous system. The motor symptoms of Parkinson's disease result from the death of dopamine-generating cells in the substantia nigra, a region of the midbrain. Which of the following cell express dopamine?  
A. Neuron  B. Oligodendrocytes  
C. Astrocytes  D. Microglia  
E. Fibroblasts

8. Every day we see many beautiful pictures. The cell type that carries neural transmission from the retina to the brain is the  
A. Ganglion cell  B. Amacrine cell  
C. Bipolar cell  D. Horizontal cell  
E. Interplexiform cell

9. The immune system is an important component of the body protection, in which lymphoid nodule is an important lymphoid tissue. The lymphoid nodules are NOT present in the  
A. Thymus  B. Spleen  
C. Lymph nodes  D. Palatine tonsils  
E. Ileum

10. AIDS is a serious infectious disease, HIV disrupts the body's immune cells. Which of the
following cell is not immune cells
A. B cell                             B. T cell
C. Nature killer cell                     D. Chromaffin cells
E. Antigen presenting cell

11. Aldosterone is a steroid hormone which plays a central role in the regulation of blood pressure mainly by acting on the distal tubules and collecting ducts of the nephron, increasing reabsorption of ions and water in the kidney, to cause the conservation of sodium, secretion of potassium, increased water retention, and increased blood pressure. Aldosterone is secreted by the (    )
A. Zona reticularis                     B. Chromaffin cells
C. Chromophobes                      D. Zona glomerulosa
E. Pituicytes

12. Cretinism is a condition of severely stunted physical and mental growth due to untreated congenital deficiency of ONE hormone. Which of the following hormones deficiency cause cretinism? (    )
A. Thyroxine                          B. Calcitonin
C. Parathyroid hormone                  D. Aldosterone
E. Cortisol

13. Excessive stomach acid digest the gastric mucosa named Gastric ulcer, which is the clinical common disease, one of frequently-occurring diseases. Which of the following cell has gastric acid secretion capacity (    )
A. Chief cell                         B. Parietal cell
C. Stem cell                          D. Muscle cells
E. None of above

14. More and more patients with diabetes appear in China. Which of the following hormone deficiency results in increase in blood glucose? (    )
A. Glucagons                         B. Somatostatin
C. Insulin                            D. Trypsinogen
E. Lysozyme

15. The cells of which structure monitor the concentration of NaCl in the afferent arteriole of the glomerulus? (    )
A. Proximal convoluted tubule           B. Descending loop of Henle
C. Mesangial cells                     D. Macula densa
E. Collecting ducts

16. The old men often have dysuria because of which organ often found Concretions (    )
A. Epididymis                        B. Seminal gland
C. Prostate D. Ampullar region of the vas deferens
E. Rete testis

17. Liking a soap bubble collapse, alveolar in lungs is not collapse because it contains (   )
   A. Insulin B. Cilia
   C. Lysozyme D. Somatostatin
   E. Surfactant

18. The liver is the largest digestive gland in human body. Which of the following does hepatocyte secrete? (   )
   A. Bile B. Trypsin
   C. Chymotrypsin D. Vitamin A
   E. Pepsin

19. Give birth to a healthy baby is the happiness of each family. The most easily pregnant time is in the female menstrual cycle? (   )
   A. 3-5 days B. 6-9 days
   C. 12-16 days C. 20-23 days
   E. 24-27 days

20. Long beard is a man manifestation of secondary sexual characteristics. Which of the following hormone and are directly related to secondary sexual characteristics? (   )
   A. Follicle stimulating hormone B. Luteinizing hormone
   C. Aldosterone D. Androgen
   E. The sugar cortical hormone