Author's response to reviews

Title: Does Students' Preference of Test Format (Computer-based vs. Paper-based) have an Influence on Performance?

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Author's response to reviews: see over
Dear Editor,

enclosed please find the revision of the above named manuscript. We appreciate the reviewers’ careful evaluation of our study and have addressed their comments in the revised manuscript. Please find below our detailed response to the reviewers’ concerns.

Response to the comments of reviewer:

In their article, “Does Students’ Preference of Test Format (Computer-based vs. Paper-based) have an Influence on Performance?”, the authors have demonstrated that a computer-based examination (CBE) of medical students in genetics, when taken voluntarily, yielded equal results to a paper-based examination (PBE). The paper provides post-test opinions of the two groups about the format. These findings are important and offer the first step toward moving to CBEs.

Major Compulsory Revisions

1. As the paper is written, there is a perception of a bias on the part of the authors to find CBE equal to, or superior to, PBE for all exam takers. The criticisms of the PBE group need be dealt with by a subsequent study that isn’t voluntary to answer questions raised, or unanswered, by
their data. I would favour sticking to the findings of equivalent test scores and greater grading efficiency, but admitting to some residual preference for PBE in that group.

=> To avoid the impression of a bias we added an explicit comment on this point explaining that this study was not intended to prove that CBE is equal/superior to PBE (p.8). Additionally we emphasized the voluntary aspect in the abstract (p.2): “…(2) to examine the acceptance and satisfaction with the CBE on a voluntary basis…”.

2. The Abstract should be re-written with #1 above in mind. For example, its Results state, “The students with the CBE judged their examination to be more clear and understandable”, but the data to support this conclusion is not provided.

=> The presented data in Table 1 show a tendency that students with the CBE judged their examination to be more clear and understandable (4.4 vs. 4.0, p=0.12). Because this difference did not reach the level of significance we corrected this statement in the abstract (p.2). Additionally we clarified this aspect in the discussion (p.7).

3. Also, the Abstract Conclusion states, “Students concerns of getting poorer results in a CBE could not be objectified” and the paper’s Conclusion states, “By providing reliable information and a proper preparation of the students for the exam via an introduction to the software, a CBE is a good method to conduct written examinations efficiently and fairly.” Neither conclusion is totally supported by their data due to the limitations the authors have recognized.

=> We agree with the reviewer: Because we do not have data that proves that PBE-students would really get poorer results in a CBE we removed this sentence from the abstract (p.2). Concerning the second statement we attenuated the conclusion (p.9): “By providing reliable information and a proper preparation of the students for the exam via an introduction to the software, a CBE could be a good method to conduct written examinations efficiently and fairly.”

4. Whether the test examination was specially written to adapt to both a CBE and a PBE as compared to the “usual genetics exam” that would be given otherwise should be specified.
Initially we did not include the information that the examination in human genetics is usually performed paper-based to support the readability of the article. In the revised manuscript we included this information in the beginning of the methods section (3).

**Minor Essential Revisions**

1. In Abstract Results, “Reasons for the students’ objections against CBE include additional noise from the keyboard or missing habits normally present in a paper based exam.” This statement denotes the least frequent of the objections and gives a skewed perspective of the PBE group objections.

=> In the revised manuscript we included all of the objections.

2. In Abstracts, I think that the group preference for PBE should be included.

=> In the revised manuscript we included the group preference for PBE (p.2).

3. In Abstracts, the statement, “Both groups did not differ concerning sex, computer-experience, their expected and achieved examination results of the test, and their satisfaction with the chosen format” is not totally correct. Certainly the expected test scores differed, and perhaps, their satisfaction as well.

=> As described on p.5 the expected results differed so we removed this statement from the abstract (p.2).

4. Table 1 should show all 19 items questioned.

=> In the initial manuscript we did not include all items of the questionnaire in this study to avoid confusion for the reader. We agree with the reviewer and appreciate his suggestion to report data on all items of the questionnaire. In the new version of the manuscript we have included all 19 items in of the questionnaire (p.12/13).
5. In Results, I don’t know what “..., both groups had the same level of previous experience with CBE (CBP: 3.7; PBE: 3.5; not statistically significant),” means. What do the numbers denote?

=> As described in Table 1 we used a Likert scale from 1 (‘I do not agree at all’) to 5 (‘I completely agree’). To improve the readability of the manuscript we amended this information as well in the methods section (p.4).

6. In Results, the statement “In the event of a repeat exam, the overwhelming number of the students who took CBE would choose the CBE again (2.8), only a few students (ca. 15%) stated a preference for PBE in future exams.” is not clear to me. What does 2.8 represent? Give the data alluded to.

=> In the revised version of the manuscript we explained this statement in more detail (p.4). As it was already described in Table 1 the correct number is 3.7 on a Likert scale (not 2.8), we are sorry for the confusion caused by this mistake and corrected it in the revised manuscript.

7. In the Discussion, it is stated, “In this respect, experiences in the performed examination certainly contradict the fact that the CBE was finished earlier than the PBE. This observation coheres with the findings of another study, which was also able to demonstrate a smaller amount of time necessary to complete computer-based examinations.” These statements aren’t clear; data should be provided to clarify the points being made.

=> We observed that both groups needed almost the same time for the examination, so we discussed this topic in contrast to the study of Ogilvie et al. To clarify this statement we changed this paragraph (p.7) into:

“While Ogilvie et al. demonstrated that students found computer based tests less time consuming, we experienced that both groups finished in nearly the same amount of time.”

8. In the Discussion, where it is stated, “…there was a tendency of more students to fail the examination in the PBE-group (8 vs. 2 in the CBE-group)”, the percentages, 12.9% vs. 5.6%, respectively, ought to be listed to give a more complete picture of the unequal group sizes.

=> We added the percentages to give a more complete picture of the unequal group sizes (p.8).
Discretionary Revisions

1. In Abstract, “(CBE) ensure higher efficiency with respect to feasibility”. I don’t think feasibility is the correct word here.

=> We substituted “producibility” for “feasibility”.

2. In Abstract, would add “voluntary” to the sentence “…(2) to examine the acceptance and satisfaction with the CBE”.

=> We added “on a voluntary basis” to the marked sentence (p.2).

3. In Abstracts Results, “Out of 98 students, 36 voluntary chose”, should read “voluntarily”.

=> We corrected this grammatical mistake (p.2).

4. In Abstract Conclusions and in the Conclusions where it is stated, “Voluntary computer-based assessment leads to equal results”, “examinations” should be substituted for “assessment” and “test scores” for “results”.

=> In the revised version of the manuscript we substituted “examinations” for “assessment” and “test scores” for “results” (p. 2 and p.9).

5. In the Discussion, “The main advantage of the computer-based examination is an increase in efficacy and objectivity”; rather than efficacy, I assume the authors may mean efficiency of grading the CBE, and perhaps, even taking a CBE. Re an increase in objectivity, how so?

=> We thank the reviewer for his suggestion and substituted “efficiency” for “efficacy”. Additionally we explained “objectivity” in more detail (p.8): “…because the automatic procession of the examination data is assumed to be less error-prone”.

6. In Table 2, it would be best to add n = 26 of 36 for the CBE and n = 55 of 62 for the PBE group.
=> We added the number of participants for both groups in Table 2 (p.14).

7. It might be helpful to specify that they are medical students in the title.

=> We agree with the reviewer and changed the title of the manuscript in “Does Medical Students’ Preference of Test Format (Computer-based vs. Paper-based) have an Influence on Performance?”

Level of interest: An article whose findings are important to those with closely related research interests.

=> We completely agree with the reviewer.

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

=> After overworking the manuscript, we have checked the English and corrected some language mistakes.

Statistical review: No, the manuscript does not need to be seen by a statistician.

=> We are glad to hear that the reviewer trusts in our statistical evaluation.

Additional formatting changes:
In the revised version of our manuscript we included an acknowledgement section at the end of the manuscript before the reference list (p. 10) and added legends to the figures (p.15, 16). The sources of funding have been included in the declaration of interest (p.10).

We trust that these changes meet with your approval. Should you require further adjustments, please do not hesitate to get in touch with us. Thank you very much for your time. We look forward to hearing from you.

Yours sincerely,
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