Author's response to reviews

Title: Evaluation of effectiveness of instruction and study habits in two consecutive clinical semesters of the Medical Curriculum Munich (MeCuM) reveals the need for more time for self study and higher frequency of assessment

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Author's response to reviews: see over
Dear Editors, dear Reviewers,

We are delighted to hear that our manuscript is considered for publication in the BMC Journal of Medical Education. We thank the reviews for their valuable input, from which we could greatly benefit in the process of revising our manuscript. We hope the revised version is now meeting your expectations and quality standards. Detailed answers to the reviewers’ suggestions and concerns can be found below.

Please don’t hesitate to contact us if you have any questions or further suggestions.

Kind regards,

(Sophia Müller)

Response to Reviewer 1:

1. Literature:
Background and hypothesis are built on just one reference from 1995
Aren’t there any additional studies in this topic?
We have considered the reviewers comment and to further support the scientific background of our hypothesis we included the following publications. A study conducted by Schmidt et al. that enrolled a total of 14000 Dutch medical students over almost 10 years could demonstrate that time available for self-study was the only determinant of graduation rate and study duration. Lectures where shown to be negatively related to self-study and graduation rate.
Added references include:
2. Design:

Even though the return rate of the surveys compared to other studies seems to be representative, I guess a selection bias is included, as especially highly motivated students take part in the survey. Maybe others would expect more benefit from mandatory lessons?

This selection bias might indeed play a role and we now have addressed this issue in our discussion. Although our data does not provide information about which kind of student preferentially answered to the survey, it is likely that especially motivated students took the effort of completing the questionnaire. As those students are also likely to show a high willingness to dedicate time for self-study despite many compulsory lessons, this potential bias would presumably result in an overestimation of TSS/QI. As we claim that TSS/QI is too low in our current curriculum, this is biasing our results towards a more “conservative” estimate rather than towards incorrectly low TSS/QI values (see limitations of the study). Maybe others would expect more benefit from mandatory lessons?

It may be true, that less motivated students might benefit more from mandatory lessons. However, one could also argue the other way round, suggesting that less motivated students are even more unlikely to spend time on important self-study after long mandatory lessons. Accordingly, less motivated students could benefit at least equally if not more from reduced mandatory lessons than highly motivated students, especially when taking into account that we suggest a raise of test frequency in order to additionally encourage self-study.

Response to Reviewer 2:

1. Limitations were not discussed, including the importance of considering likely highly motivated students (with high return rates in this group) resulting in skewed results (selection bias?)

A bias towards highly motivated students is indeed possible and the relatively low return rates especially of survey 1 and 2 give further raise to this assumption. However, as those students are also likely to show a high willingness to dedicate time for self-study despite many compulsory lessons, this potential bias would presumably result in an overestimation of TSS/QI. As we claim that TSS/QI is too low in our current curriculum, this is biasing our results towards a more “conservative” estimate rather than towards incorrectly low TSS/QI values (see limitations of the study section of discussion).

2. The comparison "surgical versus internal medicine" is not free from bias (multicenter study could help)

We selected two out of six clinical semesters for our study (practical year excluded), especially as their test frequencies and load of mandatory lessons were different, which was known to result in different perception and evaluation of those semesters by students. As these differences shall be addressed in an upcoming curriculum reform, it was one of the sub-aims of this study to quantify these differences. Of course, selecting two out of six clinical semesters for practical reasons might result in some bias although it does not get obvious to the authors how and in which direction this might impair our results.
3. The authors noted past research focusing on frequent testing as having positive outcomes for student learning. However, with respect to the target group, the OSCE results (or other assessment methods for competence) would be very interesting, in comparison to students without a multiple testing. There are no learning outcomes or achieved levels of competence.

It is true that in this study we based our hypothesis on prior evidence on the relation between TSS and learning outcome. Previous studies, even on a multicenter level [6] could already provide evidence for the positive relation between TSS and learning outcome [3, 6]. While we could show, that increased test frequency results in raised TSS/QI and TSS, that is increased quantity of learning, the reviewer is absolutely right that this study did not demonstrate the impact of TSS on learning outcome. Future studies should address this question by correlating test frequency or TSS directly to exam results, levels of competence or graduation rate in order to verify that this evidence based assumption holds true.

4. There is no statistical testing for differences between the two groups (quotient TSS/QI). This diminished the strength of the study.

We have considered the reviewers comment and additionally carried out a Wilcoxon rank sum test with continuity correction to compare TSS/QI in the group with 1 assessment per semester and the group with 2 assessments per semester. All valid measurements were used for a global test, and multiple comparisons were carried out at semester weeks 1, 8 and 15. Groups were significantly different when compared globally and at week 8, and not different when compared at 1 week and at 15 weeks (adjustment for multiple testing was applied).

5. The conclusion, "increased test frequency potentially has a positive influence on the quality and the quantity of students' studies and thus advances learning outcomes" has to be revised.

True, we neither assessed learning outcomes nor did we report on quality of learning (see 3.). This conclusion has been revised in the manuscript. To strengthen our claim that increased test frequency raises quantity of learning, we added figure 1B, that illustrates the relationship between TSS and testing.

6. The cases should be show in the figures, not only percentages.

We added n=number of answers to figures 3 and 4. Note that the students' questionnaire was an online questionnaire where students could only proceed to the next question after having answered the previous question. Accordingly n=number of completed surveys for each answer (n=109). The same is true for the internal medicine teachers' questionnaires (n=79). By contrast, the surgical faculty staff completed a paper version (n=122), which resulted in partly unanswered questions. Therefore n is slightly varies between faculty questions (79 + (122 ± x))