Reviewer's report

Title: Learning the facts in medical school is not enough: Which factors predict successful application of procedural knowledge in a laboratory setting?

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Reviewer: Tamara van Gog

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Major comments:

1. This manuscript presents some interesting findings regarding factors associated with performance on procedural problems. However, it is not made sufficiently clear in the introduction why this is an interesting or relevant question to study. So the scientific (and perhaps also practical) relevance of this study needs to be stated much more clearly.

2. It is stated on page 5, that the aim of this study was to identify factors IN ADDITION to domain specific conceptual knowledge that predict superior performance in procedural knowledge. However, the authors train conceptual knowledge almost to full mastery level, in a session of 2 hours duration, which cancels out the role of conceptual knowledge in procedural performance (but: see next comment). In other words, they seem to take for granted the role of conceptual knowledge, and choose to keep it constant to explore other factors. While some arguments can be made in favor of such an approach, such arguments are not really provided in the introduction (e.g., for the statement on page 6 that conceptual knowledge is a known strong influencing factor, not a single reference is provided)

3. In terms of the theoretical background, it would also be helpful if the authors could provide a clearer statement of how they see the organization of conceptual knowledge. They train conceptual knowledge by providing concept definitions on flashcards. However, it is not just HAVING the knowledge that is important when it comes to effective performance, but also HOW this knowledge is ORGANIZED, in other words, the relations between concepts might be a more crucial determinant of procedural performance than the conceptual knowledge gained from the flashcards? A critical discussion of this issue is lacking

4. I also wondered to what extent the NME measures conceptual knowledge (and especially knowledge about the relations between concepts) as well as procedural knowledge, given that performance on this test turns out to be highly correlated with the performance on the procedural tasks used here. In other words, given that the conceptual knowledge relevant for these procedural tasks had been trained, there must be something else that this test measures that plays a role, but if that something else would be procedural knowledge, this finding is no longer very interesting. So please provide more information about this test and discuss which aspects of this test might cause the strong correlation.
5. It would also be good if the authors could explain in more detail how the procedural tasks were linked to the flashcard contents. It only says they were ‘strongly linked’. But how? Did participants need all 30 concepts for each task? Please provide a table with concepts as rows and procedural tasks as columns, indicating with X’s which concepts played a role in each procedural task.

6. Page 8: the weak correlation between performance on the procedural knowledge tasks and the conceptual knowledge test was to be expected given the low error rate on the conceptual knowledge task? So I would recommend introducing it as such, unless it could also mean something else?

Minor comment
Please consistently use ‘participants’ instead of ‘subjects’ throughout the manuscript in accordance with APA guidelines

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

**Quality of written English:** Acceptable

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