Cognitive load theory as a framework for simulation-based, ultrasound-guided internal jugular catheterization training: Once is not enough, but we must measure it first

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We have read with great interest the article entitled: "Cognitive load theory as a framework for simulation-based, ultrasound-guided internal jugular catheterization training: Once is not enough, but we must measure it first," by McGraw et al.[1]

The study reports the instructional design of simulation-based central venous access training, consisting of three sessions of progressive part practice. The entire procedure sequence is decomposed into part tasks that were incorporated into practice in a progressive fashion.

The authors made an important point of emphasizing the necessity for including principles of cognitive load theory in the planning and execution of procedural training sessions. The main aim is distributing the cognitive load and therefore to avoid overwhelming the working memory of the participants during the training process.

However, cognitive load theory principles go beyond the simple fact of segmenting the procedure into several steps with certain logical sequence. It is also important to define the reason that these specific steps (and no others) could and should be divided. The most important point on that decision must be to determine the cognitive load that each one of these steps has, and adjust it when the load surpasses the working memory of the practitioners. Unfortunately, the study does not provide any details on this issue.

There are at least three methods to measure cognitive load[2]: subjective ratings, psychophysiological methods, and a secondary-task performance analysis. Each one of them has its own pros and cons. Subjective ratings, such as the one developed by Paas et al., continue to be the most used, due to their simplicity and reliability.

Does the distribution of the cognitive load into part tasks have an impact upon the learning process and ultimately on the performance of the students? Based on the results of the study, it seems that after just one 2-hour session, no difference is observed. It is only after three sessions that a significant improvement in performance is reached.

Is this the result of the distribution of the cognitive load during the sessions or the effect of distributed deliberate practice?[3] The latter has abundant evidence of effectiveness as a learning strategy in improving performance.[4,5] Unless any kind of method to quantify the cognitive load is used, there is no way to answer this question, based on the results of the present study.

There is no doubt that cognitive load theory has a role in the simulation arena. Strategies aiming to quantify its impact upon a simulated learning environment are required; otherwise, it is impossible to modulate its effect on instructional designs. Further studies are warranted to address this important issue.

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