

*Full Title -Team Based Learning: The Power of THE Readiness Assurance Process (R.A.P)*

Team-based learning (TBL) represents a new and innovative pedagogical strategy and is commonly used in the medical field. It has been suggested to result in better learning outcomes than traditional “lecture style” teaching strategies. It enhances student critical analysis and reasoning. It is a student-centred approach to learning whereby students work together in the same teams throughout a module. The outcome of teaching ‘Introduction to Pharmacology’ using a TBL approach with year 1 pharmacology students at TUS has provided evidence of the effectiveness of TBL.

### Implementing the Strategy

The readiness assurance process (RAP) is a core feature of TBL. Performance of learners is assessed using an individual readiness assurance test (iRAT) and team readiness assurance test (tRAT). The iRAT requires each participant to answer multiple-choice questions (MCQs), over a specified period. This allows each member of the team to demonstrate their individual understanding of the pre-assigned content. Following this, participants work collaboratively to answer the same set of MCQs, again over a specified period. Teams undertake the tRAT as an Immediate Feedback Assessment Technique (IF-AT). This allows participants to receive immediate feedback that assesses their knowledge. Participants discuss their suggested team answer to the multiple-choice questions and then scratch to reveal. Participants are given numerous chances to obtain the correct answer. The individual answers for each option are also shown, which further promotes open discussion among teams. Furthermore, students are required to finish the iRAT before taking the tRAT and prior to receiving their iRAT score.

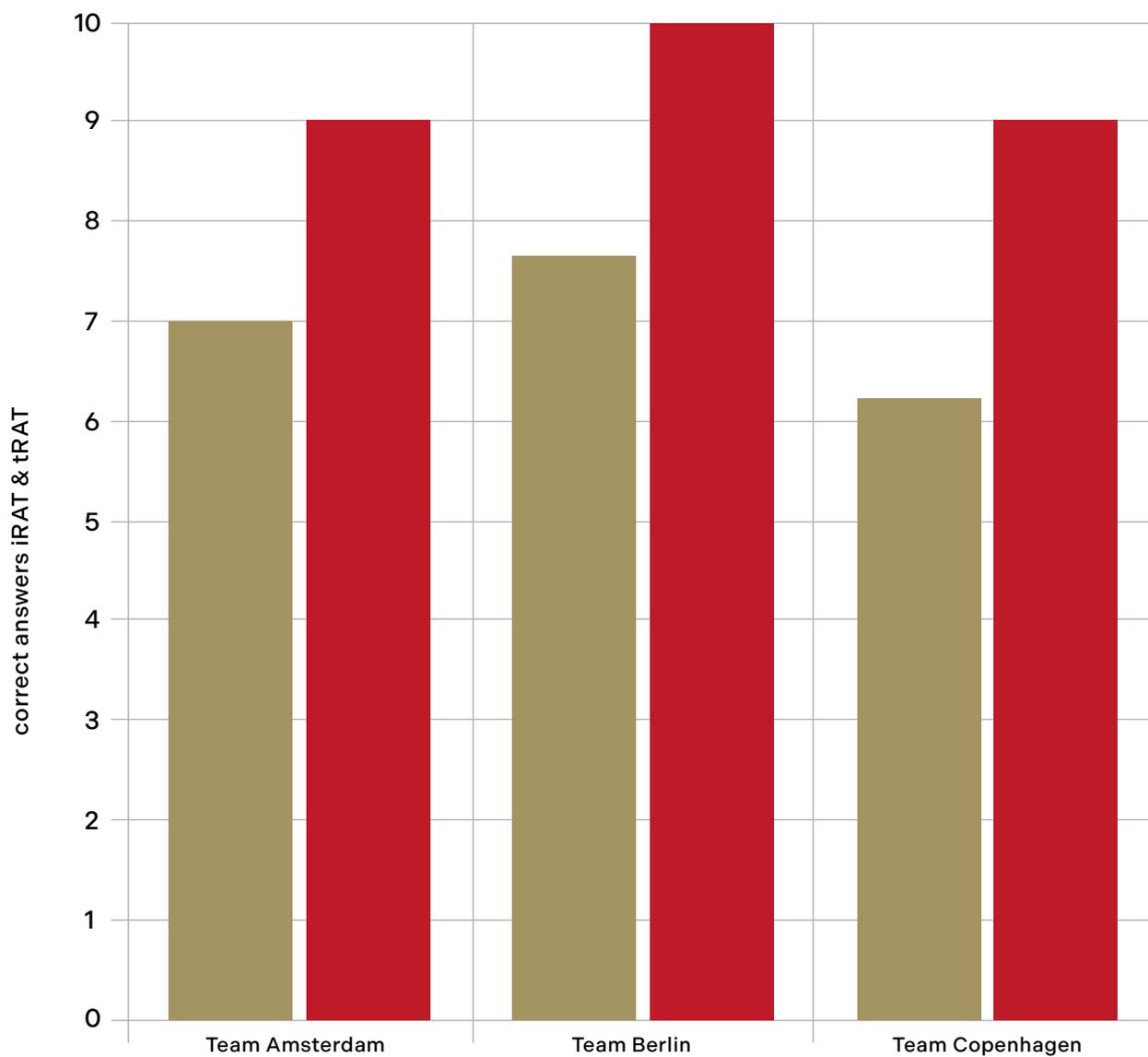
### Observations/Reflections

TBL participants performed better in their tRATs than in their own individual learning achievements in terms of RAT scores (Figure 1). The percentage difference observed was more pronounced in some cases. For example, a 45% increase in scores was seen for Team Copenhagen.

This percentage increase was more pronounced when covering complex topics such as pharmacodynamics and mechanisms of drug action. Interestingly, tRAT scores remained similar to other lessons, highlighting the benefits of teamwork and group discussion in individual student learning.

The outcome of teaching pharmacology using a TBL approach with year 1 pharmacology students has been hugely successful. It has enhanced both student satisfaction and performance compared with groups engaging with traditional lecture style teaching. Cooperative learning amongst peers is essential to the tRAT. It is evident that TBL participants performed better after group discussions than their own individual learning achievements in terms of RAT scores. In some instances, individual group members obtained similar scores in iRATs to the final tRAT score, highlighting the role of peer-based learning.

For this reason, it is a beneficial tool for an educator to use to identify students who may struggle with certain aspects of the course content. An educator can determine areas of confusion and concepts of pharmacology that learners may struggle to grasp. Knowing the common mistakes and errors that students usually make was of huge benefit. Compared with traditional lectures, it is evident that TBL and the RAP promote self-directed learning. Increased student engagement in class was observed compared to modules delivered through the traditional methods. Interpersonal interaction and peer discussion was also observed through collaboration and teamwork.



Summary			
Teams	iRAT correct answers average	iRAT correct answers	Increase iRAT vs tRAT
Team Amsterdam	7	9	29%
Team Berlin	7.67	10	30%
Team Copenhagen	6.2	9	45%
Average	6.96	9.33	34.67%

Figure 1. Summary of iRAT and tRAT scores for an individual Pharmacology lesson.