

Could Team-Based Learning be used for post-graduate training?

Luan Nhut Au, MD *

My Thi Ngoc Do, MD **

Hien Nguyen Dang Phuoc, MD, MSc ***

Correspondence:

* Lead author. Ex-deputy head. Department of Obstetrics and Gynaecology. Faculty of Medicine, University of Medicine and Pharmacy at Hochiminh City. E-mail: aunhutluan@ump.edu.vn. Phone: +(84)-988006677. Postal address: 217 Hong Bang Street, District 5, Hochiminh City.

** Co-author. Lecturer. Undergraduate educational affairs unit. Department of Obstetrics and Gynaecology. Faculty of Medicine, University of Medicine and Pharmacy at Hochiminh City. E-mail: ngocmy@ump.edu.vn. Phone: +(84)-908444657. Postal address: 217 Hong Bang Street, District 5, Hochiminh City.

*** Co-author. Lecturer. Department of Obstetrics and Gynaecology. Faculty of Medicine, University of Medicine and Pharmacy at Hochiminh City. E-mail: drndphuochien@ump.edu.vn. Phone: +(84)-974656101. Postal address: 217 Hong Bang Street, District 5, Hochiminh City.

INTRODUCTION

In the early 1980s, Larry Michaelsen wanted the benefits of small group learning within large classes. Therefore, he developed a new concept for a teaching-learning strategy. His educational approach was very close to the structure that Team-Based Learning (TBL) classrooms use today.

Decades later, several US institutions implemented TBL as part of their core curriculums. In the early 2010s, TBL became a popular educational approach. Several educational settings worldwide, including high schools and universities, introduced TBL into their training programs.

Nowadays, the Team-Based Learning TM Collaborative (TBLC) considers TBL as a collaborative learning-teaching strategy. It is evidence-based, designed around units of instruction (modules), and taught in a three-step cycle: preparation, in-class readiness assurance testing and application-focused exercise¹.

TBL helps learners solve cognitive gaps, connect learnt concepts, and build critical thinking. According to available evidence, TBL effectively enhances teacher-learner interactions.

Unfortunately, only a few institutions implemented TBL into their post-graduate training (PGT) programs.

There are few studies on the use of TBL in PGT. Published works mainly discuss the possibility of using TBL in a specific teaching context and rarely discuss technical issues.

Therefore, this paper focuses on technical issues. It discusses the implementation of TBL in PGT and the factors that make TBL more relevant.

FEATURES OF TEAM-BASED LEARNING

As conventionally described, TBL flow includes three consecutive steps: preparation before class, in-class readiness assurance testing and in-class application-focused exercise. Even though TBL is one of the various kinds of flipped classrooms, the TBL approach is very different from the other flipped classrooms.

Resources and learner accountability

In TBL, small groups perform their learning activities within large classes. Therefore, it requires fewer resources (faculty and rooms).

Working in a team requires higher learner accountability (learning attitude and taking responsibility). On the other hand, the TBL process holds students accountable for coming to class prepared and working together as a team.

Preparation phase

This phase includes all learner must-do activities before a class.

During this phase, learners work on provided materials. Learning materials must cover and be aligned constructively with all learning objectives (ELOs).

It is important to remind that this phase aims to provide essential knowledge to learners and does not aim to find or solve their cognitive gaps.

In-class Readiness Assurance Test

The in-class Readiness Assurance Test (RAT) is the icon of TBL.

RAT is typically a set of 5-20 MCQs which concern the topic's ELOs. Learners work twice on RAT. In the first step, they individually work on RAT (iRAT). Later, they retake the same test, but in a team (tRAT) this time.

By the end of the iRAT, via self-reflection, learners get some preliminary ideas about their knowledge gaps. Immediately, these feelings are going to trigger discussion during tRAT.

Immediate feedback features tRAT. Scratching IF-AT® cards allows facilitators to give prompt feedback, which aims to help teams recognize and solve their cognitive gaps.

Later, teams go to the appeals process. This final step aims to solve the remaining cognitive issues, if any.

In-class Application Exercise

The in-class Application Exercise (APP) is also the icon of TBL.

APP is typically a set of problems/situations which concern the topic's ELOs. Technically, it uses tailored problems/situations rather than real-life events. It also focuses on specific targets rather than general management.

In APP, problems/situations should be Significant; teams work on the Same problem; choices must be Specific; and answer submission must be Simultaneous. This 4S principle is mandatory for ensuring a successful APP.

By the end of the APP, all team members can apply learnt knowledge to the given problems/situations. On the other hand, by being involved in discussions and reaching a consensus, learners enhance their critical thinking ability and build their long-term memories.

Facilitators

There is neither a lecturer nor a lecture in TBL classrooms.

TBL facilitators are in charge of facilitating in-class discussions. They are not being responsible for delivering course content.

Therefore, the in-class presence of experts is not a mandatory requirement.

Besides, mini-lectures are not considered a routine part of TBL classroom activities.

[Insert Fig 1. Here]

FEATURES OF POST-GRADUATE TRAINING

PGT is different from undergraduate training (UGT) in several particularities. The three main differences are learner characteristics, learning outcomes and learning environment.

Learner characteristics

In general, PGT courses involve learners who come from different backgrounds. This diversity includes learner competencies and practical experiences. Consequently, the PGT learner population is very heterogeneous.

This heterogeneity also concerns learner accountability, learning dynamics and social status.

Educational goals

PGT focuses on professional competencies rather than basic concepts. It aims to help learners reach the top three levels of the educational pyramid (shows, does, trusts).

Bringing theory into daily practice, practising in real life, facing real issues, moving from knowledge-centred to human-centred feature PGT.

The current trend in PGT focuses on Entrustable Professional Activities (EPA). In EPA, learners follow a process of metamorphosis from novice to competent via milestones. This process requires step-by-step adaptations in teaching and learning approaches.

Therefore, PGT faces more complex knowledge which concerns different disciplines.

Educational environment

Graduates learn by practising in real-life conditions. Various workplaceactivities feature this specific training.

In PGT, the weighting of theoretical courses and simulation-based activities becomes lower than that of workplace activities.

Consequently, learning material must be significant and respect authenticity.

[Insert Table 1. Here]

TBL AND POST-GRADUATE TRAINING

Review of literature

As of 2023, a few institutions implemented TBL in their PGT curriculums. Most of these uses of TBL are experiential. Preliminary works on the experiential use of TBL in PGT have shown controversial opinions.

Graham (2023) demonstrated that TBL is as effective as conventional approaches, with some minor advantages².

McMullen (2014) stated that TBL could be part of a residency training program but requires adaptations³.

On the other hand, the TBL community reached a consensus that appropriate adaptations are the key to implementing TBL in PGT. McMullen (2014) considered involving TBL experts, reinforcing pre-class preparation and avoiding excessive pre-session assignments as keys to making TBL more relevant.

The performance of these changes seems likely a challenging task. Difficulties come from the complexity of knowledge and the ability to link new concepts to real-life practices.

Experiential use of TBL for PGT at UMP

In 2017 we built up and started a PGT course based on TBL. It was a course on reproductive medicine. This integrated course included biology, physiology, biochemistry, embryology, endocrinology and gynaecology.

At the end of this course, we invited learners to give us feedback. Learners presented positive feedback that concerns the teaching-learning approach. They also showed positive individual perspectives.

In the two following academic years, we ran the same PGT credit but applied some modifications to the RAT.

As of 2023, we found that involving experts, preparing learning materials, defining RAT goals, composing authentic application situations and selecting facilitators should be considered for applying TBL for PGT.

We also experienced the impacts of the PGT educational ecosystem on TBL course outcomes.

How to adapt the practice of Team-Based Learning to post-graduate training while still keeping the TBL principles?

Adapting the practice of TBL to the PGT ecosystem while keeping the TBL principles

EPA and multidisciplinary approaches feature PGT. Besides, varieties of workplace activities dominate teaching-learning processes.

In the workplace environment, learners should perform their tasks in teams rather than individually. Their ability to work in teams becomes a mandatory requirement. That causes a big problem because teammates come from different levels and disciplines.

Consequently, building teams appropriately by attributing teammates from different backgrounds is crucial.

Once the forming team meets the above requirement, TBL allows learners to improve their ability to work effectively together. Travis (2016) confirmed this statement. She showed empirical evidence which suggests that TBL is a suitable pedagogical approach that enhances learners' ability to work in teams⁴.

Designing course syllabi

Conventionally, TBL was an approach which aimed to teach theory basis.

In PGT, the weighting of this purpose is low, while that of practical activities is high. Moreover, in PGT, the teaching theory basis targets multidisciplinary knowledge, which works on higher complexity and more practice-oriented issues. Consequently, conventional approaches might not be suitable to ensure the effectiveness of TBL in PGT. Therefore, changes in TBL course designs become crucial.

Nowadays, in PGT, there is a shift from the use of multidisciplinary approaches to the use of interdisciplinary/transdisciplinary approaches. That requires radical changes in curriculum design.

The boundary between disciplines exists only in multidisciplinary approaches. There is no more boundary found in modern trends.

In the interdisciplinary course, learners often feel challenged. They have to connect different concepts which come from various disciplines. Designed ELOs should target the ability to link ideas. Inversely, that should not focus on the ability to understand the separate ones.

Implementing TBL in PGT allows for gaining advantages. TBL contributes to putting learners at ease while simultaneously working on several topics.

[Insert Fig 2. Here]

Choosing assessment methods shares the same issue. Simple MCQs seem likely unable to evaluate the ability to synthesize concepts. In PGT, assessments must target a higher level of knowledge, such as the ability to analyze/synthesize complex issues. Composing relevant MCQs that meet these requirements is challenging. Preparing high-quality tests requires writing experience, both educational and professional.

Even though we recognize this challenge, we experienced several difficulties when composing MCQs for integrated courses.

Involving experts

Involving experts is a primary prerequisite for designing a TBL course for PGT. Practising in a real-life environment requires learners' competencies. Therefore, recruiting experienced trainers from all related domains becomes the top issue in preparing a TBL course for PGT.

Recruited experienced practitioners should work together in the expert committee. They make the core of human resources for implementing the TBL curriculum in PGT. This committee is responsible for designing course syllabi, ensuring assessments, preparing course agenda, composing learning materials, approving these materials and facilitating the TBL classrooms.

Being familiarized with TBL's philosophy is also an important practical point. Future trainers have to be trained carefully in the skills of preparing and conducting TBL. Consequently, this committee must include at least one expert in professional education.

As of 2023, we conducted several ToT (training of trainers) workshops. This activity allowed us to make our facilitator team stronger.

Preparing learning materials

Implementing TBL in PGT requires adapted learning materials. Materials for TBL use are different from textbooks. These materials should constructively align (vertically and horizontally) with designed ELOs, consistently develop ideas throughout several disciplines and directly target interdisciplinary links.

Simplified, structured, oriented and learner-centred documents feature TBL materials.

Avoiding potential learners' overload is also an important issue. Even though learners are graduates, the amount of the pre-class workload should not exceed the minimum required.

Provided documents should cover all key ideas which help learners build interdisciplinary connections. Quality materials support learners to think critically throughout the learning process.

Readiness Assurance Tests

There are differences between RAT for PGT and RAT for UGT.

In UGT, the use of RAT aims to identify cognitive gaps.

In PGT, composing RAT should focus on more complex competencies (connecting, applying, synthesizing, summarizing). Moreover, RAT for PGT aims to evaluate the ability to link concepts concerning different disciplines (integrating).

In PGT, like UGT, irrelevant RAT might "kill" in-class activities without helping learners find the right way to connect separate issues.

Therefore, trainers should work in a team (expert committee) during the composition of RAT. This committee should identify the most common misunderstood reasonings, professional mistakes, and potential cognitive gaps and put it all into the RAT.

Composing authentic application exercises

There are differences between application exercises for UGT and application situations for PGT.

Working in teams, solving the same exercises on significant problems, selecting specific solutions, and simultaneous submission of the team's solutions feature application exercises in UGT.

These 4S-based application exercises help students connect separate learnt elements and apply knowledge in simulated situations.

In PGT, graduates learn through specialized, oriented training courses. Replacement of solving simulated exercises with managing real-life situations features those courses.

Consequently, applications should focus on more complex and authentic subjects while still respect for the 4S principles.

Application situations should not include invalid details. Removing them from the original issue is crucial, which ensures reaching ELOs.

On the other hand, evidence-based solutions support learners in enhancing critical thinking. Voting via coloured clickers is far to allows graduates to express complex solutions. Using various ways for reporting encourages learners to discuss more complex options. A poster gallery walk seems likely an appropriate method for expressing complex solutions.

Choosing facilitators

Unlike the case of UGT, in PGT, professional proficiency seems likely the primary requirement for flipped classroom facilitators.

In-class activities concern the highest degree of thinking and ability to link learned concepts to real-life practices. Consequently, senior facilitators seem likely to be the sole persons who can facilitate the PGT flipped classrooms.

Besides, skilled facilitators play a crucial role in TBL classrooms. Unskilled facilitators might shoot the in-class discussion down.

Trainers (even experts) should regularly attend specific ToT on facilitating skills. Through that, they can improve the trainer-trainee interactions and the effectiveness of discussion in PGT.

Conclusion

Available evidence confirms the effectiveness of TBL.

Evidence also supports the use of TBL in PGT. Experiential works demonstrate that it is possible to introduce TBL into PGT.

However, implementing TBL in PGT requires several adaptations to more complex educational goals. The difference in the educational ecosystem also requires appropriate changes.

Paying attention to the impact of an educational ecosystem, involving experts in professional committees, carefully designing course syllabi, preparing appropriate learning materials, changing the way of writing RAT and applications, and involving trainers in ToT workshops are the most common issues which relate to the success of implementation TBL in PGT.

Figures and Table

Fig 1: Flow of a typical TBL class. *Annette Burgess (2020)⁵*



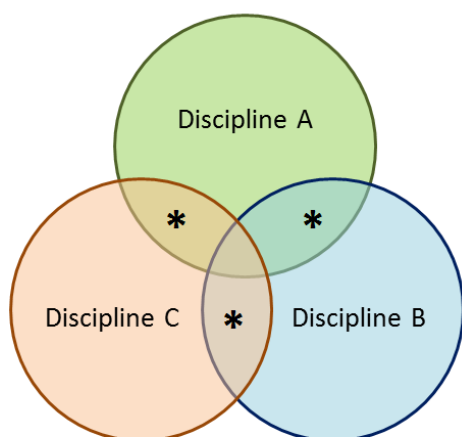
Table 1: Features of undergraduate training and post-graduate training

	Undergraduate training (UGT)	Post-graduate training (PGT)
--	------------------------------	------------------------------

Targets	Knows; knows how; shows	Shows; does; trusts
Educational environment	Simulation-based	Workplace-based
Knowledge complexity	Simple, separate	Complex, linked, connected
Outcome measurement system	Pre-defined end-points	Milestone complex system
Validating criterion	Generally pass-fail criterion	Trust-based judgement, decision
Learning materials	Tailored applications	Real life events
	Standardized subjects	Real-life beings

Fig 2: The interdisciplinary approach

(*) indicate targets of teaching-learning activities



¹ Team Based Learning TM Collaborative. <http://www.teambasedlearning.org/definition/>

² Jane Graham. Can Team-Based Learning (TBL) Be Used to Deliver Postgraduate Education in Transfusion Medicine for UK Physicians? *Medical Science Educator* 2020;(30);631–642

³ Isabel McMullen. How we implemented team-based learning for postgraduate doctors. *Medical Teacher* 2014Mar;36(3):191-5.

⁴ Lisa L. Travis et al. Team-Based Learning Improves Course Outcomes in Introductory Psychology. *Teaching of Psychology* 2016, Vol. 43(2) 99-107.

⁵ Annette Burgess. Team-based learning: design, facilitation and participation. *BMC Medical Education* 2020, Volume 20 supplement 2.