

Using Team-Based Learning for Post-graduate Training: Challenges and Solutions

Luan Nhut Au, University of Medicine and Pharmacy at Hochiminh City, Vietnam
My Thi Ngoc Do, University of Medicine and Pharmacy at Hochiminh City, Vietnam
Hien Dang Phuoc Nguyen, University of Medicine and Pharmacy at Hochiminh City,
Vietnam

The Asian Conference on Education 2023
Official Conference Proceedings

Abstract

Introduction: Available evidence demonstrates that Team-Based Learning (TBL) enhances teacher-learner interactions, solves cognitive gaps, connects concepts, and builds critical thinking. Nowadays, TBL become a popular approach in undergraduate training (UGT). Surprisingly, only a few institutions implemented TBL into their post-graduate training (PGT) programs. UGT and PGT differ in their educational ecosystem, learning goals, and learner characteristics. Attempting to use TBL in PGT (TBL-PGT) requires adaptations to these differences. There are few conducted studies on TBL-PGT. Most discuss the possibility of using TBL in specific courses and do not discuss technical issues. We also experience challenges during our experiential TBL-PGT course. This paper aims to clarify TBL-PGT characteristics, identify potential challenges and discuss suitable solutions.

Methods: We search papers on TBL-PGT, identify technical issues and discuss potential solutions.

Results: To date, no systematic use of TBL in any post-graduate programs. All TBL-PGT attempts were experiential. The authors agreed that TBL could be part of the PGT program and that implementing TBL-PGT requires suitable adaptations. Experiences from experiential TBL-PGT affirm the crucial role of adapting course design to the particular PGT educational ecosystem, the complexity of knowledge, and the ability to link new concepts to real-life activities. We identify factors that might influence the TBL-PGT program outcomes, which include involving experts, enhancing learner accountability, building teams, determining educational goals, configuring assessments, preparing learning material, formulating authentic applications, training facilitators, and organizing in-class activities.

Conclusions: TBL is suitable for PGT. It promotes certain advantages. However, curriculum developers should consider adaptations while implementing TBL-PGT.

Keywords: Team-Based Learning, Post-graduate Training, Outcome-Based Education

iafor

The International Academic Forum
www.iafor.org

Introduction

In the early 1980s, Larry Michaelsen developed a new approach to teaching-learning that allowed profit the benefits of small-group learning within large classes. This 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) defines TBL as “an evidence-based collaborative learning teaching strategy designed around units of instruction, known as “modules,” that are taught in a three-step cycle: preparation, in-class readiness assurance testing (RAT), and application-focused exercise (APP). A class typically includes one module” [8].

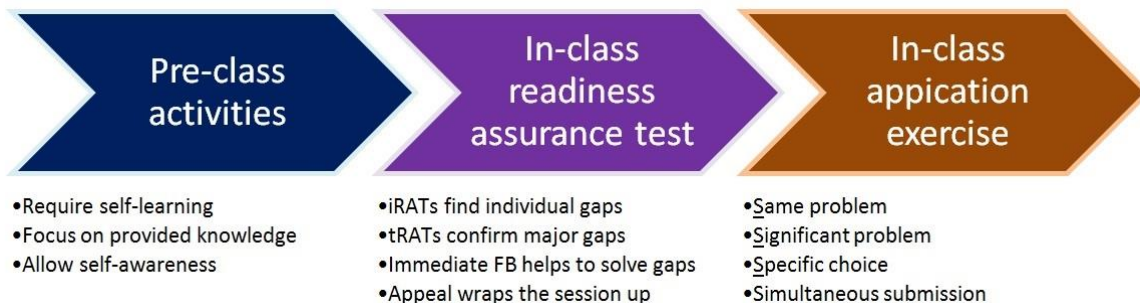


Figure 1: The three steps of Team-Based Learning

By flipping the classrooms, TBL allows beneficiaries to avoid wasting time on in-class speech, so it promotes gaining time. This precious time gained is crucial for ensuring active learning. According to available evidence, TBL effectively enhances teacher-learner interactions. Published works also demonstrate that TBL helps learners effectively solve cognitive gaps, connect learned concepts, and think critically [6, 7].

Unlike the case of undergraduate training (UGT), only a few institutions implemented TBL into their post-graduate training (PGT) programs. The number of publications concerning the use of TBL in post-graduate training (PGT) is quite limited. There are few conducted studies on the use of TBL in PGT (TBL-PGT). Those papers mainly discuss the possibility of using TBL in specific courses rather than its potential technical issues.

Therefore, this paper clarifies findings that concern the use of TBL in PGT, identifies potential challenges, and discusses suitable strategies for solving them.

Methods

We searched affiliated journals of the BEME, the IAMSE and the AMEE for published works on using TBL in PGT, using “team-based learning” and “post-graduate training” as keywords. Found papers were retrieved and reviewed. The revision focused on the type of implementation, potential challenges, and the author’s suggestions. These potential challenges and propositions were retrieved and used as subjects of discussion.

Because of the limited number of published works, we could not apply any statistical methodology for analyzing data. Consequently, we decided to perform direct analysis and comparison instead of quantitative or qualitative analysis. Retrieved issues were also compared with UMP’s current practices.

Results

We found only five papers which directly discuss issues related to the implementation of TBL in PGT. These five are published by McMullen (Medical Teacher, 2014) [4]; Travis (Teaching of Psychology, 2016) [9]; Graham (Medical Science Educator, 2020) [1]; Xue (Nurse Education Today, 2021) [10]; Nandamudi (Journal of Interprofessional Education & Practice, 2022) [5].

Author	Year	Disciplines	Implementing type	
McMullen	2014	Psychiatric	Experiential use	[4]
Travis	2016	Introductory Psychology	Experiential use	[9]
Graham	2020	Transfusion medicine	Experiential use	[1]
Xue	2021	Nursing	Comparative study	[10]
Nandamudi	2023	Dysphagia interprofessional collaborative	Pilot study	[5]

Papers Revision

The revision of these papers found that, to date, only a few institutions implemented TBL in their PGT curriculums. All of these uses of TBL in PGT were experiential and partial. There was no systematic use of TBL in any post-graduate programmes. Preliminary works on the experiential use of TBL in PGT have shown controversial opinions.

Graham ran three transfusion medicine sessions adhering to TBL principles. She demonstrated that TBL is effective and enjoyable. She also mentioned that preparation should be adequate, and team continuity is poor despite ‘compulsory’ education sessions [1].

McMullen converted a didactic module of lectures into a TBL module for psychiatric residency training. She concluded that her attempt to introduce TBL into her residency training programme was successful. She considered involving TBL experts, reinforcing pre-class preparation and avoiding excessive pre-session assignments as keys to making TBL more relevant [4].

Travis studied the influence of team-based learning (TBL) methods on exam performance and student satisfaction in her PGT class on introductory psychology. She demonstrated that students in the TBL sections performed significantly better on items that tested the content covered in the TBL modules. She concluded that TBL is more effective than lecture in contributing to learning among introductory psychology students without negatively impacting course satisfaction [9].

Xue compared the effect of TBL on post-graduate nursing students with lecture-based teaching with small group discussion (LBTWSGD) and aimed to clarify potential factors that promote the effectiveness of TBL. Xue concluded that TBL effectively improved self-

learning ability and classroom engagement. Xue also mentioned the importance of clear and definite reading assignments in TBL. Quality RAT helped students obtain effective teacher feedback and ensured the effectiveness of discussion and communication [10].

Nandamudi studied the impact of the effectiveness on teaching collaborative practice (in dysphagia intervention) by conducting a TBL-based training in interprofessional education (IPE). She concluded that there was a strong positive influence on achieving the four core competencies [5].

In brief, these five authors agreed that TBL could be part of a residency/post-graduate training programme. On the other hand, McMullen, Graham and Xue shared that appropriate adaptations are the key to implementing TBL in PGT [4, 1, 10].

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.

To date, we experienced the impacts of the PGT educational ecosystem on TBL course outcomes. We also 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.

Discussions

PGT is different from undergraduate training (UGT) in several particularities. The three main differences are the educational ecosystem, outcomes of learning and characteristics of learners.

In PGT, simulation-based activities become less important. Various workplace activities replace simulation and then feature PGT. Graduates learn by practising in real-life conditions. Several factors might impact learners' activities and efficacy of learning, such as facing real-life beings, interprofessional relationships and social responsibilities.

PGT focuses on Entrustable Professional Activities (EPA) and targets professional competencies. This approach aims to help learners reach the top three levels of the educational pyramid (shows, does, trusts). Through PGT, learners follow a process of metamorphosis from novice to competent via milestones. Bringing theory into daily practice, practising in real life, facing real issues, moving from knowledge-centred to human-centred feature PGT.

In general, PGT courses involve learners who come from different backgrounds. It makes the PGT learner population heterogeneous. This heterogeneity includes learner competencies and practical experiences. Learner characteristic also concerns their social status, learning accountability and learning dynamics.

Table 2: Characteristics 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 training	Workplace-based training
Learning materials	Tailored applications	Real life events
	Standardized subjects	Real-life beings
Knowledge complexity	Simple, separate	Complex, linked
Outcome measurement	Pre-defined end-points	Milestone complex system
Validating criterion	Pass-fail criterion	Judgement and decision

The above particularities of PGT require suitable teaching-learning configurations. In TBL-PGT, the technical issue to be solved is “how to adapt the practice of TBL to PGT while still keeping the TBL principles?” Therefore, measures for implementing TBL-PGT should adapt to the PGT educational ecosystem, the complexity of knowledge and the ability to link new concepts to real-life practices.

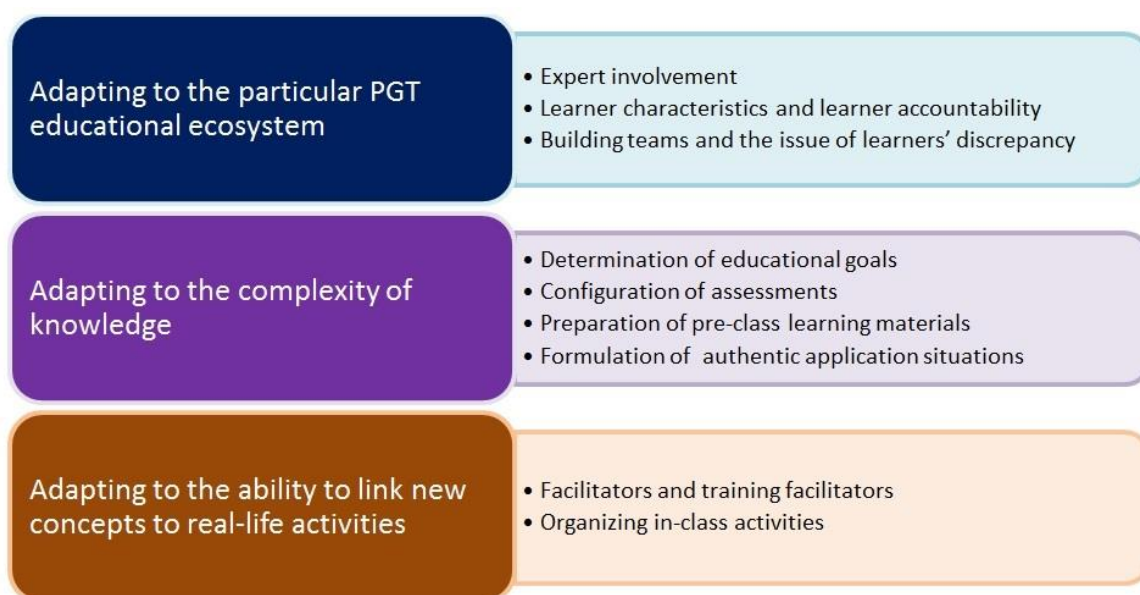


Figure 2: The three measures for implementing TBL-PGT

Adapting to the Particular PGT Educational Ecosystem

Three issues may relate to this subject. Those issues are expert involvement, learner accountability and building teams.

Expert Involvement

McMullen emphasized the importance of expert involvement in TBL course success [4]. UMP's practices reaffirmed this statement. In UGT, the participation of experts in the whole teaching process is not mandatory. Their primary roles are curriculum developers, course managers and learning material editors [2, 6]. Inversely, involving experts is a primary prerequisite for implementing TBL-PGT. Experienced experts make the core of human

resources for implementing the TBL curriculum in PGT. Practising in a real-life environment requires learners' competencies.

Therefore, PGT trainers should be experienced practitioners. Recruiting experienced trainers from all related domains becomes the top issue in preparing a TBL course for PGT. In TBL-PGT, experienced trainers should work together in the expert committee. This committee takes responsibility for designing course syllabi, ensuring assessments, preparing course agenda, composing learning materials, approving these materials and facilitating the TBL classrooms.

Learner Characteristics and Learner Accountability

McMullen emphasized that learner accountability should be reinforced [4]. The UMP also experienced the impacts of the lack of learner accountability on course outcomes and therefore made efforts to improve it. Learner accountability is a prerequisite learner characteristic. It conventionally includes a learning attitude and taking responsibility. In PGT, each learner differs from another in their social status, learning accountability and learning dynamics. This particularity might badly impact the TBL-PGT programme outcomes.

TBL-PGT course organizers must pay attention to the issue of learner accountability and seriously discuss this issue during the pre-course talk. Lack of accountability violates TBL classrooms. TBL practitioners should recognize the importance of this issue and perform strategies for accurately assessing learner accountability. Inversely the TBL process holds students accountable for coming to class prepared and working together as a team [1, 3].

Building Teams and the Issue of Learners' Discrepancy

Entrustable Professional Activities (EPA) and Interprofessional Education (IPE) feature PGT. Varieties of workplace activities dominate EPA's teaching-learning processes. In the workplace milieu, learners should perform their tasks in teams rather than individually. Their ability to work in teams becomes a mandatory requirement. Nandamudi considered that TBL-based training enhanced learners' ability to work together in IPE [5]. Travis confirmed this statement and showed empirical evidence, which suggests that TBL is a suitable pedagogical approach that enhances learners' ability to work in teams.[9] Unfortunately, these papers did not discuss learners' discrepancies in their backgrounds. Graham found that the team after-class continuity was poor, but she did not adequately explain potential hidden causes [1]. Learners' discrepancies include discipline, performance and experience. The UMP had faced the same discrepancy issue and had to solve it. The equality between teams in learner characteristics is one of the four principles of TBL. Different learner backgrounds lead to team heterogeneity that may influence the accuracy and effectiveness of team performance.

Consequently, course organizers should build identical teams. Deploying learners who have different learning experiences in equal groups should be respected. Once it meets the above requirement, TBL allows learners to improve their ability to work effectively together.

Adapting to the Complexity of Knowledge

Four issues may relate to this subject. Those are educational goal determination, assessment configuration, pre-class learning material preparation and formulation of authentic application situations.

Determination of Educational Goals

Conventionally, TBL is an approach which aims to teach theory basis in a single-disciplinary/multidisciplinary course. Undergraduates learn through understanding concepts and connecting them. In PGT, the teaching theory basis targets wide-ranging knowledge. In recent decades PGT began shifting its pedagogical approach, leaving multidisciplinary strategies and redirecting toward the universal implementation of interdisciplinary/transdisciplinary courses. The pre-existed boundary between subjects in multidisciplinary approaches becomes less indistinct in the interdisciplinary/transdisciplinary course. The learning contents usually have higher complexity and should be practice-oriented. Graduates often feel challenged while connecting wide-ranging concepts relating to various disciplines. For those reasons, conventional TBL might lose the ability to ensure its effectiveness in PGT. Changing the TBL course syllabi becomes crucial.

TBL course ELOs should target the ability to link ideas rather than focus on the ability to understand separate concepts or the ideas themselves. The above-discussed adaptations were subjects to explore in experiential uses of TBL interdisciplinary courses. It suggested that TBL-PGT allows for gaining advantages, and this approach contributes to putting learners at ease while simultaneously working on several topics. Nandamudi demonstrated that her TBL-based integrated module positively influenced helping learners achieve the four core competencies.[5] The UMP's experiential TBL-integrated course confirmed this statement.

Configuration of Assessments

The TBLC considers the RATs as double-purpose activities targeting assessment-of-learning and assessment-for-learning [1]. PGT-RAT is different from UGT-RAT in its aims. UGT-RAT aims to identify cognitive gaps, while PGT-RAT focuses on more complex competencies (connecting, applying, synthesizing, summarizing). As a formative assessment, PGT-RAT requires adapted changes to help graduates reach their learning goals. Bringing concepts together is one of the primary assessment goals in PGT. Moreover, graduates should be able to link ideas concerning different disciplines (integrating). Low-order thinking MCQs seem likely unable to meet PGT test blueprint requirements. Changing learner assessments is mandatory. PGT-RAT should target a higher level of knowledge, such as the ability to analyze/synthesize complex issues. Therefore, PGT-RATs require the replacement of low-order thinking MCQs with high-order thinking MCQs. Crafting high-order thinking MCQs needs writing experiences, both educational and professional. On the other hand, irrelevant PGT-RAT might "kill" in-class activities without helping learners find the right way to connect separate issues. Technically, composing relevant PGT-RAT is challenging.

Ideally, TBL trainers should work in an expert committee. To ensure the relevance of the PGT-RAT, this committee should identify the most common misunderstood reasonings, professional mistakes, and potential cognitive gaps and put it all into the PGT-RAT. Xue emphasized the need for relevant MCQs for teaching and assessing purposes in TBL-based PGT.[10] The UMP also recognizes this challenge. We experienced several difficulties when composing MCQs for PGT-integrated courses.

Preparation of Pre-class Learning Materials

Implementing TBL-PGT requires adapted learning materials. Provided documents should cover all key ideas which help learners build interdisciplinary connections. Those materials

should consistently develop ideas throughout several disciplines, directly target idea linkings, and constructively align (both vertically and horizontally) with designed ELOs. On the other hand, in the workplace milieu, even though learners are graduates, textbooks are not the first choice as practicable materials. 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. Quality materials support learners to think critically throughout the learning process. McMullen [4], Travis [9] and Graham [1] shared the same idea on the importance of targeted learning materials. They emphasized that ensuring the constructive alignment between ELOs, assessments, and learning materials is a prerequisite to success in TBL-based PGT. UMP experienced the same consideration.

Formulation of Authentic Application Situations

The 4S is the icon of TBL. It includes four principles: working in teams, solving the Same assignment on Significant problems, selecting Specific solutions, and Simultaneous reporting (of team solution) [1, 3]. Application exercises for undergraduate training (UGT-APP) differ from application situations for post-graduate training (PGT-APP) in their learning goals. Most UGT-APPs are simulated exercises. The 4S-based application exercises help students connect separate learned elements and apply knowledge in simulated situations [3]. In PGT, the weighting of practical activities is high. Graduates learn through specialized, oriented training courses.

Consequently, PGT-APPs should focus on more complex and authentic subjects while still respect for the 4S principles. Replacement of solving simulated exercises with managing real-life situations features those courses. Application situations should not include invalid details. Removing them from the original issue is crucial, which ensures reaching ELOs. Graham demonstrated that PGT-APPs did not reach the same degrees of effectiveness throughout different abilities [1]. UMP's experiential TBL-PGT suggested that the PGT-APP should focus on initial acquisitions rather than advanced competencies.

Adapting to the Ability to Link New Concepts to Real-Life Activities

Two issues may relate to this subject. Those issues are the facilitators and the organization of in-class activities.

Facilitators and Training Facilitators

As conventionally described, there is neither a lecturer nor a lecture in TBL classrooms. In UGT, TBL facilitators are in charge of facilitating in-class discussions. They are not being responsible for delivering a course. Consequently, the in-class presence of experts is not a mandatory requirement [10]. Unlike UGT, the PGT in-class activities concern the highest degree of thinking also the ability to link concepts to real-life practices. McMullen suggested that the in-class presence of a proficient practitioner seems likely a primary requirement [4]. To date, the UMP has constantly followed this strategy. Besides, skilled facilitators are a prerequisite in all TBL classrooms.

Facilitators should be familiarized with TBL's philosophy, regardless of UGT-TBL or PGT-TBL. Unskilled facilitators might shoot the in-class discussion down [10]. Future trainers (even experts) should equip themselves with skills for preparing and conducting TBL. They

should regularly attend specific ToT on the ability to facilitate. Through that, they can improve the trainer-trainee interactions and enhance the effectiveness of discussion in PGT. McMullen considered training facilitators as a crucial part of preparation [4]. The UMP has constantly supported this consideration. To date, we conducted several ToT (training of trainers) workshops. This activity allowed us to make our facilitator team stronger.

Organizing In-Class Activities

Even though TBL is one of the various kinds of flipped classrooms, the TBL approach is very different from the other flipped classrooms. A typical TBL flow includes three consecutive steps: preparation before class, in-class RAT and in-class APP [1, 3]. The preparation phase includes all learner must-do activities before a class which mainly focus on self-studying provided materials. This phase aims to provide essential knowledge to learners and does not aim to find or solve their cognitive gaps. Even though the fact that graduates have an advanced background, self-learning is still a matter in PGT-TBL. McMullen and Graham experienced the impact of inadequate learner preparation on TBL-course outcomes [4, 1]. Graham emphasized the significance of the preparation phase in the TBL-based training and suggested conducting an opening talk for each course [1]. The UMP also faced and experienced this issue. For that, UMP constantly respected these recommendations.

The in-class RAT is the icon of TBL. PGT-RAT focuses on high-order thinking. On-target focused discussions and experienced trainers are the two factors that ensure the effectiveness of PGT-RAT. Discussions should treat interdisciplinary/transdisciplinary issues. Discussion should not focus on separate subjects. Even though the in-class presence of experts is mandatory, experts should keep being TBL-facilitator. Delivering speeches shot discussion down. Technically, we consider that facilitating is the most challenging TBL-PGT issue.

The in-class Application Exercise (APP) is also the icon of TBL. PGT-APP concerns transdisciplinary linked concepts. Experienced trainers are crucial to ensure the relevance of PGT-RAT. On the other hand, evidence-based solutions support graduates in enhancing critical thinking. Voting via coloured clickers, as classically described, becomes far to allow graduates to express complex solutions. Using various ways for reporting encourages learners to discuss more complex options. A poster gallery walk seems likely helpful for expressing complex solutions [1].

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.

Acknowledgements

The authors gratefully acknowledge the valued support from Professor Todd Kelson, director of Brigham Young University-Idaho INBRE Undergraduate Research Internship Program (University of Idaho), for the whole preparation process for this paper.

References

- [1] Graham J, Hayes C, Pendry K. (2020). Can Team-Based Learning (TBL) Be Used to Deliver Postgraduate Education in Transfusion Medicine for UK Physicians? *Med Sci Educ.* 2020 Mar; 30(1): 631-642.
- [2] Gullo C, Ha TC, Cook S. (2015). Twelve tips for facilitating team-based learning. *Med Teach.* 2015; 37(9): 819-24.
- [3] Hong J, Rajalingam P. (2020). Geographic Trends in Team-based Learning (TBL) Research and Implementation in Medical Schools. *Health Professions Education.* 2020 Mar; 6(1): 47–60.
- [4] McMullen I, Cartledge J, Finch E, Levine R, Iversen A. (2014). How we implemented team-based learning for postgraduate doctors. *Med Teach.* 2014 Mar; 36(3): 191-95.
- [5] Nandamudi S, McKnight A, Baird K. (2023). Dysphagia interprofessional collaborative practice and team-based learning in graduate curriculum for students in healthcare disciplines: A pilot study. *Journal of Interprofessional Education & Practice.* 2023 Mar; 30,100588.
- [6] Parmelee DX, Hudes P. (2012). Team-based learning: A relevant strategy in health professionals' education. *Med Teach.* 2012 Apr; 34(5): 411-13.
- [7] Reimschisel T, Herring AL, Huang J, Minor TJ. (2017). A systematic review of the published literature on team-based learning in health professions education. *Med Teach.* 2017 Dec; 39 (12): 1227-37.
- [8] Team-Based Learning™ Collaborative. What is TBL? [Internet]. Overview. [about 2 screens]. Available from: <http://www.teambasedlearning.org/>
- [9] Travis LL, Hudson NW, Weidenbenner J, Street WS, Henricks-Lepp GM. (2016). Team-Based Learning Improves Course Outcomes in Introductory Psychology. *Teaching of Psychology.* 2016 Mar; 43(2): 99-107.
- [10] Xue H, Yuan H, Li G, Liu J, Zhang X. (2021). Comparison of team-based learning vs. lecture-based teaching with small group discussion in a master's degree in nursing education course. *Nurse Educ Today.* 2021 Oct; 105.

Contact emails: aunhutluan@ump.edu.vn
ngocmy@ump.edu.vn
drndphuochien@ump.edu.vn