EDITORIAL

CONTEMPORARY METHODS OF TEACHING UNDERGRADUATE MEDICAL STUDENTS

Professor Dr. Alam Sher Malik
International Medical School, Management and Science University, Malaysia
alamshermalik@hotmail.com

The most practical definition of teaching describes it as "a process that facilitates learning". Within this perspective, the role of a teacher is envisaged as a guide, mentor, and facilitator who supports students in their pursuit of knowledge. Many teaching approaches have been described, which has generated frequent debates in the literature concerning their relative effectiveness. The following section explains some of the modern methods of teaching along with the educational theories that underpin them.

Lev Semyonovich Vygotsky (1896-1934), a Russian psychologist, presented the concept of the Zone of Proximal Development (ZPD) in the late 1920s and early 1930s. Unfortunately, he died at a young age of 37 and most of his scholarly work was published posthumously.

ZPD emphasizes the distinction between what students can learn independently on their own and what additional knowledge they can acquire with the guidance of more capable and knowledgeable persons including their teachers and peers.

As described by Vygotsky himself, ZPD is the 'distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers'.[1]

In medical education this means that topics or tasks that are relatively easy or for which students already have prior knowledge need not be formally taught in the classroom and can be assigned for self-study before the planned teaching session. The actual teaching session should concentrate on the relatively complex areas where students would be provided the required assistance in learning (scaffolding) and would also focus on the application of this knowledge in real-life scenarios.[2]

The multi-theory model of adult learning states that learning begins with the activation of existing knowledge (constructivism) and the learner needs to go through five phases of learning to gain a successful learning experience.[3]

During the "dissonance phase" the learners realize that their knowledge is incomplete, leading them to the "refinement phase" where reflection, discussion and research help them refine the new information into a series of new concepts. The third phase is "organization" where learners make sense of the new or additional information/concepts by testing and re-testing these hypotheses and reflecting on it. The most critical phase is "feedback" by peers and teachers which either reinforces the new belief or makes the learners reconsider it in the light of opinions and new information received during this phase. The "consolidation phase" is the 'reflection on action' where learners look back on their learning journey both in terms of gaining new knowledge and the learning process itself.

The practical application of Vygotsky's ZPD concept and the adult learning theory can be witnessed in the 'flipped classroom' approach to teaching and learning activities that reverses the traditional teaching and homework strategy. The students are given homework before they attend the teaching session. They are required to read an article or a book chapter, listen to a podcast or watch a video before joining the teaching session. Class time is used for active learning exercises, exploring complex ideas and appreciating the application of knowledge in real-life scenarios rather than simply delivering information.[4]

The potential advantages of the flipped classroom include: increased teacher-student interaction opportunities[5]; self-direction and accepting the responsibility for their own learning by the students; incorporation of evidence-based teaching practices by teachers; and providing personalized education to the learners. By optimizing the saved time (by not repeating what students have already learned on their own) available in the classroom, the teachers can pay more

attention to the students requiring support and improve their own teaching skills based on the feedback.

Depending on learners' needs, the information technology and computer-assisted learning modules can be used to conduct online interactive quizzes, discussions or exercises before or during the flipped classroom sessions. This can help improve students' engagement and in gauging their difficulties with a particular topic or a given area.[6] Such identified difficulties can be addressed in the classroom thus making the teaching student-centered. The students are also reported to enjoy the flexibility of moving through the pre-class reading materials at their own pace.[5,7]

A major challenge of the flipped classroom is its requirement of self-motivated students who must take responsibility for their own education. If students fail to complete the assigned pre-class tasks or do not engage in the in-class activities, the flipped classroom will not deliver effective learning.[8] Another challenge for the academic staff is the increased time and work required for reorganizing the course materials and teaching workflow.[9] It may include needs assessment exercises, identification of learning outcomes and aligning them with teaching content and assessment methods.[10] However, most of these initial measures are one-time in nature and can be used repeatedly for subsequent teaching sessions. Moreover, the successful implementation of the flipped classroom will reduce the usual lecturing time for the teachers and thereby free up time to work on these additional preparations.

Readiness of the teachers and students to change from traditional to modern teaching methods including the flipped classroom is a major factor in achieving success. Both enthusiasm and capability are important attributes for successful flipping. Gaining technical skills, in-depth understanding of underpinning principles and adult teaching experience are necessary requirements. Lack of these qualities can become a major hurdle if not handled carefully. Staff development and student training cannot be overemphasized in this regard.[11]

Covering an ever-expanding body of scientific knowledge in a designated time is a common challenge for medical teachers. With the flipped classroom approach, there is a risk of overloading students with excessive content in the form of pre-class reading assignments – either physically in print format or usually in online format.[5,9]

The effectiveness of the flipped classroom in teaching/learning activities has been studied extensively both in general and in specific disciplines such as radiology[12], ophthalmology[13] and emergency medicine.[14] On the other hand, after a systematic review, based on 45 studies involving undergraduate health professions' education, the authors did not find irrefutable evidence to claim that implementation of the flipped classroom improves academic performance or supports learners' satisfaction. They concluded that more well-designed and higher powered randomized controlled trials are needed to arrive at a convincing inference.[15]

The typical flipped classroom facilitates active learning through a wide variety of teaching/learning methods such as problem-based learning, peer-assisted learning, team-based learning, case-based learning and experiential learning.[4] Students' involvement is further enhanced through the use of gamification tools such as Kahoot, Mentimeter, Classcraft, and Quizizz. These methods make the teaching activities interactive, student-centered, integrated, engaging and reflective.

In problem-based learning, students (usually pre-clinical) are presented with a novel problem. While trying to understand (and not necessarily solve) the problem, they note the gaps in their knowledge (i.e. the learning needs mainly related to basic sciences). They work on these learning needs individually or in groups and discuss their newly found information with their peers when they reassemble a few days later, thereby helping each other to learn.

Team-based learning (TBL) involves a number of steps both out of the class and in the class. The students are required to study given materials e.g., an article or a chapter in a book or they may be asked to watch a video or a podcast. The lecturers are required to prepare two sets of questions, related to the materials under study, to be used during the session. The first set of questions assesses the comprehension of the students and the second set assesses the ability to apply the knowledge in real-life situations. The students answer these questions individually as well as in teams. The lecturer provides explanations (if required) and feedback.[16]

In case-based learning students are usually presented with a clinical scenario or a case to be solved (e.g., to make a diagnosis, propose management etc.) and they solve the problem as a group using their previously acquired knowledge.[17]

All these approaches and teaching methods need staff and student development and training; through repeated practice, both staff and students develop mastery in these modern methods of teaching.

REFERENCES

1. Vygotsky LS. Mind in society: the development of higher psychological processes. Cole M, John-Steiner V, Scribner S, Souberman E, editors. Cambridge (MA): Harvard University Press; 1978.
2. Gillespie H, Reid H, Conn R, Dornan T. Pre-prescribing: creating a zone of proximal development where medical students can safely fail. Med Teach. 2022;44(12):1385-91. DOI: 10.1080/0142159X.2022.2098100
3. Taylor DCM, Hamdy H. Adult learning theories: implications for learning and teaching in medical education: AMEE Guide No. 83. Med Teach. 2013;35(11):e1561-72. DOI: 10.3109/0142159X.2013.828153
4. Bishop JL, Verleger MA. The flipped classroom: a survey of the research. In: Proceedings of the 120th ASEE Annual Conference and Exposition; 2013 Jun 23-26; Atlanta, GA. Washington (DC): American Society for Engineering Education; 2013.
5. Johnson GB. Student perceptions of the flipped classroom [master's thesis]. Vancouver (BC): University of British Columbia; 2013. Available from: https://open.library.ubc.ca/soa/cIRcle/collections/ubctheses/24/items/1.0073641
6. Cooper L. Online courses: tips for making them work. E-J Instr Sci Technol [Internet]. 2000;3(3):20-5. Available from: https://www.e-jist.org/volume-3-number-3-2000/
7. Butt A. Student views on the use of the lecture time and their experience with a flipped classroom approach. Bus Educ Accreditation. 2014;6(1):33-43.
8. Kachka P. Understanding the flipped classroom: part 2. Faculty Focus [Internet]. 2012 Oct 24 [cited 2025 Sep 19]. Available from: https://www.facultyfocus.com/articles/blended-flipped-learning/understanding-the-flipped-classroom-part-2/
9. Wagner D, Laforge P, Cripps D. Lecture material retention: a first trial report on flipped classroom strategies in electronic systems engineering at the University of Regina. In: Proceedings of the Canadian Engineering Education Association (CEEA) Conference; 2013 Jun 17-20; Montréal, QC. Kingston (ON): Queen's University; 2013 [cited 2025 Sep 19]. Available from: https://ojs.library.queensu.ca/index.php/PCEEA/article/view/4804
10. Lockyer J, Ward R, Toews J. Twelve tips for effective short course design. Med Teach. 2005;27(5):392-5. DOI: 10.1080/01421590500136297
11. Shimamoto DN. Implementing a flipped classroom: an instructional module. Presented at: Technology, Colleges, and Community Worldwide Online Conference; 2012 Apr 17-19; Honolulu, HI [cited 2025 Sep 19]. Available from: https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/55ffdad7-1a87-4098-b036-10d7de76ae6d/content
12. Qi Y, Zhao P, Bai R, Shao Y, Pan S, Hou Y. Teaching diagnostic radiology to radiology majors: implementation and evaluation of a flipped classroom model. Med Teach. 2025;47(3):521-33. DOI: 10.1080/0142159X.2024.2351138
13. Chan PP, Lee VWY, Yam JCS, Brelén ME, Chu WK, Wan KH, et al. Flipped classroom case learning vs traditional lecture-based learning in medical school ophthalmology education: a randomised trial. Acad Med. 2023;98(9):1053-61. DOI: 10.1097/ACM.0000000000005238
14. Lu F, Luo Z, Huang T, Lv X, Wang H, Wang Y, et al. Effectiveness evaluation of flipped classroom in emergency medicine online teaching for medical undergraduates. Med Teach. 2024;46(5):689-96. DOI: 10.1080/0142159X.2023.2273780
15. Naing C, Whittaker MA, Aung HH, Chellappan DK, Riegelman A. The effects of flipped classrooms to improve learning outcomes in undergraduate health professional education: a systematic review. Campbell Syst Rev. 2023;19(3):e1339. DOI: 10.1002/cl2.1339
16. Malik AS, Malik RH. Twelve tips for conducting team-based learning session online in synchronous setting. Med Teach. 2022;44(5):486-93. DOI: 10.1080/0142159X.2021.1910642
17. Malik AS, Malik RH. Flipped classroom teaching strategies [video]. YouTube; 2025 [cited 2025 Sep 19]. Available from: https://www.youtube.com/watch?v=xaGMigjqkg8