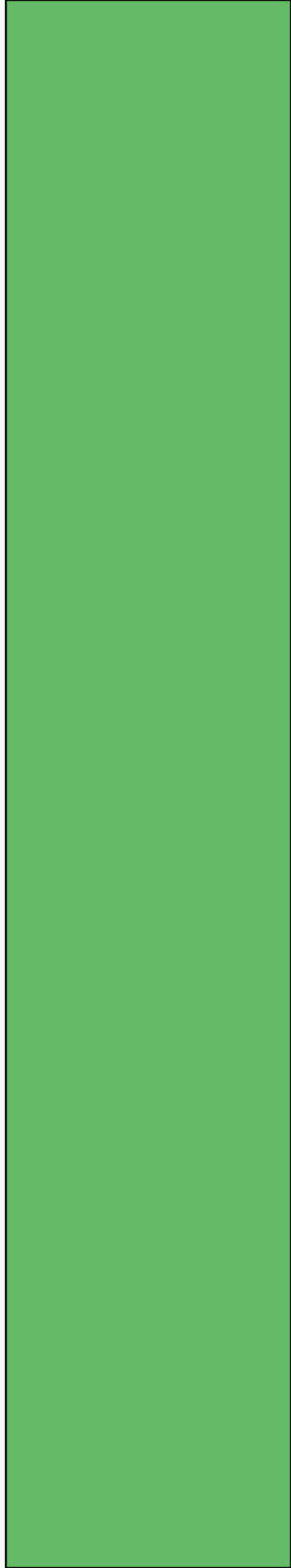


HUMANITIES

Educational Models to Enhance Student Learning.....



Review of Three Educational Models that Enhance Student Learning: Alternatives to Lecturing

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The Flexner Report of 1910 has resulted in drastic and lasting changes to medical education in the 20th and 21st centuries. In assessing education, Flexner stressed the importance of the traditional lecture format in delivering information. Although the lecture was revolutionary in and appropriate for its time, there has been a call for change in how knowledge is formally delivered given the major advancements in medicine. Irby and Cooke et al. noted that “not only has the knowledge base for medical practice hypertrophied since Flexner’s day, but the delivery of care has also become vastly more complicated and the expectations of the public higher.”¹ Irby et al raise fundamental questions about educating our future physicians, including who will assume responsibility for teaching, how they will be rewarded, who will finance medical education, and how do educators deal with shift work by faculty and short trainee rotations? These critical questions are part of the discussion of shifting responsibility of mastery of information to trainees as mentioned by Knowles in his work with adult learning theory. The knowledge and technology explosion have stimulated a shift from a teacher-centered to a learner-centered educational environment.

The essence of a learner-centered approach is to activate learners, increasing their depth and breadth of comprehension. Cognitive

psychology has shown that facts and concepts are best recalled when they are taught, practiced, and assessed in the context in which they will be used.² Pluta et al. describes a shift into a “new era” of learning that employs a diversity of approaches to support collaborative learning.³ Concomitantly, new teaching styles have evolved to stimulate such learning.

The purpose of this paper is to present an overview of three learner-centered teaching models; namely, Team Based Learning (TBL), Flipped Classroom (FC), and Just in Time Teaching (JiTT) for faculty to consider as a way to address learner-centered education. These techniques have been used and studied in primary, secondary and higher education and are currently being adapted across the continuum of medical education.

Team Based Learning

TBL, developed by Michaelson over 20 years ago for use in teaching business principles, has since been studied in medicine, pharmacy, and dentistry. The goal of TBL is to enhance the learner’s conceptual and procedural knowledge while promoting active and critical thinking.⁴

TBL provides learners the opportunity to practice course concepts during class time, which is in contrast to the traditional lecture format where class time (e.g., basic science curricula, resident core lectures, student clerkship lectures, and morning report) focuses on course material; i.e., knowledge. The method has three phases: preparation, application, and assessment. In the preparation phase learners complete an out-of-class assignment (e.g., short reading, watching a

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video), on which they will be tested at the beginning of the next class. The test format contains 10 multiple choice questions to assess the learners' understanding of the materials they reviewed. The learner first answers questions individually over a 5-7-minute period, using the Individual Readiness Assessment Test (IRAT) and then reaches consensus on the best answer to each question in small groups over 5-7 minutes using the Group Readiness Assessment Test (GRAT). When groups disagree about best answers, the facilitator instructs the group with the correct answer to teach the other groups; i.e., near-peer teaching.⁵ After determining participants' understanding of the material, the facilitator addresses any issues needing clarification. In the application phase learners can practice using cases illustrating the topic presented (e.g., Krebs' cycle as it relates to the patient with diabetic ketoacidosis) and/or standardized learners. Faculty then observes learners translating new knowledge into performance, seldom done in lecturing. This technique is better suited when introducing clinical medicine in the basic sciences and less ideal for the clerkship and residency because: 1) groups stay together over time. 2) learners are graded longitudinally as a group based on answers to test questions and class contributions. 3) addressing large class numbers make these sessions more interactive than lectures.

Benefits of TBL include modeling a team approach; i.e., interdisciplinary education group discussions promote interactive learning and how to best use information/knowledge in practice. In addition, studies on TBL have demonstrated improving learners' memory recall as well as confidence. Lastly, there are now online platforms to support TBL. The major barriers to implementation are required faculty time to create provocative questions to stimulate learner comprehension; eliminating or reducing PowerPoint slides; and being comfortable with facilitating discussions.

The Flipped Classroom

King, who believed class time should focus more on "the construction of meaning rather than information transfer," introduced the Flipped Classroom (FC) model in 1993. This evidence-based model, a variation of TBL and JiTT, has been widely studied and implemented in primary, secondary and higher education, promoting active learning.

The FC can "maximize the use of teacher supported face-to-face classroom based sessions towards delivering hands on activities and individual scaffolding."⁶ This method shifts content review to before the classroom interaction, with class time reserved for executive higher cognitive learning, e.g. practicing giving feedback to a standardized learner.

The FC process parallels TBL, beginning with a self-directed phase that occurs outside the classroom; e.g., reading an online lecture or review article. The session opens with a brief introduction to the topic, followed by an IRAT and GRAT. Once the facilitator knows the learners have mastered the knowledge via their answers to the questions, the rest of the session (~50%) is devoted to application of knowledge. Distinguishing features of the FC that differentiates it from TBL: 1) groups do NOT stay together over time, making it conducive for use in residency training, 2) there is no grading, 3) sessions are not linked as they are in TBL, and 4) topics are very amenable to using standardized learners for the application sessions; e.g., practicing a skill.

Advantages of the FC include a deeper understanding of the learning material, increased speed of covering topics, and improved test scores. Added benefits include allowing learners to learn the information in the individual phase on their own time and pace, and having increased interaction with faculty at higher cognitive levels while in class. A study by Chokshi et al.⁷, demonstrated that the flipped classroom approach was both efficient and

effective in teaching residents on how to improve their teaching skills as measured by their pre and post learning test scores.

The FC has barriers to implementation. The model doesn't cater to all learning styles (nor does lecturing!) and sometimes learners perceive the pre-class workload as being too extensive. In addition, the faculty's need to recreate and alter their pre-existing teaching styles may deter them from using this model. Lastly a systems review of the flipped classroom studied by Chen et al.⁸ noted "the lack of strong evidence for the effectiveness of flipped classroom" and called for further studies of the method.

Just in Time Teaching

JiTT teaching is a pedagogical model similar to FC and TBL where faculty uses feedback from learners in close proximity to interacting with them. Learner feedback is obtained from the time period between formal classroom activities (e.g., core lectures) and work outside of class, in preparation for the next face-to-face interaction with faculty. The goals are to increase learning at higher cognitive levels during classroom time, to motivate, activate and inspire learners, and to allow the instructor to fine-tune the classroom activities based on learner feedback.⁹ The pre-class JiTT assignment often consists of a few test questions based on the topic for the next class sent out by the faculty member via email, course website, or iPhone. Learners reply to the test questions in proximity to class time, allowing the faculty member to adjust content for that session based on learners' answers. Differences of JiTT versus FC include learners completing test questions before class, learner answers to questions determine class content, and learner difficulties can be identified and specifically focused on in class. Quoting learners' responses acknowledges learners' thoughts and promotes class discussion. Like the other models, JiTT promotes learner

activation, modification of learner knowledge, and self-directed learning¹⁰. Compared to traditional lecturing, JiTT has been shown to be more effective in promoting concepts and applications, especially in the sciences (physics, biology, engineering).

What do we know about learner outcomes using these three techniques? The education literature has many studies addressing this important issue but changes in the medical education curriculum has only begun to incorporate learner-centered education principles; predictably we anticipate seeing more of these studies in medical education literature in the next couple of years.^{11, 12}

So, there are many vectors impacting on why our traditional vision of education needs to change to a more learner-centered model. We have presented evidence that activating learners through any of the three models results in more effective and efficient learning within the context of limited time for formal education. These models also inherently demand learner participation and transform faculty into facilitators of learning based on learner needs. In addition, adhering to learner-centered models in which learners learn in greater depth and breadth and retain more information in the context of patient problems they see encourages deep learning and not memorization. Lastly, external accrediting bodies are assessing medical student and resident programs on the basis of learner outcomes and models that encourage learner autonomy. Since traditional lectures have never been shown to change performance, there is a need to incorporate processes that promote learner activation.

In summary, the current trend in all education to be more learner-centered requires an alternative approach to traditional lecturing. This perspective reviews three models that clinical and basic science faculty can use in their teaching to make learning more fun, effective, and ascending to higher cognitive levels.

	Team Based Learning	Flipped Classroom	Just in Time Teaching
Setting	<ul style="list-style-type: none"> Lecture Hall: Basic science 	<ul style="list-style-type: none"> Pre-continuity clinic lecture Core resident/ clerkship lecture time Morning Report Inpatient Attending Rounds 	<ul style="list-style-type: none"> Core lecture time for residents or students
Number of Participants	Large: 60-200	Ideal: 10-30 (can be smaller/larger)	Ideal: 10-30 (can be smaller/larger)
Pre-class Preparation	<ul style="list-style-type: none"> Read review articles View PowerPoint Watch video clip 	<ul style="list-style-type: none"> Read review articles View PowerPoint Watch video clip 	<ul style="list-style-type: none"> Answer questions related to day's topic 1-2 hours prior to class
In Class Activities	IRAT, GRAT, near-peer teaching, practice skills: cases, application to clinical scenarios.	IRAT, GRAT, near-peer teaching, practice skills: cases, application to clinical scenarios, practice with standardized learners (SL).	Teacher directs objectives that day based on learners' pre-class responses.
Group Work	Answer questions as a group and graded on their answers plus class participation.	Answer questions as a group and work together in the application phase: e.g., giving feedback to a SL.	Varies and dependent on teacher's approach. May include small group participation.
Evaluations	Learners evaluate the sessions	Learners evaluate the sessions	Learners evaluate the sessions

Table 1: Summary of Educational Models for Medical Students

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