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PERSPECTIVES

Turning The Tables On Tradition: Flipped High-Fidelity Simulation To Potentiate Learning

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Abstract: Innovative teaching modalities are more popular than ever within medical education. Examples include the flipped classroom model, incorporation of digital media and use of high-fidelity simulation technology. Our novel flipped simulation curriculum proposes the use of the flipped teaching method within the simulation lab for undergraduate and graduate medical education. With a focus on case-based learning, procedural skill development, and clinical excellence, flipped simulation incorporates many of the most important facets of medical education.

Keywords: simulation, flipped classroom, undergraduate medical education, graduate medical education

For decades, medical trainees have traditionally been taught through didactic sessions, bedside teaching rounds, and standardized patients.[1,2] Innovative teaching techniques are more essential now than ever before in medical education. As educators, we are tasked to capture our trainees' attention in a world of constant stimulation via hand-held smart devices, tablets, and computers. Current educators must be open to blending technology and innovative techniques into the more traditional framework of medical education.[3,4]

Studies have shown that blending technology and asynchronous learning with traditional classroom teaching serve to "facilitate a simultaneous independent and collaborative learning experience".[5] Examples of innovative modalities include the flipped classroom model, incorporation of digital media and use of high-fidelity simulation technology. Our novel flipped simulation curriculum proposes the use of the flipped teaching method and digital media within the simulation lab for undergraduate and graduate medical education. With a focus on case-based learning, development of procedural skills, and clinical excellence, flipped simulation incorporates many of the most important facets of medical education.

In the flipped classroom model, learners view video lectures and educational materials at home while subsequent in-class sessions serve as a forum for active discussion, problem-solving and group projects.[3] By pre-learning at home, flipped theory uses precious classroom time for case-based learning and anecdotes with high emotional valence to captivate learners' attention and promote retention.[3] According to Prober, the more memorable or "sticky" a lesson is, the more likely it is to promote curiosity, engagement, and retention.[3] This theory has gained increasing popularity in both undergraduate and graduate medical education.[6] Evidence shows that reviewing basic principles in advance activates learning during subsequent in-person sessions and

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Table 1 Examples Of Flipped Simulation

Domain	Preparation	Simulation
Psychomotor	Video-recorded transvenous pacemaker placement	Case of third degree heart block secondary to Lyme disease
Knowledge	Video-recorded toxicology lecture on common antidotes	Case of carbon monoxide and cyanide toxicity due to house fire
Resuscitation	Video-recorded ACLS protocols lecture	Case of cardiac arrest secondary to ventricular fibrillation
Interpersonal	Video-recorded example of physician breaking bad news to family member	Case in which trainees must tell a family member their loved one has died

that benefits of this modality include higher order thinking, more time-efficient use of faculty, and collaboration amongst learners.[7] Digital media adjuncts are incorporated into the flipped classroom model as trainees utilize computers, tablets and hand-held devices to review clinical cases, work collaboratively and even answer questions in real time via electronic applications.

The Residency Review Committee (RRC) within the Accreditation Council for Graduate Medical Education (ACGME) and Council on Residency Directors (CORD) have recognized the importance of flipped theory and provide national workshops to teach educators about the implementation of the flipped classroom model.[8] While many previous studies have focused on flipping the traditional classroom, there are opportunities outside of the classroom, such as the "flipped bedside" approach to demonstrate ultrasonography and a flipped approach to teach procedural skills via task trainers.[9,10]

What would flipped high-fidelity simulation look like? By teaching content and skills prior to a simulation session via digital media applications, the time in the lab can be reserved for solidifying these learning points by implementing them within a case-based simulation scenario. Many physicians can recall the patient name, presentation and clinical setting of the most harrowing cases such as a difficult intubation, emergent dosing of magnesium sulfate for torsades de pointes, or a pediatric cardiac arrest because of the adrenaline surrounding the scenario. Flipped simulation scenarios attempt to mimic these high acuity situations where the best learning occurs and, equally as important, the best retention of information.

As with any teaching intervention, it is important to understand how this may affect learners' education and impact clinical care. It will require buy-in from the trainees and will change the pedagogical approach to include preparatory work. The pre-assigned teaching must be tailored to each educational endeavor. For example, if the goal of simulation is to improve procedural skills and efficiency of transvenous pacing, the associated preparatory video should demonstrate the step-by-step process of placing a transvenous pacing wire. If the goal of the simulation is to improve knowledge retention of toxicologic antidotes, the preparatory materials will include a videotaped lecture on this specific educational content (Table 1). Covering the background information and procedural knowledge in advance will likely increase the educational yield of high-fidelity simulation, reserving these resources for implementation and practice to prepare our trainees for the true clinical setting where it counts the most.

Our curriculum has been implemented within our three-year emergency medicine residency at an academic tertiary care medical center. There are thirty-nine residents, all of whom participate in simulation throughout residency. Thus far, our implementation of this technique has led to self-reported increase in trainee confidence surrounding procedures, trauma resuscitations, ACLS protocols and delivering bad news to patients. A limitation of our novel curriculum is that it is in its early stages of implementation and further research and observations are needed to investigate the impact of flipped simulation on trainee learning and its translation to the clinical setting. Future studies will be necessary to assess this educational method and determine if it can be broadly implemented across various disciplines within undergraduate and graduate medical education.

Disclosure

The author has no conflicts of interest to report.

References

1. Roberts L, Lu W, Go R, et al. Effect of bedside physical diagnosis training on third-year medical students' physical examination skills. *Teach Learn Med*. 2014;26:81–85. doi:10.1080/10401334.2013.857329

2. Herbstreit F, Merse S, Schnell R, et al. Impact of standardized patients on the training of medical students to manage emergencies. *Medicine*. 2017;96:e5933. doi:10.1097/MD.0000000000005933
3. Prober CG, Heath C. Lecture halls without lectures—a proposal for medical education. *N Engl J Med*. 2012;366(18):1657–1659. doi:10.1056/NEJMp1202451
4. Dankbaar M. Serious games and blended learning; effects on performance and motivation in medical education. *Perspect Med Educ*. 2017;6(1):58–60. doi:10.1007/s40037-016-0320-2
5. Garrison D, Kanuka H. Blended learning: uncovering its transformative potential in higher education. *Internet Higher Educ*. 2004;7 (2):95–105. doi:10.1016/j.iheduc.2004.02.001
6. Young TP, Bailey CJ, Guptill M, Thorp AW, Thomas TL. The flipped classroom: a modality for mixed asynchronous and synchronous learning in a residency program. *West J Emerg Med*. 2014;15 (7):938–944. doi:10.5811/westjem.2014.10.23515
7. Lew EK. Creating a contemporary clerkship curriculum: the flipped classroom model in emergency medicine. *Int J Emerg Med*. 2016;9 (1):25. doi:10.1186/s12245-016-0123-6
8. Toohey SL, Wray A, Wiechmann W, Lin M, Boysen-Osborn M. Ten tips for engaging the millennial learner and moving an emergency medicine residency curriculum into the 21st century. *West J Emerg Med*. 2016;17(3):337–343. doi:10.5811/westjem.2016.3.29863
9. Choo E. Flipping the bedside: telesonography and clinical education. *Acad Emerg Med*. 2014;21:1295–1296. doi:10.1111/acem.12492
10. Liebert CA, Mazer L, Bereknyei Merrell S, Lin DT, Lau JN. Student perceptions of a simulation-based flipped classroom for the surgery clerkship: a mixed-methods study. *Surgery*. 2016;160(3):591–598. doi:10.1016/j.surg.2016.03.034