Title: Teaching Design Thinking to Develop Medical Students’ Leadership & Innovation Competencies

Submission Type: Innovation Highlights in Medical Education

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Purpose: Modern healthcare challenges increasingly require physicians to apply systems-thinking, rapidly integrate disruptive technologies, and participate in interdisciplinary teams to serve patients. However, there is growing consensus that traditional medical school curricula do not adequately prepare future physicians to manage this changing role and set of responsibilities. Disciplines including business and engineering teach trainees “design thinking,” an innovation framework for solving complex systems-based challenges. This is regarded as a highly successful way to develop leadership and innovation competencies in these fields. As a result, a growing number of institutions, including the University of Virginia (UVA), are adapting design thinking pedagogy for use in medical education. We will share insights from UVA’s experience developing and teaching a design thinking course for medical students.

Approach/Methods: When UVA students expressed interest in expanded opportunities for training in complex problem-solving, faculty secured curricular innovation grant funding and collaborated with students to develop learning opportunities to meet their needs. The result was UVA’s Medical Design Program (http://uvamedical.design), which offers a year-long elective course in design thinking for first-year students. First offered in 2015, the course provides 30 hours of instruction via monthly workshops, complementing UVA’s core Next Generation and Leadership curricula. The course teaches a progression of medically-relevant design skills. These include research methods drawing on ethnography, participant observation, and empathy-based interviewing; active simulation to understand user needs (e.g. simulating visual impairment to empathize with blind patients navigating clinics); rapid prototyping (e.g. creating realistic, low-cost surgical models to develop better instruments with surgeons); and interprofessional collaboration with clinicians, engineers, architects, and entrepreneurs.

Results/Outcomes: Approximately 10% of each first-year class has enrolled in the course since its launch (N = 41 students from 2015 to 2017). All students who enrolled completed the course. Student interest has continued to grow, with 33% of the first-year class expressing interest in design-based learning in 2017-2018. Emerging themes from qualitative review of student comments support direct applicability of design thinking competencies to leadership skills, complex problem solving, and empathizing with patients. Early heterogeneous quantitative data indicate uniform student satisfaction with the course and increased comfort approaching complex healthcare problems. In 2016-2017, students unanimously indicated that they would recommend training in design thinking for their peers.

Discussion: UVA’s experience teaching design thinking has been positive. We believe the course has delivered “proof of concept” that design thinking is a valuable addition to medical school training and an effective way to equip future physicians with essential leadership and problem-solving competencies. Responding to increasing student demand, UVA continues to offer its year-long course and is launching expanded design-based learning opportunities for more students, including online, open-access.
workshop materials for anyone to download and use individually, with friends, or in the setting of a formal course.

**Significance:** UVA’s experience teaching design thinking has been positive. We believe the course has delivered “proof of concept” that design thinking is a valuable addition to medical school training and an effective way to equip future physicians with essential leadership and problem-solving competencies. Responding to increasing student demand, UVA continues to offer its year-long course and is launching expanded design-based learning opportunities for more students, including online, open-access workshop materials for anyone to download and use individually, with friends, or in the setting of a formal course.

**References:** N/A
Title: Meaningful is more than memorable: Exploring what makes educational experiences “stick” to learners’ memory

Submission Type: Research Highlights in Medical Education

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Submitting Author Institution: New York University School of Medicine

Purpose: Health professions educators invest a significant amount of time and resources creating complex educational experiences for learners [1,2]. To optimize learning from these experiences, we should understand what aspects of our educational experiences are memorable for learners and why. Identifying what makes specific learning experiences “stick” to learners’ memory may allow us to enhance the effectiveness of our educational interventions by making them more “sticky”. In this study we ask: When exposed to the same educational experience, what elements of that experience “stick” to learners’ memory and why?

Approach/Methods: We developed an educational intervention called Night-on-Call (NOC), which exposes learners to a variety of learning experiences, incorporating multiple activities and instructional design modalities. NOC is a 4-hour simulation during which near-graduating students act as interns during four authentic clinical scenarios. Learners communicate with nurses [standardized]; assess patients [standardized]; write notes; make an oral case presentation to an attending [standardized]; view an e-learning module addressing the content of two cases; and handoff four patients to an intern [standardized]. Nine months after NOC, we interviewed 29 participants using a semi-structured protocol, asking learners to describe what was memorable about NOC and why. Using thematic analysis, two researchers (KE, HD) iteratively coded the transcripts, borrowing open, axial, and theoretical coding processes from constructivist grounded theory. Three researchers (LV, KE, HD) met regularly to discuss evolving codes and relations between them to generate themes. Once all themes were constructed, all team researchers met for a full day to review the coding and build additional insights.

Results/Outcomes: Participants described four memorable activities: the e-learning module that explicitly integrated case content; the highest urgency clinical cases; the oral presentation to the attending; and the handoff to an intern. Eight characteristics made these activities memorable: interactivity, framework, novelty, authenticity, risk-free practice, self-reflection, role exposure, and transfer. During analysis, we realized that while all students engaged in the same educational intervention, each learner had a different learning experience. Learners’ “sticky” memories existed on a continuum. At one end was recall (i.e., participants could list activities they remembered). Next was memorable (i.e., participants elaborated on activities that were encoded in their memory, further informing their existing understanding of those activities). At the other end of the continuum was meaningful (i.e., participants remembered activities that promoted deeper knowledge development, generating understandings applicable to other contexts). Memorable activities landed across the continuum (e.g., the handoff could be recalled by one learner but be meaningful to another). Furthermore, the characteristics of memorable activities fell across the continuum – at different places for different participants.
**Discussion:** We searched the psychology and education literatures, but were unable to find theories exploring the recall-memorable-meaningful continuum of learning experience. We suggest the identification of this continuum is a key development from this study.

**Significance:** Although learners identified similar memorable learning activities and reasons for these “sticky” memories, the extent to which these experiences were meaningful was highly individualized. It is essential to further develop a theory about this continuum so that we can understand how to construct meaningful learning experiences.
Title: Assessment of Medical Student Integration of Public Health and Disease in a First Patient Discoveries Activity

Submission Type: Research Highlights in Medical Education

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Purpose: To effectively treat diverse patient populations, physicians must understand the impact of public health issues on wellness and disease. Medical educators have often struggled to identify time and resources to integrate a public health curriculum into existing medical school programs.1 At the Medical College of Georgia, the First Patient Discoveries Activity was introduced to provide medical students an opportunity to explore the link between basic science, clinical medicine, and public health. The purpose of this study is to assess students’ understanding and awareness of how public health factors contribute to health and disease.

Approach/Methods: First year medical students (n=190/year) are divided into 24 dissection groups. Dissection groups are introduced to their body donors as their “first patient.” Groups note gross anatomical findings, biopsy suspected pathologies, and make differential diagnoses about their “first patient.” Based on observations, pathological findings, and outside research, they hypothesize a cause of death (COD) and submit a final report including a discussion of public health factors that may have affected the presentation and outcome of disease in their patient. End of year reports are evaluated using a grading rubric to assess students’ understanding of how public health issues may have affected their “first patient’s” quality of life and contributed to their COD. Students’ perceptions of how well the activity fostered their knowledge and awareness of public health issues are gathered from a curricular evaluation survey (n=105 respondents).

Results/Outcomes: Most groups (20 out of 24) met or exceeded expectations on discussions of public health issues and their impact on the presentation and outcome of disease in their patient (average score: 86.9%). Most groups (83.3%) discussed a national or state-wide public health issue. The most commonly discussed issues were heart disease & stroke (42%), tobacco use (42%), and obesity (38%). Comments on public health issues as they relate to observed pathologies included, “Patients who smoke are at a high risk of developing abdominal aortic aneurysms and heart disease. Therefore, our patient’s personal habits such as smoking … could have greatly contributed to the presentation of her pathologies.” Despite performing well on the year-end report, only 40% felt the activity increased their awareness of public health contributions to health and disease.

Discussion: Public health is often introduced into medical school curricula as a stand-alone competency using teaching modalities such as pandemic simulations or para-curricular activities.2,3 However, integrated pedagogic approaches have shown the biggest impact on undergraduate medical school learners.4 The First Patient Discoveries Activity promoted integration and understanding of public health issues and how those issues would have affected their patient’s COD and pathologies. Students ably related the impact of public health factors to their patients’ morbidity and mortality, a similar trend
seen by others using an integrated approach. Overall, the First Patient Discovery Activity was a successful modality for integrating public health and disease.

**Significance:** An integrated activity such as the First Patient Discoveries Activity provides a good platform for integrating social medicine competencies such as public health with basic and clinical sciences.
Title: Integrating Patient Safety into First Year of Medical School Curriculum via the Procedural Timeout

Submission Type: Research Highlights in Medical Education

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Purpose: Medical error is the third cause of death in the US, with an estimate of 251,000 deaths annually (1). These errors include wrong side surgery (2,3) and may result in serious injury or death, and increased medical costs. The AAMC has stated that the slow progress regarding patient safety in medical education has been due to the lack of integration of into the core curriculum (4). To address this, we developed a curriculum that integrated patient safety education into gross anatomy, a first-year course.

Approach/Methods: First year medical students completed a pre-timeout test prior to the first day of anatomy lab to assess knowledge regarding error and procedures to prevent error. Just prior to their first dissection, a physician delivered a presentation on errors and the universal protocol (5) and pre-surgical timeout. Prior to beginning dissection, students completed a surgical timeout and marked the site of the procedure/dissection. The next day they completed a post-timeout test. Later in the year, surgical sponges were hidden in cadavers before the students completed the abdominal dissection. After finding sponges, they participated in an educational session on errors and retained surgical objects highlighting the importance for all healthcare providers including medical students to take an active role in patient safety. A second timeout was performed at the end of anatomy. A final post-timeout test was collected.

Results/Outcomes: 306 students participated. 300 completed the time out. Average time to complete the checklist was 3 minutes. 279 completed the pre-test, 216 the post-test, and 248 the final-timeout test. The pre-test and the post-test had the same questions which assessed knowledge about components of the universal protocol and the surgical timeout. Every question post-test showed improvement in mastery, indicating that students better understood universal protocol, medical error terminology and the components of a surgical timeout. After the final timeout, 99.4% felt a timeout procedure was easy to accomplish, compared to 97.2% post-first timeout and 45.2% pre-timeout. Post-final timeout, 95.6% felt they had a clear understanding of the components of a procedural timeout compared to 93.9% post-first timeout and 17.6% pre-timeout. Post-final-timeout, 91.0% indicated they would be comfortable performing a procedural timeout compared to 92.5% post-first timeout and 17.3% pre-first timeout. Although 83.3% felt a timeout should be completed prior to every dissection post-first timeout compared to 58% pre-timeout, only 41.9% thought this should be done prior to every dissection on the final post-timeout.

Discussion: Medical students overwhelming felt they had a clear understanding of procedural timeout, and were comfortable performing the protocol. After exposure to curriculum, students reported they were more cognizant of errors and procedures to prevent error. Despite positive comments students were less inclined to perform timeouts with every dissection. Incorporating timeouts as a required rather than an optional activity may help inculcate students into the culture of safety practice.
Significance: A novel program introducing fundamentals of the universal protocol and surgical timeout can be integrated into the curriculum of first year medical students to highlight the importance of patient safety early in medical school.