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FEATURE: PERSPECTIVE

The Medical Education of Generation Y

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Medical schools face challenges preparing students to meet evolving health-care needs in society. However, little has changed in the way that education is delivered to aspiring health professionals [1]. The in-class lectures continuing in the majority of classrooms across the country do not acknowledge the unique proclivities of the current crop of medical students. An explanation of this observation is gleaned by understanding the fundamental attributes of the current generation of medical trainees.

Educational research in schools outside of medicine demonstrates that students with different learner characteristics will value instructional measures in relation to the way they suit their own habits, ideas, and preferences of learning well [2]. To be effective, teaching styles have to take into account learning styles [3]. Therefore, instructional measures should address learner beliefs to improve the quality of student learning [2]. Our paper responds to the need to examine the impact of social and motivational variables in learning. Specially, we sought to understand the implications of generational differences in medical education, and how medical education can consciously evolve to accommodate the learning styles of current trainees.

Generational Learners

Academic medical centers are made up of four generations: (1) the Silent or "Adaptive" Generation, (2) Baby Boomers, (3) Generation X, and (4) Generation Y (Millennial) [4–8]. Although individuals may share characteristics of various generations and not fit perfectly into the generation designated for them, social anthropologists have categorized the different generations by their different views on core values, attitudes, family and work life, and styles of teaching and learning. Applying knowledge from social anthropologists, we were curious how these generational differences show up in medical training and inform how different generations learn and work in medicine. Table 1 summarizes each generation.

We used the following search terms in our literature search of Medline and Scopus: *generational learning, medical education, technology, social media, Generation Y, millennial learners.*

Generation Y

A focus on Generation Y is essential because the future depends on getting their education right. Although intra- and intergenerational teaching take place bidirectionally within academic medicine, the majority of intergenerational teaching comes from the Silent Generation, Baby Boomers, and Generation X teaching Generation Y. Educators often turn to motivational theory in attempts to answer the age-old question of what motivates Generation Y students [3].

Generation Y is an optimistic and assertive generation surrounded by technology and comfortable with multitasking [4]. Electronic medical records and online textbooks and journals are virtually ubiquitous for this generation [9]. Medicine residents have shown they prefer Web-based learning [10]. They are quick learners who learn promptly from their mistakes (perhaps as a result of the video game effect). They are usually attentive learners as long as the format is on their terms [7]. They utilize self-directed,

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Table 1 Attributes of four generations in medicine [4–8]

Generation/defining life events	Roles in medicine/training experience	Working style attributes	Learning style attributes
Silent or "adaptive/veteran" generation (age 70–80s; born 1922–42) World War II, Korean War, Great Depression, creation of polio vaccine, rise of labor unions. Raised by parents who were immigrants. Emphasis on traditional morals and nuclear family.	Chairmen, presidents, senior professors. Trained before duty hours formally mandated; marriage and pregnancy discouraged during training; call frequency as often as every other night.	Likelier to adapt than rebel; value hard work; "work before play." Loyalty and trust in the institution/workplace. Takes care of patient until work is done.	Rules and expectations delineated ahead of time, prefer to learn from someone of their age/generation, use textbooks and printed material. Formal teaching style with authority emphasized and formal attire expected. Use lectures, handouts, written tests. Strong emphasis on physical exam and face-to-face interactions.
Baby Boomers or "Idealist" generation (age 50–60s; born 1943–60) Vietnam War, emergence of birth control, first lunar landing, civil rights movement. Parents had secure jobs; both spouses worked and expected long-term job security.	Associate professors, professors, committee heads, division chiefs, chairmen. Call schedule every third night; most residents married. More advocates for equality between male and female physicians than preceding generation.	Driven and dedicated; identify strongly with career. Takes care of patient until work is done. Likely to bring work home, work during weekends.	Study on their own, have a list of learning objectives (to which they will add their own objectives), use reference books. Use interactive lectures, pop quizzes, bedside teaching, and "pimping." Prefer face-to-face interactions with learners via office hours, yet often use e-mail correspondence.
Generation X or "Reactive" generation (age 30–40s; born 1961–81) Iran hostage situation, Gulf War, emergence of AIDS, popularity of video games, growing acceptance of interracial marriages. Children of single parents; first of the latch-key kids. Seek a greater sense of family.	Majority of fellows and junior or early mid-career faculty. Experienced 2003 duty-hour regulations and culture of shift work into care of patients.	Hard-working, protective of personal time. Believe paying dues not as relevant as their predecessors because long-term job security not guaranteed; lifelong loyalty to one institution not mandatory. Less likely to pursue tenure than predecessors. Motivated by short-term incentives. Portray a relaxed demeanor/attire; comfortable addressing senior attendings by first names.	Learn material that is "going to be on the test"; participate in study groups and review courses; cram for tests. View mentoring as a right, actively seek feedback. Use interactive didactic strategies; provide web-based resources for independent learning. Correspond commonly via e-mail; proactive in providing feedback for learners.
Generation Y/Millennial or "Civic" generation (age 20s; born 1982–2002) War in Iraq, Columbine shootings, 9/11 attacks, cell phone ubiquity, reality television. Parents known to be protective and nurturing.	Majority of medical students and housestaff Educated under 2003 duty-hour regulations; underwent further work-hour restrictions with 2011 mandates.	Question why something must be done a certain way. Comfortable with frequent social interactions, group/team work, diversity. Prepared to transfer care of patient to colleague at end of shift per duty-hour regulations.	Variety of styles: visual, auditory, and kinesthetic. Accustomed to learn in small groups as opposed to isolated/solitary learning or large groups such as in lecture halls. Use social media to share and better comprehend concepts.

electronic learning because it is convenient and efficient and it allows for control over pace, sequence, and content [11]. Chatting/blogging and social media have become important forms of learning in medical education [12, 13]. We have anecdotally observed how our Generation Y learners prefer to use textbooks as references and focus on practice questions as the crux of content delivery, a more retrospective form of learning.

The theory of multiple intelligences by psychologist Howard Gardner holds that individuals have seven or more intelligences from developmental stages. Traditional medical education (e.g., lecture and rote memorization) favors two of these intelligences: verbal–linguistic and logical–mathematical [3]. The interest in active learning techniques the past 10 years demonstrates an attempt to teach students relying on other types of intelligence and has led to increases in participation and pre-/post-test scores [3].

Nonetheless, if Generation Y prefers instant results and immediate feedback, how does this attitude translate to patient care? Do they have the patience to obtain a detailed history and conduct a thorough physical exam? Do they believe there is value in time spent at the bedside? Anecdotally, some

members of Generation Y at our institution explain that their dedication to patients goes beyond the end of their shift; with electronic medical records, they often spend time at home checking patients' results, reading notes, following up imaging studies, and using online resources to learn about patients' condition.

Despite new educational aids, learners need to devote the time to study. Studies looking at in-training exam scores after the 2003 duty-hour regulations were implemented did not reveal significant improvement in the scores related to decreased work hours [6].

For this generation, barriers to learning include intimidation-style teaching (do not like to feel put on the spot), having only one resource to learn from (but too many resources can be distracting), large classroom sizes, didactic lectures with no audience involvement, lack of feedback, and instructors who are inaccessible by e-mail [11].

Generation Y are primarily visual learners, a style which research has shown will almost certainly conflict with the learning style and habits of a more seasoned instructor [14]. Shifting from pure lecture to incorporate hands-on activities holds student interest and increases information retention. Hands-on activities should be directly related to a specific task that students perceive as a need, because they are concerned about saving time [3, 15, 16].

Some Modest Proposals

Research in other educational domains demonstrates that traditional didactic/classroom-style teaching may not be the most effective way to relay information to today's students [17]. From our anecdotal experience, attendance drops as the year progresses and there is no relationship between attendance and improvement in medical knowledge, although this needs to be better studied in medical trainees. Generation Y often prefers to watch lectures at home or via podcast on their own time [10, 18]. Campus space also needs to be reconfigured because traditional, cubicle-style libraries are not often preferred by this generation, who tend to work in groups and use laptop computers simultaneously [15].

Although students are able to read and learn information on their own, instructors can act as coaches and mentors to stimulate and challenge thinking, guide them in solving problems, and encourage their learning and application of the material [19]. Active learning exercises (e.g., teamwork, debates, self-reflection, case studies) prompt students' engagement and reflection, encourage them to explore attitudes and values, while fostering motivation to acquire knowledge and enhance skills. Developments in both active learning and technology have prompted a few educators to implement a flipped classroom educational model where students are responsible for coming to class with a basic understanding of the material to participate in class discussion [1].

As medical educators, we have experienced the benefits of electronic learning. It places the onus on the student to take the initiative to learn, allows for ease in updating content, may replace the need for a teaching assistant, is environmentally friendly (e.g., no need for handouts), allows an option for outcomes assessments, and allows for efficiency via the use of electronic grading options. Although medical education has used simulators like the Harvey simulator for decades, *gaming* is a newer modality with characteristics that appeal to Generation Y. For instance, gamification has been successfully utilized to promote learning among nursing students, medical students, and residents [14, 20].

The teaching styles of Generation Y are still evolving, but intragenerational teaching is effective. For instance, senior medical students teaching junior medical students motivates the seniors to learn the material well, provides the seniors with teaching and leadership experience, and promotes interest among the junior students in taking on similar teaching roles [21].

We must recognize and accommodate the generational differences in attitudes regarding patient care. With the resident work-hour limitations, patient handoffs are increasingly more frequent, yet less than 10 % of medical schools teach students how to hand off patients in a formal, standardized way [22, 23]. When rounding with house staff and medical students, the attending physician must create a team environment by engaging the learners, empowering them as valued and contributing members of the team. Because Generation Y tends to use a variety of learning resources, inpatient attending physicians can share clinically relevant articles with the team via e-mail (visual), capture teaching opportunities with focused white board lectures (auditory), teach at the bedside (kinesthetic), and encourage senior residents to teach interns and students after the attending has completed rounds. Educators at Harvard highlight the importance of educators understanding the generational differences and cultural environments that are unique to Generation Y [19]. They also state how understanding the different learning styles may minimize intergenerational tension.

Research demonstrates how personality traits of Generation Y medical students differ significantly from Generation X [24]. More research looking into ways to take advantage of the Generation Y learning style in our fast-growing environment of technology will be valuable. We may find that some areas of learning still require traditional methods [25].

It is imperative that we mentor the next generation of physicians; even though their teaching and learning styles may differ from their predecessors, the experience and knowledge shared by more senior generations are invaluable and not effectively obtained from a simulator, videogame, or website. Examples are to start mentorship relationships by sharing backgrounds and focusing on similarities, focus on patient outcomes and leave some of the implementation to learners, create innovative ways to incorporate career

development into education (e.g., teaching the student interested in academics how to write a manuscript), make sure learners know they are valued, explain the "why" behind tasks, look for opportunities to reward mentees, provide feedback, make work enjoyable, and model expected behavior. After all, this is the group of physicians who will be taking care of us.

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