To the point: medical education, technology, and the millennial learner

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This article, from the "To The Point" series that was prepared by the Association of Professors of Gynecology and Obstetrics Undergraduate Medical Education Committee, provides an overview of the characteristics of millennials and describes how medical educators can customize and reframe their curricula and teaching methods to maximize millennial learning. A literature search was performed to identify articles on generational learning. We summarize the importance of understanding the attitudes, ideas, and priorities of millennials to tailor educational methods to stimulate and enhance learning. Where relevant, a special focus on the obstetrics and gynecology curriculum is highlighted.

Key words: medical education, millennials, obstetrics and gynecology, simulation, technology

Generational change is nothing new; there will always be change and challenge in education. Many faculty educators believe that medical students of today are particularly different from previous generations of medical students because of their generational base.[1] People of the same "generation" grow up with common experiences in a common location at a common time and have similar social attributes.[2] Most our current medical students, residents, and recently graduated physicians were born from 1977−1995; they belong to Generation Y, also known as Millennials. Their teachers are typically either Generation X (born from 1965−1976) or Baby Boomers (born from 1946−1964). Faculty from the "Silent" or "Veteran" generation (born from 1925−1945) may also continue to teach at some institutions.

Each generation is impacted by world events, technology, and social norms, all of which shape the responses, preferences, and priorities of individuals in that generation. As such, Millennials are different from their Baby Boomer or Generation X educators, with unique priorities, habits, experiences, and preferences. What is important to Millennials may be different from what is important to individuals who belong to other generational groups. Millennials have been parented distinctly and have been consistently deemed to be "special" and "winners," irrespective of their behaviors, effort, or actions.[3-5] Rapid forms of global communication mean that Millennials are interconnected and in frequent contact with their social network. A survey of 7000 American college students in 2007 found that they speak or text with their parents on average 1.5 times per day.[6] Local experience with their applications to medical school and obstetrics and gynecology residency programs demonstrates a history of numerous jobs, extensive hobbies, and often a diverse list of education achievements and degrees. This could lead to an impression that Millennials prioritize diversity in their experiences over depth of focus, which is a contrast with Generation X, who typically demonstrated longstanding commitment and depth of experience in a small number of activities.

Important world and cultural events that shaped Millennials include the fall of the Berlin Wall, 9/11, the great recession and energy crisis, global warming/climate change, increasing international communications and travel, and an explosion in technology. Many have never known a world without the internet and a smart phone. They are accustomed to learning in groups and with help from technology. How are the Millennials distinct from Generation X, the Baby Boomers, and the yet to be defined Generation Z/Homeland Generation? The Table highlights traits of each generation.[7-9]

Although there is an inherent danger in overgeneralizing students, recognizing generational characteristics allows educators to develop a learning culture that is appealing and relevant to our current generation of learners. This, in turn, will guide our faculty development to create teachers who think and teach in a manner conducive to the Millennials' learning preferences. Recognizing the unique learning styles of Millennials and the importance of catering delivery of educational curriculum to suit their styles of learning specifically in the field of Obstetrics and Gynecology has been noted recently.[10]

Learning preferences of Millennials

A spectrum of learning traits has been linked to Millennials. These student profiles have arisen largely from surveys or opinions that were based on

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TABLE
Generations categorized by time, cultural and character context

Generation	Birth years	Current age, y	Defining cultural events	Character traits
Baby boomers	1946–1964	53–71	Vietnam War, civil rights, prosperity	Self-centered, driven, judgmental
Generation X	1965–1976	41–52	Personal computer, cable television, human immunodeficiency virus, women's rights	Adaptable, independent, impatient
Millennials	1977–1995	22–40	Internet, 9/11, mobile communication devices, "smart" devices; lesbian, gay, bisexual and transgender rights	Optimistic, techno-savvy, needy for feedback, collaborative

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observation. In terms of learning preferences, simulation, interactive group activities, workshops, and game-style presentations of knowledge are preferable. The personality profile is characterized as hopeful, confident, goal and achievement oriented, and inclusive. They share and are open and civic-minded.[8,11]

Millennials have grown up in an environment of choice and unlimited information. They have an aptitude for web-based, self-directed learning and media literacy, as opposed to lecture hall–based learning and reading literacy. Customization of their learning and provision of optional ways to learn and discover information, especially in groups, are preferred.[2] Millennials value sharing and access to education materials, irrespective of copyright laws and the idea of intellectual property. Millennials would like information to be free and freely available. A lack of appreciation of the attitudes and preferences of Millennials can lead to misunderstanding and disquieting friction between generations. Consider this example: A medical student at our center posted a lecture created by 1 of our faculty members on a public website. The frustrated (Gen X) faculty member discovered the posting, demanded that it be taken down immediately and that the student who was responsible to be reprimanded. The Millennial's focus to "share" ideas was at odds with the Generation X's need to "protect" those ideas.

Teaching styles that appeal to Millennials

Millennial learners seek instruction that is technology enhanced, convenient, personalized, and linked to relevance and societal meaning.[12] Didactic PowerPoint (Microsoft Corporation, Redmond, WA) presentations may be considered by a Millennial to be "ancient" without embedded interactive questions or video clips to stimulate discussion. Contemporary teaching strategies include e-learning, flipped classroom, simulation, peer-to-peer teaching, and social media.

E-learning

Podcasts, educational websites, virtual patient simulations, interactive multimedia tutorials, and on-line problem-based learning are all examples of e-learning.[13] Multiple podcasts with a range of topics and sources can be found on the web, free of charge, and available through iTunes. Topics include emergency obstetrics, operative delivery and use of forceps, and a multitude of topics that include contraception, vaginal agenesis, management of preeclampsia, and cervical cancer screening. The Association of Professors in Obstetrics and Gynecology has a series of clinical cases and videos for self-learning that are freely accessible on their website and are linked to obstetrics and gynecology objectives.[14] University medical centers should consider development of an education website to act as a framework to share information and to direct students to some of the most reputable and beneficial links. Obvious benefits of e-learning include convenience, efficiency in learning through use of built-in hyperlinks, unlimited viewing, and ability to deliver and access information across physical distance and in a wide variety of settings.[15] These e-learning references should be vetted by the faculty members and course and clerkship directors for authenticity, accuracy, and relevance.

Hampton and Sung[16] examined, in a randomized fashion, the use of interactive computer-based learning vs usual teaching for pelvic anatomy and pelvic floor dysfunction as part of a medical student curriculum. After comparison of preintervention knowledge and attitude scores, the computer-based training group had improved knowledge and attitude significantly. However, Corton et al[17] examined computer-based vs a paper-based learning platform to teach pelvic anatomy to medical students and found that pre- and posttest scores were not significantly different between the 2 platforms. This suggests that students may still learn and retain information irrespective of delivery platform.

Flipped classroom

Millennials are accustomed to fast information and answers, so empiric evidence suggests that they may tend to have shorter attention spans. Spending time with students interactively with a case discussion, instead of a lecture, is preferable. The flipped classroom replaces didactics with active learning in the classroom. During a flipped classroom learning session, the learner prepares with self-learning before the session and then solidifies the learning through teamwork, debates, self-reflection, case study discussion, application and consolidation, and coaching to challenge thinking and problem-solving.[18] Preparatory work can include PowerPoint presentations with voice instruction or voice-over narration, and students independently can review basic

knowledge on their own and at their convenience. Class time is reserved for hands-on teaching, group discussions, consideration of which tests to order and when, discussion of treatment options, and response to therapy. The flipped classroom can be linked easily to milestones, entrustable professional activities, and competency-based training goals.[15] Morgan et al[19] developed a flipped classroom method to teach endometrial hyperplasia and cervical dysplasia to medical students in obstetrics and gynecology.

Simulation and gamification

Simulation can be used to teach skills, practice skills, or evaluate skills, which helps the learner to translate fundamental knowledge into patient care. High- and low-fidelity simulations have been integrated into medical education at many US and Canadian medical schools. Posner and Nakajima[20] have developed an undergraduate curriculum in obstetric simulation that has been in regular use since 2009 at the University of Ottawa. Simulation provides an opportunity to learn about clinical experiences that are not obtained easily or that are rare. Because Millennials tend to be tech savvy,[21] simulations also present interactive, hands-on methods that appeal to Millennial learners.[22]

Gamification, defined as the use of game design elements in a nongame context,[23] is a related but distinct form for presenting information to learners. Immediate gratification associated with gaming is an attractive way to teach and engage students in learning. It is a technique that has been explored and implemented successfully among medical students and residents.[24] Although there are no published examples of application of gamification to obstetrics and gynecology learning outcomes yet, there is an example of applied gaming in internal medicine. Inspired by 1 of the world's most popular computer games Tetris, "Septris" is a free, mobile web-based medical game that runs on an iPad (Apple, Cupertino, CA), computer, or smart phone. Developed at Stanford University, Septris allows learners to manage sepsis in 2 patient simulations, gaining points for making appropriate management and diagnostic decisions. The goal of the game is to not only to diagnose and initially manage sepsis but also to cure the condition, with early reports suggesting that the game leads to significant self-reported improvement in ability to treat septis.[25] Some studies have investigated the role of previous video game experience on laparoscopic simulation tasks in obstetrics and gynecology. One study pitted 15 experienced teenage video gamers against 15 postgraduate year 1 obstetrics and gynecology residents without video game experience in the timed performance of 3 laparoscopic simulator tasks.[26] Perhaps not surprisingly, the teenagers performed all 3 tasks from 27−41% faster than the obstetrics and gynecology residents. Although the impact of previous video game experience on nonsimulated, real-life surgical skills in obstetrics and gynecology presently is unknown, a recent review by Chalhoub et al[27] suggests that the learning curve in laparoscopic gynecologic surgery may be shortened by facilitating 3-dimensional depth perception, ambidexterity, hand-eye coordination, and tone reflexes.

Peer-to-peer teaching

Formalized intragenerational teaching programs increasingly are being appreciated and valued by students and faculty. Students who teach other students must know and understand the materials well enough to present and answer questions. It promotes educational leadership and stewardship and allows for creative teaching and learning.[28] This can be a very successful method when accompanied by proper faculty guidance and oversight. Obstetrics and gynecology residents are already recognized as providing valuable teaching in the clinic setting, often times allowing for more hands-on experience with patients when compared with faculty preceptors.[29] Fourth-year medical students in obstetrics and gynecology were assessed for their teaching value in the operating room by Graziano[30] in 2011, and there were greater learning and retention when the teaching was provided by a peer as opposed to a resident teacher. At the University of Ottawa, medical students are responsible to teach each other 1 educational objective. Students work in pairs and are given 30 minutes with the class with a faculty member present who evaluates their teaching skills. Students are encouraged to be curious and to cover the objective in any manner they choose. This peer-to-peer teaching activity is called "Student Conference" and is consistently the most highly rated teaching and learning activity in the obstetrics and gynecology curriculum.

Social media

Social media is a regular part of a Millennial's daily routine. Many forms of social media are used, sometimes simultaneously, by our Millennial learners. Twitter (Twitter Inc, San Francisco, CA) provides a unique way to reach learners and is a kind of "2-way sharing conversation" rather than a 1-way conversation platform. High-yield "pearls" or "tweets" can be delivered to a group of students simultaneously to stimulate thinking and reflection. Each tweet is like a microblog and is limited to 140 characters per post. This is a kind of "push technology" that feeds information forward rather than the student selectively "pulling" information from a given site. Tang and Hew[31] published a review that assessed the benefit of Twitter in the education context. They reviewed 51 publications in teaching and learning and concluded that Twitter possibly could improve learning outcomes when used to push information forward and to serve as a platform for communication between teacher and learner. To our knowledge, there is no obstetrics and gynecology curriculum yet published that uses a Twitter-based platform. Bahner et al[32] developed a popular curriculum in ultrasound that has been shown to have popularity not only within its intended institutional-based group of students but also has spread across several countries and continents. They developed a curriculum of high yield ultrasound learning "tweets" that were delivered to medical students over a year. At the end of the year, they evaluated the usefulness and value and found that the majority of the

students (81.1%) found the information useful.

Facebook (Facebook, Inc, Menlo Park, CA) is a social networking site that allows users to join groups with common interests. This can promote educational discussions on clinical topics. Additionally, Facebook can be used as a central communication base for various courses for updates on schedules, quizzes, tests, and other information pertinent to the course. The use of Facebook by medical students at the University of Melbourne was studied by Gray et al[33] in 2010. Twenty-five percent of students had used Facebook for education reasons, and 50% of them were open to using it for education purposes. Facebook users were organized in groups and primarily used the platform to ask and answer potential examination questions, post diagrams and figures for study, list tips for studying for examinations, and provide links to helpful learning sites. The authors concluded that an opportunity exists for faculty to engage students in more profession-based social media sites because the use of Facebook for education seems modest. Many other group-sharing formats such as Google Drive (Google, Mountain View, CA), Dropbox (Dropbox Inc, San Francisco, CA), and Basecamp (Basecamp, Chicago, IL) provide a forum for sharing documents, cases, videos, photographs, and other educational materials.

Comment

Technology always has influenced how students are taught. Traditional hospital library usage is decreasing and adapting to provide e-learning resources as Millennials overtake the workforce. Work space is shared, and conference room space is a premium. Students use internet searches to access digital collections and knowledge. They use technology to communicate; texting is ordinary, and pagers are antiquated. Does this mean that lectures are obsolete and useless? Jordan et al[34] compared computer-based instruction to traditional didactics for 4th-year medical students in emergency medicine and found that acquisition of knowledge was superior with didactics. The authors cited benefits of didactics that included the opportunity for immediate clarification of concepts and extension of knowledge that arises from communication during live lectures. Regardless, even traditional didactic style lectures serve to benefit by incorporating interactive techniques such as peer discussion, embedded videos, and regular questioning; 1 study showed that 92% of students preferred interactive, compared with regular, lectures.[35] Another study found that medical students rated both "interactive" and "fun/engaging" as the most important qualities of lectures, above even "practical/important content."[36] It therefore would seem that there is room within curricula for both classic and technology-based innovative teaching methods. A blended framework, which offers multiple domains of learning, is likely to be acceptable to both teachers and learners, offering something for everyone, spanning the generations, and providing opportunities to teach Millennial learners with engagement from the entire faculty.

Conclusion

As our world evolves and molds the generations that live through those times, so does the field of medicine. The Millennial learner is our present generation of learner, and we should embrace and adapt our pedagogy to meet their style, needs, and views. We have embraced technology in clinical practice with the electronic health record, electronic physician order entry, laboratory results, and radiographic results review. We communicate with patients through on-line patient access portals. We submit our billings, register for academic meetings, and communicate with our colleagues (e-consults) using technology. It is time for us to also expand our use of technology in education so that we can stay current and address the learning preferences of our students. Because the field of obstetrics and gynecology is one that relies on technologic diagnostic and treatment devices, we are suited particularly to avail ourselves of multiple opportunities to enhance the Millennial's learning experience in our field. Because our educators differ in generation from our learners, there is more potential for them to become disconnected. To remain relevant, we must be accessible, honest, and approachable. Our role as educators is to help them develop their own future as physicians that will be characterized by independent learning, technologic integration, and a love of teaching. ■

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