PROFESSIONAL ISSUES

Training the Millennial Learner Through Experiential Evolutionary Scaffolding: Implications for Clinical Supervision in Graduate Education Programs

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Abstract They are the Millennials – Generation Y. Over the next few decades, they will be entering genetic counseling graduate training programs and the workforce. As a group, they are unlike previous youth generations in many ways, including the way they learn. Therefore, genetic counselors who teach and supervise need to understand the Millennials and explore new ways of teaching to ensure that the next cohort of genetic counselors has both skills and knowledge to represent our profession well. This paper will summarize the distinguishing traits of the Millennial generation as well as authentic learning and evolutionary scaffolding theories of learning that can enhance teaching and supervision. We will then use specific aspects of case preparation during clinical rotations to demonstrate how incorporating authentic learning theory into evolutionary scaffolding results in experiential evolutionary scaffolding, a method that potentially offers a more effective approach when teaching Millennials. We conclude with suggestions for future research.

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Introduction

Would you counsel patients with different characteristics the same? Genetic counselors take justifiable pride in being able to personalize counseling sessions. In fact, a primary value-added component of the face-to-face genetic counseling interaction is the ability to target the specific characteristics of the patient. Most genetic counselors develop skills to alter consultations to accommodate, for example, education levels, cultural differences, learning styles, and age to assure that the informed consent and decision making processes are specific to the patient's situation (McCarthy Veach and LeRoy 2009; Weil 2001). In this paper, we suggest that those who teach and supervise should take the same approach with the next generation of genetic counseling students, the Millennial generation.

Prior genetic counseling students came in three generational waves, each forming a culture with highlights summarized in Table 1. These cultures included differing learning characteristics (Howe and Strauss 2000, 2007; Johnson and Romanello 2005; Oblinger 2003).[1] The Veteran or Silent Generation arrived in small numbers in the early development stages of the profession and learned by working hard, following the rules and being seen, not heard (Weston 2006). The Baby Boomer generation arrived as genetic counseling programs were beginning to grow

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[1] Although individuals in each generation take pride in their unique personalities, scholars have found general characteristics within generations. The purpose is not to stereotype, but to provide useful guidance for understanding qualities that impact interactions in academics, the workplace, and relationships.

Table 1 Features of prior generations

Cohort	Historical milestones	Technology	Generational context	Learning characteristics
Veteran (Silent) 1922–1945	· Great Depression · World Wars I, II · Emergence of middle class	Newspapers Radio Movies	· Rationing · Patriotism	· Sacrifice and work hard · Follow rules and be loyal
Baby boomers 1945–1960	· Moon landing · Kennedy assassination · Vietnam war	Television	· Post-WWII prosperity · 2-parent households · Change	· Question everything · Explore everything · Consider change
Generation X 1960–1980	· Challenger spaceship disaster · Nixon	Computers	· 2-career households · "Latch key" generation · Layoffs	· Self-directed · Active in what should be learned · Focus on outcomes

and though they questioned the status quo (Olson 2009; Weston 2006), they learned by working long hours and absorbing any and all information available (Freeman et al. 2009; Howe and Strauss 2000, 2007; Olson 2009). Generation X genetic counseling students were generally children of young two-career Baby Boomer parents and learned by being self-directed, aggressive, highly devoted to their profession (although not necessarily a single organization) and by focusing on outcomes (Borges et al. 2006; Freeman et al. 2009; Oblinger 2003; Olson 2009; Romanelli and Ryan 2003; Walker et al. 2006).

The newest generational wave, the Millennials, who are entering genetic counseling programs now and will be for the next few decades, has formed a new cultural perspective. The first Millennials were born between 1980 and 2000, in the early Reagan years, they entered secondary school when Clinton was president, were teens during the Columbine tragedy, and they graduated with the Class of 2000. Millennials are children of Baby Boomers who bore children in their later years and the oldest of the Generation X couples who bore children early (Howe and Strauss 2000, 2007; Romanelli and Ryan 2003; Olson 2009). These parents generally pushed their children to view themselves as special and able to reach new heights, while doting on their safety and achievements (Elam et al. 2007; Wilson 2004). They provided their children with new tools (such as computers, internet, cell phones) and exposed them to different environments (diverse groups and global situa-

tions), which caused Millennials to develop early skills such as multi-tasking and active teamwork (Howe and Strauss 2000, 2007; Pardue and Morgan 2008). Millennials, as a group (Table 2), are unlike previous genetic counseling students in many ways, including the way they learn (Borges et al. 2006; Howe and Strauss 2000, 2007; Pardue and Morgan 2008). Just as being aware of a patient's situation is critical to developing the appropriate treatment, being aware of Millennial characteristics is critical to developing the appropriate teaching methods to enhance learning (Mangold 2007).

In this paper, we propose what we call *experiential evolutionary scaffolding* as one model to enhance the learning of students whom epitomize the Millennial generation. This new model incorporates authentic learning theory (Donovan et al. 1999; Rule 2006) into evolutionary scaffolding theory (Holton and Clarke 2006). Authentic learning is active and student-driven, with students engaged in complex independent exploration and critical thinking that is connected to the flexibility needed in a real world experience (Lombardi and Oblinger 2007; Renzulli et al. 2004; Rule 2006). Scaffolding consists of prompted content, materials, and tasks, as well as teacher and peer support, that are provided to assist the learner in a range of cognitive growth (Vygotsky 1978; Dickson et al. 1993; Holton and Clarke 2006). By combining authentic learning and scaffolding theories into experiential evolutionary scaf-

Table 2 Features of the Millennial generation

Cohort	Historical milestones	Technology	Generational context	Learning characteristics
Generation Y (Millennial) 1980–2000	· Oklahoma City federal bldg bomb · Columbine · 9/11 attacks	Internet iPods Video games	· Resurgence of heroism · Patriotism · Renewed sense of community service	· The Millennial learner (see Table III)

folding, supervisors and instructors[2] add increasingly complex authentic learning experiences while simultaneously moving Millennial students from externally developed scaffolds to internally driven scaffolds.

The experiential evolutionary scaffolding approach contributes to genetic counseling education by preparing the Millennial learner with the critical and independent thinking skills necessary to be successful in the academic and professional environment. Millennial students are effectively and systematically moved from the supervisor-mimicking stage often initially encountered in clinical rotations to an independent stage where they know how to bridge their own gaps in knowledge. Millennial students are also presented with increasingly complex authentic learning experiences that develop their critical thinking skills, regardless of whether the student starts from a risk averse, safety-oriented state or a confident, special-oriented state.

Millennial Learners and Learning Theories

The Millennial Learner

Millennials tend to display ten distinguishing characteristics that are likely to shift how genetic counseling supervisors teach in clinical rotations to create effective learning.[3] The ten characteristics of Millennial students, as summarized in Table 3 (Elam et al. 2007; Howe and Strauss 2000, 2007; Weston 2006), can be broken down into three categories: self-views, needs, and talents. Supervisors who understand these characteristics and use teaching methods that leverage these traits may enhance the learning process (Mangold 2007; McGlynn 2008; Walker et al. 2006; Weston 2006).

Millenials' Self-View

The characteristics of being special, confident and pressured constitute the self-view that serves as a lens for Millennial students. They believe they are special and should be solving real world problems, with some feeling entitled to do bigger and better things (Elam et al. 2007; Howe and Strauss 2000; Kiesa et al. 2007). Many have acquired a strong sense of community responsibility and want to know how their learning can be immediately used outside the classroom (Elam et al. 2007; Howe and Strauss

2000). Thus, Millennials question the need to learn rote content and knowledge that won't be used in the near future (Howe and Strauss 2000, 2007; McGlynn 2005). They are confident and want to take on challenging tasks in their learning environments, and they can appear arrogant when instruction and assessment seem vague or irrelevant (Elam et al. 2007; Howe 2005). Additionally, Millennials have grown up in a busy world, juggling schedules at a young age; so they feel pressured, and thus do not want to waste time on unnecessary learning activities (Howe and Strauss 2000, 2007).

Millenials' Needs

Achievement, shelter, and convention constitute the needs that Millennial students feel are necessary to be successful. They need to feel a sense of achievement (or over-achievement!) and can be overly focused on grades as a measure of their learning (Howe and Strauss 2000, 2007; Monaco and Martin 2007). There are times when they perceive that "putting in effort" equates to "learning," even though assessment of their performance may indicate otherwise. Millenials have spent much of their lives being sheltered and expect supervisors to provide structure and support so they can meet their learning achievement needs (Howe 2005; Wilson 2004). To establish shelter and build achievement, Millennials also rely on convention and institutional authority, and they are quite comfortable seeking advice from supervisors to achieve the learning goals (Borges et al. 2006; Wilson 2004). However, Millennials want the goals and rules to be transparent so they are clear about exactly what needs to be learned.

Millenials' Talents

Millennial students bring the talents of being team oriented, tech savvy, able to multi-task, and accepting of diversity. Furthermore, they believe they can leverage these talents in the learning environment. They are comfortable working in teams and believe that teamwork is quite effective in building learning. For Millennials, teamwork is most effective when individuals are learning from each other in a reciprocal manner (Howe and Strauss 2000, 2007; Pardue and Morgan 2008). They are skilled in a wider range of technologies than previous generations and believe that access to data and resources through technology is more effective than memorization (Carlson 2005; Cobcroft et al. 2006; Tyler 2007). This is particularly true if they believe the content is changing so rapidly that it will be outdated by the time they are in their first job, a likely feature of today's genetic counseling environment. Millennials raised in a multimedia world have become used to multi-tasking and

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[2] Because the focus of this manuscript is about clinical supervision, we use the term "supervisor," recognizing that the proposed model could be applied to both supervisors and instructors.

[3] Although we respect and honor each person as a unique individual, we assume in this paper that Millennial generational characteristics will emerge in many if not most genetic counseling students. To the extent that this is not true, supervisors should adjust accordingly.

Table 3 Millennial learner characteristics, strengths and potential opportunities

	Characteristics	Strengths	Potential Challenges
Their Self View	Special Will solve world's problems	Believe that they can solve the future's problems	May need to be coddled & require individual help/ more time
		Believe in community/social responsibility	Me oriented
			Require reciprocal actions
	Confident Been told they can do anything	Can accomplish challenging tasks	Hesitant to face realities
		Bring positive attitudes	Sometimes come across as arrogant
	Pressured Are constantly busy juggling agendas	Want to do well, because they feel like they have to	More opportunity for cheating
		Tend to be on time	Want information quickly
Their Needs	Achievement Want to achieve although they can perceive effort as achievement	Want to do well	More opportunity for cheating
		Can accomplish challenging tasks	They have been "taught to the test"
		Can set specific goals	
		Very comfortable with tests	
	Shelter Need structure and to feel "safe"	When structure provided, grading disputes drop	They need to feel safe
		Still have variation in performance	Have difficulty with ambiguity, need more detailed instructions
	Conventions Comfortable with and need institutional authority if its rules are transparent	Value institutions	Are risk averse
		OK w/ institutional authority	Respond better individually or in teams vs. the whole class
		Can leverage parental authority	Conservative tendencies
		Can apply general rules if objective and transparent	
Their Talents	Team Oriented Comfortable working in teams, although not necessarily team projects	Work well in teams, peers can aid in creating pressure to perform	Do not think as well individually
		Can make use of social networks	Difficulty knowing what plagiarism is
			Group project challenges
	Tech savvy Generally comfortable with and want to use new technologies	Math and science skills are strong	Verbal skills are weaker
		Comfortable with new technology	Rely on unreliable internet resources
		OK with the use of Power Point & Smart Boards as long as they're not lectures	
	Multitasking Because they have to–see Pressured	Can be assigned work simultaneously	Short attention spans
			Difficulty with critical thinking
	Divers(ity) Have been exposed to and are aware of diverse groups and thoughts	Comfortable with a variety of team members and environments	Despite awareness, strongly held views may be difficult to combat
		Bring a variety of perspectives	

Adapted from Howe and Strauss (2000, 2007) and various articles on Millennial learners

having instant and constant availability of data. Therefore, they will multi-task, especially if they are pressured, and they believe they can juggle several activities, even during learning situations such as lectures or tumor boards! They are relatively comfortable with diversity and acknowledge that many viewpoints and cultures are a reality they must learn and understand.

Millennials Are Among Us

Evidence supporting the existence of core characteristics and their impact on learning appears in several educa-tional surveys and observations (e.g., Coomes and DeBard 2004; Elam et al. 2007; Howe and Strauss 2000; Weston 2006). The Millennial students have recently begun entering graduate school, including genetic counsel-ing programs, and supervisors are already reporting that their teaching methods are not as effective (Chambers 2010; Gloeckler 2008; Olson 2009). Research supports that Millennial learners often start from one of two positions. On one hand, many Millennial learners feel pressured and have a high need for shelter (Olson 2009) (a risk averse, safety-oriented state); therefore they have difficulty with a low amount of direction, ambiguous

situations, and the high amount of information needed. On the other hand, many Millennial learners feel special and self-assured (Kiesa et al. 2007; McGlynn 2005; Olson 2009) (a confident, special-oriented state) and want to jump into learning situations, even if they don't have all of the requisite knowledge or skills. While some may alternate between the two positions in different circumstances, many will generally present themselves one way or the other. How to teach them then becomes a critical question.

Genetic counseling supervisors can adjust their teaching methods to leverage the Millennial characteristics and look for strategies to minimize potential challenges. Prior research in other disciplines suggests that the Millennials' potential limitations include lack of independent thinking, critical thinking, and flexibility in handling ambiguous situations (McGlynn 2005; Monaco and Martin 2007; Tyler 2008). The responsibility for these deficits rest with both the Millennial students and the genetic counseling supervisors. Just as genetic counselors adjust to patients of different cultures (e.g. Hart and Nance 2003; Lindh et al. 2003), they need to adjust to students with a different cultural perspective, in this case, the Millennial learner.

Genetic counseling instructors and supervisors can adjust their teaching methods without compromising learning goals (Hart and Nance 2003; Lindh et al. 2003). A literature is developing regarding genetic counseling supervision, the method by which most genetic counseling students develop their clinical skills (Borders et al. 2006; Hendrickson et al. 2002; Kennedy 2000). In this paper, we draw from two theories, authentic learning and evolutionary scaffolding, to suggest a direction that genetic counseling supervisors could take to leverage Millennial characteristics and create effective learning that will result in developing successful genetic counselors. This paper will focus primarily on clinical activities, although the methods could work in an academic class room setting as well. Authentic learning and evolutionary scaffolding theories seem especially ideal for supervising genetic counseling clinical rotations, which involve patient interactions that require independent thinking, critical thinking, and flexibility in varied and often unique situations.

Authentic Learning

Authentic learning theory suggests that a "real world" context should be incorporated sooner rather than later to enhance learning. In authentic learning, the student is engaged in a genuine experience as an active participant, not just as an observer or a subordinate (Carlson 2002; Galarneau 2005; Rule 2006). Authentic learning typically increases the sophistication of the tasks as the student masters them. Authentic learning incorporates real-life problems that are open ended, activities that are targeted to real audiences outside the classroom, are complex enough to incorporate time and process constraints, and mirror the "real world" (Carlson 2002; Oblinger 2003; Rule 2006). Authentic learning also takes advantage of the interdisciplinary aspects of the field, allowing the student to meld the science (e.g., explaining autosomal dominant inheritance) with the art (e.g. assessing anticipatory grief) of genetic counseling. All of this is done in the context of *learning*, which involves continual assessment and feedback to improve the gaps in students' knowledge and skills. The result is that students develop critical thinking skills and are able to apply each aspect of their learning in future real-world situations of uncertainty (Lombardi and Oblinger 2007; Rule 2006).

Authentic learning provides powerful opportunities for the Millennial student who has special and confident self-views, high achievement needs, and talents for multi-tasking. Authentic learning allows Millennial students to feel special as they actively participate in solving patient problems. Authentic learning leverages confidence because the real world action allows Millennials to involve themselves in situations that will occur after graduation. Confidence is also built in the same way as in the video games they were raised on–where learning involves trial and error, and persistence rules. Reading instructions (if they even exist) may not be useful due to the changing dynamics of each situation. Authentic learning allows Millennials to develop critical thinking skills and achieve in the uncertain and ambiguous situations they will face as a practitioner (Cranton and Carusetta 2004; Oblinger 2003; Renzulli et al. 2004; Rule 2006).

Methods based on authentic learning theory alone do not meet the needs of Millennial students or genetic counseling supervisors. First, Millennials tend to come from either a risk averse, safety-oriented state, or from a confident, special-oriented state. Currently authentic learning theory does not adjust for these different, almost polar, states. While most Millennials will value authentic learning experiences, some may not feel sheltered or supported enough to handle these "real world" situations and activities right away since the "rules" may vary from one authentic situation to another. Even highly confident Millennials are likely to hesitate in authentic situations, as they want to feel special and assured that they will be able to achieve by demonstrating the appropriate competency.

Second, authentic learning theory does not address the increasing levels of complexity that supervisors will need to facilitate learning during the rotations. Research in hierarchical complexity modeling (Commons and Miller 2001) suggests that tasks and experiences have an escalating level of complexity. No matter where the Millennial starts, as the rotation progresses, the student must acquire the critical and

independent thinking skills, whether basic or complex, that operate in professional practice (Olson 2009). To facilitate learning for Millennial students and teaching for genetic counselors, we suggest that scaffolding be integrated into authentic learning experiences in genetic counseling rotations (e.g., Bickhard 2005; Commons and Miller 2001).

Evolutionary Scaffolding

The evolutionary scaffolding theory progresses through three stages from expert to reciprocal to self-scaffolding where control moves from an external, instructor-centered process to an internal, student-centered process (Holton and Clarke 2006; Holton and Thomas 2001). Scaffolding is a short-term process by which students are given a variety of support tools until they are able to perform new skills independently (Vygotsky 1978). Scaffolds are specific instructional supports designed to empower the learners to reach places they would otherwise be unable to reach (Vygotsky 1978). This learning theory posits sequential and supportive constructive learning activities which assess both the current level of development and ultimate potential while creating critical, independent thinking (Holton and Clarke 2006). Evolutionary scaffolding provides a structure for supervisors and Millennial learners with a need for achievement whether the Millennial starts from a risk averse, safety-oriented or confident, special-oriented state during their authentic learning experience.

Expert Scaffolding

The component of this theory that genetic counseling supervisors are most likely to use in rotations is expert scaffolding (e.g., Borders et al. 2006; Middelton et al. 1997; Reid and Donnai 2007; Hess 1986). In expert scaffolding, the supervisor evaluates the student's knowledge and attempts to bridge the gap between existing knowledge (e.g., classroom content) and needed knowledge (e.g., how to apply to a real patient) (Bell et al. 1993; Bruner 1985; Reiser 2002). The gap is known as the "zone of proximal development" (ZPD), and the supervisor's goal is to guide the student across the ZPD (Bruner 1985; Vygotsky 1978). The supervisor who role-models a pedigree intake for a class while each student captures the data, then assesses each student's level of competence to determine the ZPD (i.e., the gap in knowledge) and subsequently provides a variety of exercises specific to each student, is using expert scaffolding to improve pedigree construction and critical thinking skills (e.g., Reiser 2002). In expert scaffolding, supervisors take the position that they know where students start and that students learn more when guided safely through the ZPD with supervisor-led scaffolds (e.g., role models, questions, activities).

Self-Scaffolding

The next most common scaffolding application genetic counseling supervisors likely use is self-scaffolding (Benbassat and Baumal 2005; Hess 1986). Self-scaffolding is the idea that instead of relying on the supervisor for growth and knowledge, the students take full control and rely on themselves to internally assess the ZPD and use appropriate scaffolds (Holton and Clarke 2006; Knouzi et al. 2010; Mascolo 2005). For example, a pediatric referral may be similar to one from a previous week with respect to an uncertain diagnosis, but involve a family with a different desire for knowledge. The supervisor can expect the self-scaffolding student to independently seek the right resources for the new family (cf. Albanese and Mitchell 1993). The student is expected to become a critical, independent thinker and self-evaluate her or his knowledge. Where there is a ZPD, the student might choose self-reflection, a paper or electronic source, another clinician, or any other resource that will allow for learning. Under self scaffolding, the supervisor takes the position that the student learns more by doing even though it may make the student feel uncomfortable and less safe.

Reciprocal Scaffolding

Finally, although this is an integral part of the process, fewer supervisors rely on reciprocal scaffolding where two or more people work collaboratively on a common task to increase learning. In reciprocal scaffolding (Holton and Thomas 2001), the supervisor and student work together and may switch back and forth between who is the expert and who is the learner (Seymour and Osana 2003). In this component of the theory, control of learning is mutual since the situation determines which individual is the expert and maintains the basic assumption that both student and supervisor can be experts (and learners) and therefore jointly bridge the ZPD (Doering and Veletsianos 2007; Holton and Clarke 2006; Holton and Thomas 2001; Seymour and Osana 2003). For example, a reciprocal experience could occur after a student identifies a genetic testing laboratory that is not typically used by the rotation facility, but is less expensive and has a faster turn-around time. There may be other reasons that the facility uses their established laboratory, such as established billing practices or research collaboration. This may then become a reciprocal learning experience when the student learns about traditional hospital protocols and the supervisor learns about a different laboratory that may be more beneficial to the patients than the "one we have always used." Under reciprocal scaffolding, the supervisor takes the position that the student and supervisor learn more through mutual interaction versus guided action or learning by doing.

Table 4 Scaffolding categories

Scaffold category	Control of student's learning	Source of ZPD assessment	Motivation	Example of scaffolding activity
Expert	External	Supervisor	Imposed by supervisor	Leading questions and exercises
Reciprocal	Mutual	Joint	Synergized between supervisor and student	Open discussion
Self-scaffolding	Internal	Student	Derived from within student	Self-reflective journal

ZPD refers to the "zone of proximal development," which is the gap between existing knowledge and needed knowledge

Evolutionary Scaffolding

Holton and Clarke (2006) advocate an evolutionary approach to scaffolding that incorporates all three scaffolds. Many supervisors tend to select one scaffolding category and stick with that approach. While this may be a natural function of supervisor and human behavior, Holton and Clarke (2006) suggest that a better approach is to use all three scaffold categories with the goal of moving students from expert scaffolding to the self-scaffolding mode as shown in Table 4. Building from prior research in scaffolding (e.g., Ge and Land 2004; Holton and Thomas 2001; Reiser 2002; Reiser et al. 2001; Rosenshine and Meister 1994), Holton and Clarke (2006) describe how each scaffold provides a different function that can help in the development of learning.

While Holton and Clarke (2006) suggest use of all three approaches as a means toward increasing learning and problem solving, we further contend that this approach is ideal for Millennial learners and will increase independent learning, critical thinking and enhance flexibility in uncertain situations. If, during each rotation under evolutionary scaffolding, the genetic counseling supervisor begins with expert, moves to reciprocal, and finishes with self-scaffolds, such an approach will provide shelter in earlier periods and build confidence that leads to achievement throughout the process (e.g., Holton and Clarke 2006; Knouzi et al. 2010; Mascolo 2005). Moving along the continuum also leverages the special self-view of Millennials as they increasingly become the expert helping the patient. Reciprocal scaffolding leverages their teamwork skills, and each stage increases the level of multi-tasking required of Millennials (e.g., Howe and Strauss 2000/2007; McGlynn 2008; Rosenshine and Meister 1994). As the students move from external to internal scaffolds, they must rely more on independent and critical thinking in uncertain situations. This will press them to be flexible and select appropriate scaffolds on their own. As with many experiences, students with not always progress linearly along this evolution. However, the ultimate goal of self-scaffolding will provide them with the independent and critical thinking needed as they move from academics to the workforce.

Evolutionary scaffolding theory alone also does not meet the needs of Millennial students or genetic counseling supervisors. First, the Millennial learners are seeking experiences that are real enough to move to their first job with confidence (Olson 2009). Even as they move from expert to self-scaffolding, the clinical experiences may not provide sufficient real world learning opportunities unless they become increasingly complex (Olson 2009). Second, evolutionary scaffolding does not provide the means for genetic counseling supervisors to determine which types of authentic learning experiences (i.e., simple or complex clinical cases) should be presented at each scaffolding level (e.g., Doering and Veletsianos 2007; Rule 2006). We therefore propose consideration of what we term *experiential evolutionary scaffolding*, a model that brings together authentic learning experiences and evolutionary scaffolding while incorporating task complexity.

Applying Experiential Evolutionary Scaffolding in Millennial Learner Clinical Rotations

In the balance of this paper, we will describe and apply experiential evolutionary scaffolding and outline how it may increase the learning of Millennial genetic counseling students. We suggest that in the clinical rotation process, the supervisor moves the student through the evolutionary scaffolding stages in which students evolve from expert to reciprocal to self-scaffolding and supervisors incorporate authentic *learning* experiences in every stage (e.g., Doering and Veletsianos 2007; Holton and Clarke 2006; Reiser 2002; Rule 2006). In this way, genetic counseling supervisors can move Millennial students towards critical and independent thinking by leveraging their core characteristics while assuring that patients receive high quality care.

Experiential Evolutionary Scaffolding

Experiential evolutionary scaffolding, as shown in Fig. 1, is a model to match the need for increasingly complex authentic learning experiences with the appropriate scaffolding level. In this model, supervisors begin with formal

Fig. 1 Experiential evolutionary scaffolding in genetic counseling rotations

authentic learning experiences and expert scaffolding. A formal authentic situation is one that includes a real case for which students draw from a finite set of options (Commons et al. 1998; Commons and Miller 2001; McElroy 2009) but the case does not have real world limitations (such as time, diversity, or unexpected findings). Students then move to systemic authentic learning experiences with reciprocal scaffolding. A systematic authentic learning experience involves multiple variables and relationships (Commons and Miller 2001; McElroy 2009), such as limiting the time that the student has to prepare or adding last minute details that more closely mirror the real world. Finally they move to metasystematic authentic learning experiences with self-scaffolding as they complete the genetic counseling rotation. In a metasystematic authentic learning experience, the student works with systems of relationships and may be asked to simultaneously handle time and process difficulties, political changes, and socio-cultural differences (Commons and Miller 2001; McElroy 2009). Because experiential evolutionary scaffolding allows for escalated development of independent thinking via scaffolding and critical thinking via increasingly complex authentic learning experiences, we suggest this approach will meet Millennial students' and genetic counseling supervisors' needs (e.g., Doering and Veletsianos 2007).

Case Preparation

Case preparation is an essential requirement for genetic counseling sessions, but may be challenging for the counseling student due to the detailed level of requisite preparation and the variety and potential differences of each case. While the experienced counselor can incorporate prior knowledge and skills to provide many services "on the fly," the most successful consultations are conducted with adequate preparation. The student, or even novice counselor, will typically need a significant amount of learning to bridge the ZPD between classroom knowledge and clinical service. Case preparation presents an excellent opportunity for experiential evolutionary scaffolding, since each case represents a unique situation with problems that are open ended, and the student may need sequenced steps to reach a point of independent critical thinking. Case preparation typically requires multiple resources beyond the classroom, and if taught appropriately, will position students for life-long learning beyond their initial cases, thus benefiting the profession and the Millennial learner.

What does case preparation entail? For many of the cases the student in which the student will actively participate, students are expected to develop an outline or written case plan. They need to glean relevant information from myriad resources, including patient charts and extended family medical records. They need to know about available literature, potential research opportunities, support groups, patient education materials, and internet resources for the family. All of this information should be targeted to the family's unique situation and specific genetic needs. Prior to entering a patient session, the counselor should have prepared the differential diagnoses and defined the potential laboratory tests with appropriate insurance authorization. Finally, psychosocial issues that might impact not only the immediate, but the extended family should be considered (Uhlmann 2009).

We selected two of the case preparation tasks to demonstrate experiential evolutionary scaffolding and how it can increase the learning of Millennial genetic counseling students. Chart review and abstracting, as well as the literature search, were selected because they are universal to all clinical domains and can be more or less complex depending on the particular rotation and the specific family. Using these examples, genetic counseling supervisors can easily adapt experiential evolutionary scaffolding to other learning competencies expected prior to graduation.

Two Starting Positions for Millennial Learners

Strategies for teaching millennial learners often depend on the type of student. Millennial learners who feel pressured and have a high need for shelter will want to know exactly how to work with each situation. They are less likely to be comfortable with self-scaffolding in the initial stage of each rotation due to the unique issues embedded in each case. They want detailed instructions and a chance to observe the variety of cases that are seen. While observation is likely already incorporated early in each rotation, each case may have unique issues, so subsequent cases cannot necessarily be modeled from earlier ones. Some supervisors are also concerned that detailed instructions early in a rotation will set the stage for imitation with minimal critical thinking. Thus the instruction challenge for pressured, sheltered Millennial learners is to encourage them to self-scaffold by the end of the rotation.

On the other hand, Millennial learners who feel special and highly confident may begin sessions without sufficient

preparation. For them, experiential evolutionary scaffolding is designed to ensure competency while leveraging their confidence. Achievement may not be at their fingertips right away, especially if measured as a perfect, independent consultation during the first week. However, normalizing a process that initially provides expert support but quickly moves to reciprocal scaffolding will give those students the confidence to appreciate achievement and provide the supervisor a means to ensure good quality counseling (e.g., Holton and Thomas 2001; Rosenshine and Meister 1994). The confident Millennials do not want to constantly create outlines or conduct other mimicry tasks that seem designed to simply show that they know how to do something when they've once demonstrated that ability. Instead, expert scaffolding can initially demonstrate the purpose and value of an outline to structure a successful counseling session. Ultimately, the special student will appreciate the necessity of the outline, especially for different or complex cases. With experiential evolutionary scaffolding, the supervisor can feel comfortable allowing Millennial students to advance to the self-scaffolding level by adding complexity that is relevant to each case and allowing them to demonstrate that they are prepared to deal with contingencies. By using the outline to present the case to the supervisor, a mutual interaction with authentic learning situations in expert and reciprocal scaffolding provide evidence of the students' critical and independent thinking skills (Holton and Clarke 2006).

We assume the following. First, we assume that supervisors can quickly gauge the Millennial's characteristics because most genetic counseling programs have a small number of students and rotations include only one or two at a time, which allow supervisors to know their students (Howe and Strauss 2000, 2007). Second, we assume that most rotations are four to 8 weeks in duration (ABGC 2010); therefore, we will use a four-step process to explain the scaffolding progression and show how the approach works even in a short timeframe. Third, we assume that Millennial students generally begin from one of two positions – highly pressured

and in need of shelter or highly special and confident and in high need of achievement (McGlynn 2005, 2008; Olson 2009) and that their characteristic is easily recognizable (Howe and Strauss 2000, 2007; McGlynn 2005; Olson 2009). As mentioned previously, some may alternate between the two positions, but most will present themselves one way or the other. Finally, we assume that the supervisor is willing to consider the student the same way they do a patient and can and will customize their instruction to their characteristics (McCarthy Veach and Leroy 2009; Weil 2001), especially if doing so will increase critical and independent thinking skills.

Chart Review and Abstracting

In chart review and abstracting, the student will initially be required to work with the supervisor because there is no standardized chart documentation system. Since medical charts are likely different in each rotation, students need to learn how to find, read, and interpret relevant information. The supervisor's role is to first demonstrate the process of chart review for that particular rotation, provide increasingly complex authentic learning experiences, and move the student from mimicry to independent, critical thinking. Critical thinking occurs when the student is able to articulate prior knowledge and apply that knowledge to increasingly complex genetic evaluations. Independent thinking occurs when the student is able to develop his or her own scaffolds when facing new chart review problems (e.g., missing data or medical records of other family members from different institutions with different documentation policies). Upon completion of the experiential evolutionary scaffolding process as summarized in Table 5, students should be able to handle a variety of chart review situations and new problems that may arise in the professional setting.

Week One. Expert scaffolding and formal authentic learning both need to be used in week one. Since the medical records in many hospitals are different, initially, the

Table 5 Experiential evolutionary scaffolding for chart review

Scaffold category	Control of student's learning	Source of ZPD assessment	Example of scaffolding activity	Authentic learning level of complexity	Example of authentic learning experience
Expert	External	Supervisor	Leading questions and exercises	Formal	With two representative charts, supervisor demonstrates first one and evaluates student review of second
Reciprocal	Mutual	Joint	Open discussion	Systematic	Student reviews chart and bring path questions to supervisor, who had not previously incorporated
Self-scaffolding	Internal	Student	Self-reflective journal	Meta-systematic	Student realizes component of chart is missing and calls a different hospital to collect data

ZPD refers to the "zone of proximal development," which is the gap between existing knowledge and needed knowledge

formal, authentic situation requires that the supervisor takes sufficient time to review at least one or two charts with the student, providing specific questions and guidance regarding the location of key information. With these questions, the supervisor uses expert scaffolding in a formal, authentic manner to evaluate the student's knowledge and define further opportunities to bridge the gap between existing and needed knowledge. By guiding the student to the location of relevant information and comparing the collected information during the initial observation cases, the supervisor provides the framework for the student to be confident in her or his critical thinking for future cases.

Once the supervisor has built enough expert scaffolds to bridge the sheltered student's knowledge gap, an assessment of the quality of a chart review can be conducted. This will occur with either more questions or more sample charts to review. The supervisor and student can then move to reciprocal scaffolding and more complex authentic learning experiences in week two or three.

For confident student, the supervisor's goal is to use expert scaffolds to quickly assess whether the Millennial's confidence is warranted or not. The supervisor initially provides fewer expert scaffolds but offers ones that have more opportunities for independent critical evaluation. The supervisor may offer less guidance or a minimal number of scaffolds and then allow the student time and space to abstract the record, assessing the ZPD by conducting an independent chart review and comparing it to the student's effort. If, after the first case or two, it is clear that the student needs additional scaffolds, the supervisor can exert conventional authority. At that point, the student will likely recognize her or his lack of achievement and be more accepting of and desire the safety of the supervisor's expertise. If it is clear that the student is ready to progress, then additional formal authentic experiences, with new variables (e.g., a different type of patient, outdated or incomplete laboratory tests), can be added or the supervisor can move to reciprocal scaffolding. During this process the supervisor discovers whether the Millennial learner's confidence matches the critical thinking needed and works with the student according to her or his performance.

Weeks Two and Three. Millennial learners next expand their critical thinking skills and obtain a higher level of independence by reaching the reciprocal scaffolding stage and handling systematic authentic learning situations. A systematic authentic learning experience will occur with additional variables such as limiting the time the student has to prepare or adding last minute details which would more closely mirror a real world experience. In the reciprocal scaffolding stage of experiential evolutionary scaffolding, Millennial learners leverage their team skills as they conduct independent chart abstracts and have discussions with the supervisor regarding systematic authentic

experiences. A reciprocal learning experience is one in which students who are still extensively reviewing the chart may find content that was ignored by the supervisor. This will serve to remind the supervisor that those sections can continue to provide useful information or initiate a discussion regarding why the information was unnecessary (e.g., Holton and Thomas 2001; Seymour and Osana 2003). This may especially be true if the records are in an electronic form that is more comfortable to Millennial students.

By discussing the case with the supervisor, students learn critical and independent thinking skills in a team-oriented environment. Sheltered students may wish to have more expert scaffolds but can be challenged to move forward by leveraging the team framework inherent in reciprocal scaffolding. They learn what items are most important to the supervisor and the supervisor learns about different ways to explore electronic records or reconsiders the value of particular parts of the chart. Through mutual learning and interaction and more student independence, they begin to build a bridge that will allow them to choose different scaffolds to create success and operate more critically and flexibly in different situations (e.g., Holton and Clarke 2006). The supervisor may learn what discussion techniques speed the bridge building, and what new ideas or tools are surfacing from students that can be employed in genetic counseling, and both work to enhance the learning in the rotation. In this manner, both sheltered and confident Millennial learners leverage their comfort working in teams while satisfying their need to feel special by addressing the more complex situations they may face in the real world.

Week Four. In this stage, Millennial learners become independent, critical thinkers through self-scaffolding and handling metasystematic authentic learning situations. In a metasystematic authentic learning experience, the students not only are required to handle time constraints, but incorporate the more global realities of hospital policies or the socio-cultural differences that might impact the consultation. The students move toward complete independence in selecting their own scaffolds and can face more dynamic authentic experiences in metasystematic situations due to the confidence achieved in the back and forth learning during the reciprocal scaffolding stage. Students who can efficiently and accurately conduct a chart review will have succeeded in the self-scaffolding stage when they are aware that one or a number of elements are not in the chart (e.g., a particular consult note or pathology/laboratory report) and independently determine the appropriate privacy protocols before calling an outside hospital or laboratory to obtain it. The students no longer need the supervisor discussion to take this step. Instead, they may use the supervisor as a sounding board to confirm that all relevant data have been abstracted.

Metasystematic authentic learning experiences can be solved through self-scaffolding skills. When a multitude of related elements or relationships are in play (e.g., the computers are down and information that typically is readily accessible is now not available, the appointment is a last minute hospital consult, or the individual is from outside the country and doesn't speak English), students will be able to identify other ways to find medical and cultural information necessary to prepare the case. In addition to being a sounding board, the supervisor's role is to add more real world idiosyncrasies, such as a situation involving the patient who brings a huge previous record to the visit. Quickly reviewing and separating information important to the consult and glossing over the irrelevant data will require critical evaluation skills, allowing students to choose correct scaffolds and demonstrate that they are independent thinkers able to be flexible in the ambiguous environment they will face in practice.

Literature Searches

Because they are tech savvy and generally competent in accessing information, students may have no difficulty with the technical aspects of conducting an electronic literature search (Cobcroft et al. 2006; Tyler 2007). However, they may be overwhelmed by the number of articles, not know how to focus a search, draw only from the abstracts or electronic resources, and not be able to discern the relevant content. For example, a search on the relatively rare 'Muir-Torre' identified 214 articles from 1990 thru 2009 in pub-med. Which ones are most important? Since the need for a literature search will be significantly different depending on the rotation and the case, students need to learn how to identify and then fully read and interpret relevant papers. The supervisor's role is to provide guidance to the general domain and help students focus their specific needs for the various cases. Critical, independent thinking is easily assessed when students select and synthesize data from articles that are useful for the consultation.

Week One. Millennial learners who have been pressured to consistently perform well do not want information that isn't immediately useful. The dichotomy of an overwhelming amount of information and the desire to use only that which is immediately useful presents a challenge that can be addressed with experiential evolutionary scaffolding. This can be a challenge when a seminal article (which may not be available on-line and require a walk to the library and copy machine) is vital to the understanding of a particular condition. Millennial learners need formal, authentic learning with expert scaffolds to know the appropriate resources and processes to consider for their cases. They also need clear guidance regarding the value of

critically understanding a complete article versus an abstract or wiki-version of the topic. Initially, expert scaffolds such as papers provided in class or seminal articles or authors used by the supervisor can be shared, or the supervisor could provide detailed guidelines to focus a literature search. Special and confident students could be provided general expert scaffolds such as supervisor guidance that full text paper and electronic resources will be needed for the case to ensure that student confidence matches competence. The authentic learning in this early part of the rotation involves the disappointment and frustration of reading the perfect article for a family who then misses their appointment, only to be flexible enough six patients later when that information is useful and incorporated in a similar situation.

Weeks Two and Three. During this time, Millennial learners and their supervisors learn from each other through systematic authentic learning experiences. The reciprocal learning involves the student's ability to justify the value of particular papers, while the supervisor may need to reconsider the use of seminal papers that are not as useful. Literature searches are an ideal time to provide students with practice and guidance to increase critical thinking. Thoroughly reading and evaluating articles and web resources to understand their different perspectives is only one aspect. Arriving at a personal, thoughtful conclusion that can be defended as situations or patients change is the ultimate goal. Conversations between student and supervisor serve as a bridge between expert and reciprocal scaffolding (Holton and Thomas 2001; Seymour and Osana 2003). With their tech skills, Millennial learners can identify resources that may be more obscure or have a different focus, so reciprocal scaffolding could involve a discussion of how those resources can be useful (e.g., Holton and Clarke 2006; Holton and Thomas 2001; Seymour and Osana 2003). However, some articles may be older or contain less credible research, and after a thorough review and comparison, the supervisor can generate a conversation regarding the ability to critique peer-reviewed literature. Identification of articles that are different from the current practice in the clinic may also prompt a discussion regarding how practice policies are developed. Typically, such conversations result in enhanced learning for both the student and supervisor. The systematic authentic learning situation presented in weeks two and three prepares the student to identify relevant articles that apply as situations change.

Week Four. As the students move to more independent and critical thinking, the learning that occurs at this point would also involve a shift in how much time they spend reviewing each article. In journal club, evaluating a complete article, including detailed critique of the methods section, is essential to a comprehensive dis-

cussion of the paper; in a clinical environment with 5 to 10 patients a week, students and supervisors will peruse articles with a focus on the abstract, background, and discussion to identify what is relevant to the patient with an appointment in an hour. However, reinforcing the need to more thoroughly review the article after the session and prior to writing a letter will help the student synthesize the relevant information. The metasystematic authentic learning experience will come as students need to use hospital or university resources to find an essential article (without requesting from the listserv!) for a patient scheduled in three hours. As the rotation progresses, self-scaffolding students will have their own questions about certain aspects of a case and take the initiative to conduct their own relevant literature search before discussing the issue with the supervisor.

Flexibility in Experiential Evolutionary Scaffolding

In an actual genetic counseling rotation, we recommend that supervisors use experiential evolutionary scaffolding to focus on competencies and their underlying core skills. When using experiential evolutionary scaffolding, supervisors can enhance implementation by communicating the overall teaching model (cf. McKeachie, 2010). Teaching strategies suggest that helping students understand the method and reasons for electing that method increases their understanding and willingness to learn (cf. Davis 1993).

To demonstrate how the approach might work in this paper we focused on two specific tasks in case preparation. However, we propose that for each competency, supervisors consider and provide more complex authentic experiences as the rotation progresses and move the student through the three evolutionary scaffolds. Doing so is likely to move the sheltered Millennial student forward while allowing supervisors the flexibility to quickly progress the confident and special student who has sufficient skills. This might be challenging for short rotations or those with lower volumes of patients, several supervisors who only see a limited number of cases with each student, or locations with such a variety of cases that the student is not able to progress through more complex cases. However, by using the experiential evolutionary scaffolding process, supervisors and students can focus on various aspects missed in one rotation to become the focus of the next one. Table 6 demonstrates how scaffolding can evolve in the tasks described herein as well as other aspects of case preparation to demonstrate the flexibility of experiential evolutionary scaffolding.

Experiential evolutionary scaffolding can be managed on a weekly basis and/or on an individual basis. To demonstrate how the approach might work, in this paper we focused on weekly rotations since many programs are structured in this manner. However, supervisors have the flexibility to take action based upon the performance of the student. In this case, supervisors can talk briefly with their students to identify their Millennial characteristics (see Table 3) and determine the starting point. They can then begin with a formal authentic experience to assess the scaffolding needs. For students who struggle either in the expert or reciprocal stages, extra time may be necessary. If so, the supervisor can expand the number of scaffolds used for the task (more questions, different activities, additional handouts) and provide additional formal or systematic authentic learning experiences. Initially, the student will likely not achieve self-scaffolding in all areas. However, the student should always be encouraged to reach self-scaffolding in the final week of the rotation. By later rotations, self-scaffolding in metasystematic situations should be encouraged and evaluated as early as possible.

Leveraging Millennial Characteristics with Experiential Evolutionary Scaffolding

Moving to experiential evolutionary scaffolding leverages several Millennial characteristics while improving the independent and critical thinking capabilities of student counselors. First, Millennial students will be more confident because they have observed during the expert scaffold step how the supervisor operates and will have learned some of the supervisor's skills. Sheltered Millennials have the opportunity to experience real world authentic situations whereas highly confident students have the opportunity to demonstrate their skills so that they can move onward to increasingly complex authentic experiences.

Second, reciprocal learning leverages the special self-view of Millennial learners and their team skills by allowing them to work on a more equal footing with the supervisor and take a more active role in the counseling session. In a two-pair team with the supervisor or a three-pair team with the supervisor and patient, they can showcase their tech savvy and multitasking talents (Howe and Strauss 2000, 2007) in gathering the information needed to serve the patient. During the team work between supervisor and student and their joint interaction with the patient, each acts as a scaffold for the other in building learning and serving the patient's needs.

Finally, self-scaffolding is the supreme leverage of the special and confident self-views of the Millennial learner and the ultimate indication of successful performance in an authentic learning experience for genetic counseling professionals. In case preparation, the student prepares a comprehensive case plan that is relevant to the specific family's situation. The student takes the initiative to assure

Table 6 Scaffolding for case preparation in clinical rotations

Category	Week 1 Expert	Weeks 2/3 Reciprocal	Week 4 Self-scaffolding	Learning Outcome Student able to:
Chart review	Sp identifies location for all and then essential info	St initially reviews; Sp may learn other issues	St calls lab if result not in chart	Efficiently and accurately review chart
Lit review	St pulls from lectures; Sp provides guidance to seminal papers or relevant authors	St and Sp both identify and focus articles	St identifies articles to seek own edification	Identify and read relevant articles
Define differentials	St identified most obvious; Sp guides to others	St defines most; Sp considers ones that may be less common	St identified most and determines reasons to consider (or not)	Articulate all differentials and rank, with reasons for consideration
Know lab options	St relies solely on Gene Tests; Sp guides to others	St distinguishes reason to select; Sp learns of new resources	Contact lab w/ questions; writes letter of medical necessity when needed	Identify and prepare letter of medical necessity, test request form, sending logistics
Anticipate psychosocial issues	St recognizes potential major issues with focused Sp ?s	St uses experience to build additional questions	Identify papers to address	Identify potential issues and prepare to address
Identification of resources, including patient education	Sp guides to available local/ national resources	St can identify new resources; helps evaluate	St calls support group leader to define how to refer	Know and use support resources appropriately

(*Sp* supervisor; *St* student)

that education, support and research resources are identified and available to all members of the consult team. At this point, the supervisor's role is minimal before and during the counseling session, and reflective and interactional afterwards.

Before the counseling session, the supervisor can create support by being available to the student and serve as a safety net if there are specific questions or concerns. The case review is more open-ended and conversational rather than didactic. Any serious errors or omissions can result in a temporary move to an expert or reciprocal scaffold to ensure that supervisor support is available. This will mimic the first weeks or months of a first job, where similar support will likely be available for most new graduates prior to seeing patients independently.

After the session, the supervisor will reflect with the student how the case preparation directly impacted the outcome of the session. The student and supervisor conduct a self-reflection asking each other what went well and what potential changes might lay ahead for future sessions/patients. Upon sharing with each other these viewpoints, student continue to understand how to evaluate their own knowledge, thus increasing self-scaffolding skills, so that as a practicing counselor, they can establish a pattern for continued improvement and life-long learning in their own practice.

Contribution, Future Research and Conclusion

An experiential evolutionary scaffolding model contributes to clinical supervision in graduate education programs in two significant ways. First, the model contributes by providing a method for genetic counselors to increase critical and independent thinking while leveraging the characteristics of the Millennial learner. Critical thinking is enhanced when genetic counselors provide increasingly complex authentic learning experiences (e.g., Holton and Clarke 2006; Lombardi and Oblinger 2007; Rule 2006) that provide both risk averse, safety-oriented and confident, special-oriented Millennial learners the means to achieve success. Independent thinking is enhanced by moving Millennial learners each week from expert to self-scaffolding (Holton and Clarke 2006). By using experiential evolutionary scaffolding with Millennial learners in the genetic counseling rotation, genetic counseling supervisors can produce effective, self-directed genetic counseling professionals.

Second, experiential evolutionary scaffolding contributes by creating a new model for education theory that leverages Millennial learner characteristics and boosts critical and independent thinking. For authentic learning theory, we suggest that not all authentic learning experiences are created equal (e.g., Bickhard 2005; Holton and Clarke 2006; Rule 2006). We draw from the hierarchical complexity model to show how educators can incorporate task complexity into authentic learning experiences (Commons and Miller 2001). By providing different levels of complexity (e.g., formal, systematic, and metasystematic levels), at the right time in evolutionary scaffolding (Bickhard 2005; Commons and Miller 2001); educators can ensure that Millennial learners are reaching higher stages of critical thinking. By linking increasingly complex authentic learning experiences to different levels of scaffolds, we show how instructors can align experiences to scaffolds while

developing independent as well as critical thinking skills (e.g., Bickhard 2005). While experiential evolutionary scaffolding in this paper is applied to genetic counseling rotation tasks, we believe the strategy is equally valuable for many other competencies the Millennial learner must develop.

There are some caveats to experiential evolutionary scaffolding that supervisors of genetic counseling students may wish to consider. First, we provide two relatively concrete examples to illustrate the potential of the proposed model. As supervisors apply the model to the additional American Board of Genetic Counseling competencies, adjustments such as focusing an application on a specified set of competencies may be necessary. Second, we have not addressed the workload impact to instructors. As with any new teaching method, workload may be higher during initial implementation; however, as supervisors develop expertise with the model, we expect a return to original workloads. Initial discussions with colleagues in other disciplines who are using a form of experiential scaffolding appear to support our premise. Third, self-assessment for students and instructors becomes an important factor. To the extent that self-assessment is weak for either party, the value of the model may be limited; therefore, evaluation and potential development of self-assessment skills may be necessary to successfully implement it. This will be especially true if your students vacillate between the sheltered and confident positions. Finally, we structured our examples into a four week timeframe. While we believe the model is flexible enough to handle the wider range of timeframes and complexity encountered during rotations, additional exploration in this area is likely to be fruitful. Examination of these and other issues suggests the need to conduct future research into the evolutionary scaffolding model.

Future Research

Currently, there is limited research in the health care field that investigates recommended teaching strategies for the Millennial generation. In the genetic counseling field specifically, there is limited information available to instructors and supervisors about supervising strategies, and most of this information is anecdotal. Periodic articles, lectures, and/or presentations at the National Society of Genetic Counseling (NSGC) annual education conference comprise the bulk of the formal training. In general, there is a sense that if you are a genetic counselor with any experience, you are able (and willing) to teach and supervise students. Research to assess and improve our teaching and supervision strategies is needed to more efficiently and effectively train the next generation of genetic counselors.

Future research could evaluate several aspects of teaching and learning in the genetic counseling field to meet the growing demand of the future. Some ideas include:

- How to more easily assess ZPD for each student, while balancing general common competencies against those aspects that are specific to each case.
- How to move the student thru expert to self-scaffolding in selected areas during rotations that do not allow for comprehensive development because they are shorter, involve many case supervisors, have a less predictable or lower volume of patients and/or, or a chaotic variety of complex cases.
- How to identify and develop the skills, knowledge, and attitudes that best promote reciprocal scaffolding, which relies on mutual interaction.
- What skills, knowledge, attitudes are essential to promote self-scaffolding, which represents lifelong learning?
- How does this evolution transfer to a first job – what gaps exist in teaching programs that can enhance self-scaffolding?
- How to develop and test other teaching models to minimize the intensity that currently characterizes the standard genetic counselor training, while maintaining excellence.
- How to help instructors and supervisors define an environment best suited for teaching Millennial learners prior to the starting of their careers.
- Whether and under what conditions the evolutionary scaffolding model could be applied to international students or those in other generations.

Conclusion

Genetic counseling supervisors who use the experiential evolutionary scaffolding model can effectively and systematically move Millennial learners from the supervisor mimicking stage often initially encountered in clinical rotations to the critical and independent thinking stages, regardless of whether the student starts from a risk averse, safety-oriented state or a confident, special-oriented state. The combined approach is intended to prepare Millennial learners by increasing the critical and independent thinking skills necessary for their success in the professional environment in which they are about to embark.

Whose responsibility is it to "change"? As with any unequal-power relationship, (parent-child, president-intern, employer-employee) a teacher-student relationship is one in which the teacher has the most control and is typically the

more experienced adult. In addition, excellence in a learning situation is not only dependent on the learner, but the flexibility of the teacher to leverage the self-view, needs and talents of the student(s) in the room at that time. We will be teaching Millennials for the next few decades. So we challenge instructors and supervisors to consider new approaches that will help create a great generation of effective and successful genetic counselors.

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