Generational Learning Style Preferences Based on Computer-Based Healthcare Training

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Generational Learning Style Preferences Based on Computer-Based Healthcare Training

A Dissertation by

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Brandman University

Irvine, California

School of Education

Submitted in partial fulfillment of the requirements for the degree of

Doctor of Education in Organizational Leadership

April 15, 2016

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My life would be nothing without the grace of my Heavenly Father. Because of Him, I am grateful to fulfill my dream as a promise to my natural father, Henry Page. Dad, you made sacrifices that I could not understand until I attempted this journey, and it was my prayer to make you proud. To my mother, Mary Page, who taught me through her educational experiences that talking about doing something great is harder than actually embracing the process. Mother, your personal accomplishments let me know I could achieve whatever I set my heart and soul to do.

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To my amazing Chair, Dr. Douglas DeVore, and Committee Members, Dr. Linda DeLong and Dr. Lisbeth Johnson, your leadership, mentorship, and unconditional support kept me going. Not wanting to disappoint you and the people who believed in me most is what kept me determined. I will never forget what each of you contributed to my life to help bring me to this point. The journey was worth it!
ABSTRACT

Generational Learning Style Preferences Based on Computer-Based Healthcare Training

by Michaelle H. Knight

Purpose. The purpose of this mixed-method study was to determine the degree of perceived differences for auditory, visual and kinesthetic learning styles of Traditionalist, Baby Boomers, Generation X and Millennial generational healthcare workers participating in technology-assisted healthcare training.

Methodology. This mixed-method research design used quantitative and qualitative data to analyze the research questions regarding generational learning style preferences. The study focused on quantitative data collection, through an online survey instrument that included two open-ended qualitative questions. The quantitative component (survey) was administered via a 24-question online survey. The results obtained from the qualitative component (interview questions) identified analyzable patterns and themes used to make general claims about generational preferences for visual, auditory, and kinesthetic learning. The population for this study included healthcare staff, who participated in computer-based healthcare training.

Findings. Statistical reporting provided quantitative and qualitative results showing the generations represented in this study utilize some degree of all three learning styles: visual, auditory, and kinesthetic. Interpretation of the data presented a significant difference for a visual learning style preference for Baby Boomers and Generation X. Among all generations, Generation X exhibited the most variation between learning style questions and intergeneration responses.

Recommendations. This study considered the learning style preferences of the current generational learners in the workplace who receive computer-based healthcare training. There are additional research opportunities to explore learning style preferences of Generation Z, clinical healthcare providers, healthcare trainers, secondary, or complimentary learning styles that influence learning outcomes for adult learners, or technology as the single driver for workplace success.

Conclusions. First, all generations represented in this study have varying degrees of visual, auditory, and kinesthetic learning style preferences. Second, generational studies have helped to uncover differences between the generational cohorts and the importance of understanding their values. Third, the concluding thought of this research is that vision is the primary learning source and is enhanced and/or complimented by a secondary learning style.
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CHAPTER I: INTRODUCTION

From the early 1900’s until now, philosophers, scholars, and educators have thoroughly examined the relationship between teaching and learning. Their examinations have uncovered an array of methods to convey new ideas about learning, many of which have altered the world, causing others to change, or at least challenge their way of thinking (Chandler, 1999-2015; Lepi, 2012). New ideas sparked interest, created hope, and opened the door to explore the possibilities for something different. In general, technology is the one idea that has influenced all industries and continues to make a world-wide impact (Menachemi & Collum, 2011).

Technology has been a major contributor to this new era of learning (Menachemi & Collum, 2011). As it relates to education, technology has expanded the borders of the standard classroom by creating a virtual environment. Today, teaching techniques and the ability to learn have been enhanced by the use of technology. Learners are now able to complete entire college programs while sitting in their living room. In addition, individuals have the option of attending facilitator-led courses coupled with online instruction. Though the traditional instructional design is not extinct, schools, universities, and other learning facilities are moving toward a blended learning approach (“Three Reasons,” 2011). The blended learning approach offers flexibility to the learning experience (Dziuban, Moskal, & Hartman, 2004; Cambiano, De Vore, & Harvey, 2001; Blended Learning Models, 2012).

Research indicates the availability of resources for training, development, and education in general are no longer limited to a standard classroom setting (“Three Reasons,” 2011; Blended Learning Models, 2012). Advancements in technology have
taken learning to new heights by providing mediums that meet the various needs of individuals, as well as organizations (Barnes, Preziosi, & Gooden, 2004; “Three Reasons,” 2011). Organizations have been able to design learning programs and implement learning systems that meet the specific needs of the business. Like so many corporations, healthcare has increased its usage of technology upon implementing the Electronic Health Record (EHR). Converting to an EHR system helped in the transition to a paperless patient-care system and more efficient processes to reduce frontline staff errors in patient registration, scheduling access, and payment collection processes (Learn EHR Basics, 2014; Benefits of Electronic, 2014; “What are the advantages,” 2014).

As this transition took place, one area that was not considered in the conversion process was the impact to the employees who would be responsible for utilizing the system (Menachemi & Collum, 2011). Training efforts needed to be developed in order to sustain the organization based on the patient-care functions staff perform (Menachemi & Collum, 2011). However, an essential factor of training is considering the audience. Healthcare is not unique in that there are potentially five generations within the workplace (Weinstein, 2015; Carerra, 2012). The differences among these generations may be subtle or extreme. Moreover, their perceptions about and preferences for learning technology may differ among the groups that are represented.

**Background**

**Learning Styles**

Learning style preferences begin to develop in childhood and rarely change in adulthood (Russell, 2006). From a teaching perspective, being aware and conscious of
how learning is optimized for each individual is critical in ensuring learning is effective (Barnes et al., 2004). Recent research proposes there are seven styles of learning:

Table 1

*Learning Styles and Definitions*

<table>
<thead>
<tr>
<th>Style</th>
<th>Learning Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual (Spatial)</td>
<td>Prefer using picture, images, and spatial understanding</td>
</tr>
<tr>
<td>Aural (Auditory-Musical)</td>
<td>Prefer using sound and music</td>
</tr>
<tr>
<td>Verbal (Linguistic)</td>
<td>Prefer using words, both in speech and writing</td>
</tr>
<tr>
<td>Physical (Kinesthetic)</td>
<td>Prefer using your body, hands and sense of touch</td>
</tr>
<tr>
<td>Logical (Mathematical)</td>
<td>Prefer using logic, reasoning and systems</td>
</tr>
<tr>
<td>Social (Interpersonal)</td>
<td>Prefer to learn in groups or with other people</td>
</tr>
<tr>
<td>Solitary (Intrapersonal)</td>
<td>Prefer to work alone and use self-study</td>
</tr>
</tbody>
</table>

(Lepi, 2012, p.1; *Overview of Learning*, 2015, para. 2)

For the purpose of this study, the focus was on three primary learning styles centered on basic human senses: visual (sight), auditory (hearing), and kinesthetic (touch) (Russell, 2006; “Design for Adult,” 2015). Though all seven learning styles are relevant, research consistently reported vision, hearing, and touch as the primary, foundational learning styles. According to Russell (2006), these learning styles are dominant for the entire United States population. Approximately 65% of the entire population are visual learners, 30% are auditory, and 5% are kinesthetic (Russell, 2006; Chau, 2006).

Visual learners learn best by seeing the material and forming mental images that can be recalled to apply what was learned. These learners will also rely upon
written instruction to secure their understanding. Learners who use their auditory system, hear and apply concepts that are spoken. Their preference is to talk through a process to clarify understanding versus reading. It is also common for learners who prefer this style to have another person read to them while they work on a task. Kinesthetic learners use the sense of touch, and motion to secure learning concepts. As a rule, kinesthetic learners excel in hands-on practice exercises because they can physically “go through the motion” to solidify their learning (Russell, 2006, p. 3).

Research supports that understanding adult learning styles may be more important in an online learning environment than the traditional learning approach (Barnes et al., 2004). The world is consumed with technology and, therefore, training methods have been adapted to meet the standards of this technology era.

**Adult Learning**

The idea of being a life-long learner is a concept that directly applies to adult-learning. The term “adult learning” refers to providing employees with the educational resources or training necessary to perform their work (Kenner & Weinerman, 2011).

Knowles (1984) provides an example of applying andragogy principles to the design of personal computer training:

1. There is a need to explain the reasons specific things are being taught (e.g., certain commands, functions, operations, etc.).

2. Instruction should be task-oriented instead of memorization -- learning activities should be in the context of common tasks to be performed by the others.
3. Instruction should take into account the wide range of different backgrounds of learners; learning materials and activities should allow for different levels/types of previous experience with computers.

4. Since adults are self-directed, instruction should allow learners to discover things and knowledge for themselves without depending on people, it will be provided guidance and help when mistakes are made. (as cited in Pappas, 2013, para. 5)

Further, adult learners in general are self-motivated and goal oriented (Knowles, 1984; Montgomery & Groat, 1998). Adult learning should have structure with clear expectations and a detailed syllabus (Wilson & Gerber, 2008; Kenner & Weinerman, 2011). Overall, during training, whether facilitator-led or computer-based, instructions should be simple and include modules to note checkpoints of completion (Kenner & Weinerman, 2011). Because adults are learning “by choice,” their style of learning should be considered if learning is to be effective and applied with an expected outcome in a corporate environment.

In a peer-reviewed article written by Jovita Ross-Gordon (2011), the author suggests adult learners are classified as “non-traditional” students. Her research on non-traditional students reports 73% of students are adults who have one or more of these seven characteristics:

1. entry to college delayed by at least one year following high school,

2. having dependents,

3. being a single parent,

4. being employed full time,
5. being financially independent,

6. attending part time, and

7. not having a high school diploma (para. 1).

Learning styles, or preferred learning styles, may be present in early learning exposure and cemented by experiences that shape an individual as he/she continues to develop. The learning preference may also be dependent upon the subject matter (Eye, 2015, para. 5). Learning style models were developed to classify students according to the way they receive and process information (Felder & Silverman, 1988). There are five learning style models with learning style inventories that were examined in this study: VAK Learning Style Model, Felder Solomon Learning Style Index, Multiple Intelligences, the Kolb Learning Style Model and Learning Style Inventory (LSI), and the Odessa Learning Style Inventory. These models were included because each focus on identifying learning style preferences for visual, auditory, and kinesthetic learners.

Considering there is a multitude of factors to explore why an individual prefers or is inclined to a certain style of learning, one aspect that remains true is learning techniques have evolved to incorporate a broader span of technical advancements that were not available a century ago (Csorny, 2013). Hence, there may be distinctions in the learning preferences based on generational perspectives.

**Traditionalist Learning Style**

Traditionalists were born prior to 1946. They are often characterized by the Great Depression (The Traditional Generation, 2015) and the impact World War II had on their upbringing and family dynamic. Their knowledge and experience with technology is limited to radio signals, stereo phonograph, and electronic computers that were in the
early stages of development in their lives (Dziuban et al., 2004). Much of their technical knowledge was founded on building cities and railways and developing today’s space program, not computer systems (Meet the Generations, 2015; The Traditional Generation, 2015). Adult learners in this group tend to be uninterested or disengaged in learning with technology (“Talking about,” 2015). Because they prefer face-to-face communication, Traditionalists are apt to learning in a facilitator-led training environment (“Talking about,” 2015; Faneli, 2014).

According to the West Midland Family Center (WMFC) Generational Differences Chart, Traditionalists are adapting to technology and believe their learning should contribute to the goals of the organization (WMFC, 2015). Their ability to adapt and their desire to support the company can be seen as factors that contribute to their positional longevity and leadership presence (Weinstein, 2015).

**Baby Boomer Learning Style**

Like Traditionalists, Baby Boomers are identified by their strong work ethic and loyalty to the organization (Reeves, 2006). Born between the years of 1946-1964, many “boomers” are currently leading professionals within many organizations. Inspired to achieve educational success, many individuals of this generation pursued educational advancement opportunities. Their years of service and dedication have afforded them success and the opportunity to experience retirement (Reeves, 2006). Those who remain employed are faced with the challenge of learning new technologies in order to stay current and competitive in their roles.

Technology advancements during these years included the fax machine, microcomputer, BASIC computer language, and less sophisticated software programming
and application (Dziuban et al., 2004). Today, Baby Boomers are not completely comfortable with technology; however, they are willing to learn. “Boomers” have acquired technical, computer-based skills in order to perform tasks related to their employment (WMFC, 2015). Their outlook on learning something new is training should not only contribute to organizational goals, but also lead to promotion and additional compensation (WMFC, 2015).

This group was born during a social time where working together was a means for survival. They are prone to learn best in small groups, learning from one another. Generationally, learners in this age group draw from life experiences to reinforce classroom, textbook, or on-the-job learning (Montgomery & Groat, 1998). With that, dealing with the emotions of learners from this group is key. If a learner’s memory is triggered and the associated emotion is negative, learning is impacted negatively (Hendel-Giller et al., 2010-2011).

**Generation X Learning Style**

Though one of the smaller generational cohorts, Generation X is currently the largest group represented in the workplace (Wilson & Gerber, 2008). These individuals were born between 1965-1980. “Gen Xers” have the benefit of having been exposed to the values of the Baby Boomers and direct experience with learning technology. This generation felt the profound impact of developments in technology (Dziuban et al., 2004). Windows keyboard mouse combinations, complex programming language, Microsoft and Apple operating systems have all been solid technological foundations for this generation (Dziuban et al., 2004).
Generation X consists of independent learners. Given their level of comfort with technology, e-learning, online tutorials, and other means of independent learning work well (Hendel-Giller et al., 2010-2011). Learning through these types of technology have become a recent phenomenon (Reeves, 2006; Wolfson, Cavanagh, & Kraiger, 2014). Research supports that interactive games, video-gaming, e-learning, virtual learning, and other non-traditional technologically enhanced learning environments were introduced during this generation (Wolfson et al., 2014; Meet the Generations, 2015; Reeves, 2006). These independent technical learning tools are common for Generation X and give them the sense they are in control of their learning outcomes (Meet the Generations, 2015). Individuals from Generation X tend to think of training and development as a means to increase versatility within the workplace (WMFC, 2015). This generation was assimilated in technology, making them one of the first generations to experience technologies that still exist (WMFC, 2015).

**Millennial Learning Style**

Millennials were born between 1981-1994. This group is now entering the workforce in staggering numbers (Reeves, 2006). Of the generational learners, this is the only group born with technology in full bloom (Dziuban et al., 2004). Additionally, they are the generation who has experienced the rapid changes in technology and a world without borders. Millennials do not know life without technology (Reeves, 2006). They have been bombarded with endless advancements in technology via the Internet, Web, social-media, blogs, wikis and other digital assistants (Dziuban et al., 2004). According to research on blended learning, this generation is the most technologically diverse (Dziuban et al., 2004). Their seemingly innate ability to navigate through technology,
complete tasks while listening to music and talk on the phone can be intimidating to adults from the aforementioned generations (Dziuban et al., 2004; Reeves, 2006; Weinstein, 2015). However, the basic skills necessary to think critically and take initiative are not as developed (Dziuban et al., 2004). In today’s workplace, technical, soft, and interpersonal skills are necessary to achieve an optimal level of professionalism.

According to Reeves (2006) on generational learning styles, Millennials learn best in an environment that incorporates technology with five additional components: fun, engaging, fresh, movement at a steady pace, and rewards skill development (Reeves, 2006). Chester (2005) notes six concepts used to inspire Millennial learners: starting with an orientation rather than training, assessing what learners already know, reinventing training regularly, identifying support for answers, training “why” a process is done, and keeping training interactive and fun. Training for Millennials might be amiss without technology, because it is an integral part of their lives (WMFC, 2015). For many of them, taking risks is part of the opportunity to learn (WMFC, 2015).

Learning with Technology

“E-learning” is an abbreviated term for electronic learning. By definition, this type of learning can be presented in various forms, such as web-based learning, online modules, info-graphics, interactive exercises, tutorials, and a variety of media-related style learning (Ruiz, Mintzer, & Leipzig, 2006; What are the Benefits, 2009; Hodges, 2009). Instructional designers, instructors, trainers and the like began implementing e-learning in order to reach their target audience, without the limitations or time constraints associated with facilitator-led training (“What are the Benefits,” 2009; Faneli, 2014). According to an article on e-learning, the benefits of utilizing e-learning are:
1. Is more cost-effective.

2. Saves time without sacrificing quality.

3. Minimizes travel.


5. Provides More Consistent Course Delivery.


This training method was instituted as a mass-training opportunity for several types of organizations and industries, including healthcare (Criu & Ceobanu, 2013). “The integration of e-learning into medical education can catalyze the shift toward applying adult learning theory, where educators will no longer serve mainly as the distributors of content, but will become more involved as facilitators of learning and assessors of competency” (Ruiz, Mintzer, & Leipzig, 2006, p. 207).

While there are benefits to an e-learning, technology training approach, there are some disadvantages that companies should consider (“What are the Benefits,” 2009; Applying Adult Learning, 2014).

For a number of reasons, not every e-learning program for adults follows adult learning principles. Most adults will move quickly through the modules of an e-learning course, and they may do well on the final exam. E-learning courses for adults that do not incorporate the principles can and do succeed. However, they do not take into account the unique learning needs of adults and sometimes fall short in ensuring utmost performance (Applying Adult Learning, 2014, p. 1).
In order to be effective, trainers who teach healthcare, computer-based training should consider the benefits, disadvantages, and learning styles of the adult learners who will participate in learning (“What are the Benefits,” 2009; Applying Adult Learning, 2014; Meet the Generations, 2015).

**Problem Statement**

Advancements in computer technology have offered a myriad of industries an opportunity to streamline processes and create greater efficiency (Csorny, 2013). Healthcare is part of this industry revolution, specifically as it relates to employee training. Over the years, staff training has evolved from one-on-one teaching, departmental shadowing, and facilitator-led exercises to electronic learning (Hodges, 2009). Employing this style of training allows an organization to mass train employees, regardless of location, with minimal disruption to the workday and noted reduction in training costs by implementing only one style of training (Cru & Ceobanu, 2013).

While computer-based training allows for greater efficiency, there is limited consideration for an employee’s learning style or degree of comfort with technology (“What are the advantages,” 2014; Learn EHR Basics, 2014). There has been significant research on matching training approaches to learning styles (Chandler, 1999-2015). However, the shift from standard facilitator-led training in healthcare that once focused on a specific learning style began to fade as the EHR system emerged (Learn EHR Basics, 2014). With the technical enhancements healthcare has embraced, adult learners are forced to adapt to these systems and the training necessary to operate them. Historically, healthcare organizations have not considered the implications of training
outcomes based on the multi-generational users within the company (Menachemi & Collum, 2011).

**Purpose Statement**

The purpose of this mixed-method study was to determine the degree of perceived differences for auditory, visual and kinesthetic learning styles of Traditionalist, Baby Boomer, Generation X and Millennial generational healthcare workers participating in technology-assisted healthcare training.

**Research Questions**

1. To what degree do Traditionalist adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

2. To what degree do Baby Boomer adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

3. To what degree do Generation X adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

4. To what degree do Generation Y (Millennial) adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

5. Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and
Millennial generational adult learners when participating in health care technology-assisted training?

**Significance of the Study**

Literature and research supports significant findings in learning styles of adult learners (Cambiano et al., 2001; Design for Adult Learning, 2015; Chandler, 1999-2015). Additionally, research has been conducted by the influence of technology within healthcare organizations (Csorny, 2013; Learn EHR Basics, 2014). This study identifies the gap in literature by identifying adult learning styles and their preferences for learning healthcare technology. Understanding the relationship between adult learners’ perceptions regarding their learning style and healthcare training delivered through technology is valuable in evaluating the success of healthcare training initiatives, assessing learning outcomes, and ensuring sustainability for the organization (Williams, 2013). Specifically, for three hospitals in San Diego, California, the training outcomes of adult learners are critical in achieving optimal productivity by utilizing the electronic health record for its patient access (Wolfson et al., 2014; Williams, 2013; Cambiano et al., 2001; Learn EHR Basics, 2014).

**Definitions**

The specific terms and definitions pertaining to healthcare, technology, and the target population referenced throughout this study are listed below:

**Baby Boomer** – Generational learners born between the years of 1946-1964 (Meet the Generations, 2015).

**Blended Learning** – The combination of web and face-to-face that is necessary to produce a course utilizing the best of both instructional worlds (Dziuban et al., 2004).
**Electronic Health Record (EHR)** – Electronic or computerized patient medical record system (Learn EHR Basics, 2014).

**Generational Learner** – Adult learners over the age of eighteen representing one of the generational classifications (i.e. Traditionalist, Baby Boomer, Generation X, Generation Y, etc.) (Baker College, 2004).

**Generation X** – Generational learners born between the years of 1965-1980 (Meet the Generations, 2015).


**Learning Style** - Different approaches or ways of learning ("Learning Styles Explained," 2015).

**Patient Access Representative (PAR)/ Patient Service Representative (PSR)** - Enrolls new patients, collects demographic and contact information, and provides information about the facility and its policies. The representative creates a file with basic information about the patient, including any insurance coverage or financial assistance policies the patient may qualify for, provide information about billing and repayment terms as well as other facility policies that patients may need to know (What Does, 2003-2015).

**Traditionalists** – Generational learners born prior to 1946 (Meet the Generations, 2015).

**Delimitations**

This study was delimited to patient access healthcare professionals working in the greater San Diego region. These staff members represented the four generations currently in the workplace: Traditionalists, Baby Boomers, Generation X, and Generation Y who have received computer-based healthcare training.
Organization of the Study

This study was structured in five chapters, including the literature review, methodology, data analysis, and conclusion. Chapter II is a thorough review of historical facts and current research that provides a foundation and theoretical framework for this research. Chapter III describes the types of survey instruments used to collect data for this study. Chapter IV provides an analysis of the data collection and provides a narrative of the findings. Finally, Chapter V outlines a summary of the entire study, offers conclusions, and makes recommendations for future research. Both the bibliography and appendices are included as final references and documentation for this study.
CHAPTER II: REVIEW OF THE LITERATURE

The following literature review thoroughly examines components of learning and learning style theory, an overview of adult and generational learning style preferences, learning with computer-based technology, and specifically, training received via healthcare technology. This section also reviews learning style models and inventories used to assess individual learning style preferences for adult learners.

The idea that individuals learned in different ways began to reshape what educators believed when French psychologist Dr. Alfred Binet developed the first intelligence test (Chandler, 1999-2015). A few years later in 1907, Dr. Maria Montessori introduced the Montessori Method of education that enhanced learning by focusing on sensory and preferred individual learning styles (Chandler, 1999-2015). Afterward, for more than 50 years, learning style research lay dormant. Emerging ideas in the 1950’s reignited interest in learning styles, beginning with Benjamin Bloom’s “Bloom’s Taxonomy” (1956). The early 1960’s brought a new perspective on learning style differences with Myers-Briggs Type Indicator (MBTI) (1962), and the Dunn and Dunn Learning Style Model (1976) introduced learning evaluation through diagnostic instrumentation (Chandler, 1999-2015).

Overview of Learning Theories

Between 1950 and 1980, several learning theories surfaced that branched from previous theorists, psychologists, and educators. Common themes about learning were characterized by input of information and outcomes based on the input (Laliberte, 2005).
Initial outcomes were based on six learning theories, some of which are practiced in current educational structures: Behaviorism, Cognitivism, Social Learning Theory, Social Constructivism, Multiple Intelligences, and Brain-Based Learning (Laliberte, 2005).

Behaviorism learning was defined by the outward expression of new behaviors (Laliberte, 2005). This style of instruction is highly structured, where learners receive rewards and punishments based on their behavior (Laliberte, 2005). This approach to learning was a “one size fits all” model where a learner’s thought process was not taken into consideration (Laliberte, 2005).

Cognitivism focused on learning by connecting symbols in ways that were meaningful and memorable (Laliberte, 2005). Cognitivism promoted curiosity and hypothesis testing (Laliberte, 2005). Similar to Behaviorism, knowledge was considered absolute, which left little room for individual learning preferences (Laliberte, 2005). Two theories were formulated from the Cognitivism approach to learning: Jean Piaget’s Assimilation and Accommodation and Jerome Bruner’s discovery of a learner as an independent problem-solver (Laliberte, 2005).

In 1973, Bandura introduced the Social Learning Theory (SLT) (Laliberte, 2005). On the heels of Cognitivism, Bandura believed learning took place through observation and sensorial experiences (Laliberte, 2005). SLT shed new light on collaborative, group learning and learning to imitate modeled behaviors and expectations (Laliberte, 2005). Still, learning with this model did not consider individuality, context, personal experiences, emotion, or motivation (Laliberte, 2005).
Learning Constructivism focused on the idea that learning builds upon prior experiences (Laliberte, 2005). Theorists who supported this model believed learning was based on the following context:

- A search for meaning by the learner,
- Contextualized,
- An inherently social activity,
- Dialogic (focus on written and spoken dialogue) and recursive (learning is built upon prior learning/scaffolding), and
- The responsibility of the learner (Laliberte, 2005).

The shift to individualized learning was beginning to surface. This model focused on experiential activities, as well as group and cooperative learning; however, it was not flexible for traditional age grouping or semester learning (Laliberte, 2005).

Howard Gardner’s Multiple Intelligence (MI) theory emerged in 1983. The theory is that people are born with eight intelligences listed in the table below:

| Table 2 |
|---|---|
| **Multiple Intelligence (MI) Theory** |
| 3. Logical-Mathematical | 7. Interpersonal |
| 4. Kinesthetic | 8. Intrapersonal |

(Laliberte, 2005)
For the first time in learning history, a theory focused on an individual’s ability to learn independently (Laliberte, 2005). Moreover, learners’ strengths and weaknesses were recognized as considerations in their ability to leverage their learning (Laliberte, 2005). MI introduced the concept of student-centered learning and the delivery of multiple mediums for learning (Laliberte, 2005). MI has been criticized for lacking quantifiable evidence that it exists (Laliberte, 2005). Additionally, the learning theory is a non-traditional approach that deviates from core curricula and standards (Laliberte, 2005).

The 1980’s also introduced 12 principles of Brain-Based Learning (BBL) (Laliberte, 2005). BBL provided opportunities for group learning and was the first learning method that introduced the concept of community-based learning (Laliberte, 2005). Moreover, BBL incorporated multi-sensory aspects of learning, allowing learners to make connections to the learning content:

Table 3

*Brain Based Learning (BBL) Theory*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Brain is a parallel processor</td>
</tr>
<tr>
<td>2.</td>
<td>Whole body learning</td>
</tr>
<tr>
<td>3.</td>
<td>A search for meaning</td>
</tr>
<tr>
<td>4.</td>
<td>Patterning</td>
</tr>
<tr>
<td>5.</td>
<td>Emotions are critical</td>
</tr>
<tr>
<td>6.</td>
<td>Processing of parts and wholes</td>
</tr>
<tr>
<td>7.</td>
<td>Focused attention &amp; peripheral perception</td>
</tr>
<tr>
<td>8.</td>
<td>Conscious &amp; unconscious processes</td>
</tr>
<tr>
<td>9.</td>
<td>Several types of memory</td>
</tr>
<tr>
<td>10.</td>
<td>Embedded learning sticks</td>
</tr>
<tr>
<td>11.</td>
<td>Challenge &amp; threat</td>
</tr>
<tr>
<td>12.</td>
<td>Every brain is unique</td>
</tr>
</tbody>
</table>

(Laliberte, 2005)
BBL has been criticized due to its scientific foundation, as it was developed by neuroscientists, not educators, who during this time might have had more applicable teaching experience (Laliberte, 2005). As knowledge about learning continued to expand, more learning theories materialized. Malcom Knowles’ Andragogy (1980), Mihalyi Czikszentmihalyi’s Flow (1990), Jean Lave’s Situational Learning (1991), David Asubel’s Subsumption Theory (1962-1978), and Robert Gagne’s Conditions of Learning (1985) were several learning theories explored during the 1980’s and 1990’s (Laliberte, 2005). Finally, David Kolb’s Learning Style Model (1984-Present) emerged and continues to be a cornerstone of learning style theory (Laliberte, 2005).

Importance of Setting

The study of learning style theories not only brought to light the importance of understanding the various approaches to learning, but it also introduced new ideas about where learning can take place (Griffiths, Podirsky, Deakin, & Maxwell, 2002). Traditionally, learning took place in a classroom setting, with one teacher and student participants (Rubin, 2015). The school setting or the learning environment was limited to school-aged children; boys and girls of all ages and all grade levels were taught in one room, at the same time (Rubin, 2015, p. 1). Individual perspectives or preferences were not considered during the earlier years of learning (Griffiths et. al, 2002). Teachers instructed through lesson plans, and students learned by hearing the spoken instruction, reading specific material, and by doing activities (Griffiths et. al, 2002). Based on the learning models previously discussed, this style of instruction left little room for learning exploration beyond what and how the teacher planned (Griffiths et. al, 2002). Individual perspectives or preferences were not taken into account during lesson preparation.
(Griffiths et. al, 2002). Additionally, learning was strictly intended for the classroom (Griffiths et. al, 2002). Instruction outside of a typical classroom room setting had not yet begun (Griffiths et. al, 2002).

Teaching & Learning Today

Learning with Technology

Learning outside the typical classroom setting began to materialize in the 1980’s when the first home computer was introduced (Epignosis LLC, 2014). A decade later, in the 1990’s, schools and universities began utilizing the Internet to offer online instruction and degree programming (Epignosis LLC, 2014). Now in the 21st century, employers have adopted technology as a primary resource for training and education through online tutorials and e-learning courses (Epignosis LLC, 2014; What are the Benefits, 2009). The advancements in technology have made learning more accessible and convenient for all learners, specifically adult learners (Epignosis LLC, 2014). The various applications and software programs allow for greater flexibility and variety for learner success and application (What are the Benefits, 2009).

Blended Learning

Today, learning is not restricted to a particular place, limited by time, or restricted to a specific style (Epignosis LLC, 2014; What are the Benefits of AADM eLearning?, 2009; Ruiz, Mintzer, & Leipzig, 2006). “Blended learning is a combination of offline (face-to-face, traditional learning) and online learning in a way that the one complements the other” (Epignosis LLC, 2014, p. 70).

This concept of blended learning involves employing various learning methods to achieve optimal learning success (Epignosis LLC, 2014; Ruiz et al., 2006).
There are two key principles commonly associated with blended learning (which are the “secrets” to its success): students who can share information and work with other students directly in a collaborative setting have a more enriched learning experience, and collaboration between students can be improved upon if group activities rely on information gathered from online resources or lessons. It has also been suggested that students who complete online coursework followed by interactive, face-to-face class activities have richer educational experiences. (Epignosis LLC, 2014, p. 71)

Readings in Blended Learning and Online Tutoring (Macdonald, 2006) explained self-directed leaning is applicable to designing blended learning courses; there are a variety of ways students can study to learn in a blended learning approach, and assessment design is critical in reflecting learning outcomes. One important aspect of the blended learning approach is for adult learners to “learn by doing” (Macdonald, 2006; Ruiz et al., 2006).

**E-Learning**

E-Learning is one aspect of the blended learning model that allows adult learners to learn by doing (Macdonald, 2006; Kanninen, 2009). The use of technology in an e-learning format removes locational restrictions, time constraints, and can be designed in a way that makes learning interactive, engaging, and fun (Epignosis LLC, 2014). Training using an e-learning instructional design can also be cost-effective because of the dramatic reduction or elimination of cost for materials for multiple courses, travel or boarding expenditures, and any additional lecture or instructional expenses associated with traditional learning (Epignosis LLC, 2014).
Research suggests the benefits of e-learning are attractive to most organizations for mass-training initiatives; however, there are some concerns with this approach as a one-size fits all to training (Epignosis LLC, 2014). Employing computer-based training as a primary source of employee training implies users have some degree of technical experience (Ruiz et al., 2006; Macdonald, 2006). It is often assumed staff are knowledgeable of the systems and applications used to operate the programs and navigate through the courses successfully (Ruiz et al., 2006). As a result, employers should be thoughtful in selecting the appropriate training solutions for their staff including, but not limited to financial feasibility, ease of functionality, overall maintenance, and ultimately staff performance (Ruiz et al., 2006; Macdonald, 2006).

**Learning Management Systems (LMS)**

A common platform used in creating and monitoring blended learning opportunities is a Learning Management System (LMS) (Epignosis LLC, 2014; Kanninen, 2009). An LMS offers a variety of learning resources and the ability to track student participation and learning outcomes through scoring and evaluation (Epignosis LLC, 2014). In a blended learning environment, an LMS is a valuable tool for providing standard and/or facilitator-led training courses, e-learning, tutorials, videos, and other computer-based training for a variety of learning options (Epignosis LLC, 2014). Blended learning alternatives have provided an effective option for adult learners, who like other learners have varying learning styles (Macdonald, 2006).
Learning Styles

Overview of Learning Styles Theory

“Learning styles group common ways that people learn” (Overview of Learning, 2015, p. 1). Research suggests a person’s natural learning style, their preferred mode for learning, can be identified in early stages of childhood learning experiences (Russell, 2006; Felder & Silverman, 1988). Some scholars have determined a child’s learning style preference carries over into adulthood to become one of three primary cognitive learning methods: visual, auditory, or kinesthetic (Three Learning, 2008; Russell, 2006). As adults continue to develop and their learning experiences increase, learning patterns emerge that can later be predicted among other learners who follow that pattern or model (Eye, 2015). Learning style models have been developed by various researchers to aide individuals in identifying and assessing how their learning occurs (Eye, 2015). “A learning-style model classifies students according to where they fit on a number of scales pertaining to the ways they receive and process information” (Felder & Silverman, 1988, p. 674).

According to Felder and Silverman, learning is structured in two parts: reception and processing of information (Felder & Silverman, 1988). Research supports identifying an individual’s learning style is a powerful factor in determining their learning success (Eye, 2015); Felder & Silverman, 1988).

Furthermore, learning styles influence learning outcomes and guides the learning experience (Overview of Learning, 2015). Many learning models are accompanied by descriptors that explain characteristics of the learning style and how learning can be maximized based on those traits (Three Learning, 2008).
A student’s learning style may be defined largely in part by the answers to five questions:

1) What type of information does the student preferentially perceive:
Sensory (external)—sights, sounds, physical sensations, or intuitive
(internal)—possibilities, insights, hunches?

2) Through which sensory channel is external information most effectively perceived: visual—pictures, diagrams, graphs, demonstrations, or auditory—words, sounds? (Other sensory channels—touch, taste, and smell—are relatively unimportant in most educational environments and will not be considered here.)

3) With which organization of information is the student most comfortable: inductive—facts and observations are given, underlying principles are inferred, or deductive—principles are given, consequences and applications are deduced?

4) How does the student prefer to process information: actively—through engagement in physical activity or discussion, or reflectively—through introspection?

5) How does the student progress toward understanding: sequentially—in continual steps, or globally—in large jumps, holistically? (Felder & Silverman, 1988, p. 675).

**Learning Style Models & Inventories**

This literature review explores five learning style models with learning style inventories that were consistently referred to during research for this study. Moreover,
these learning style models and instruments focus on identifying learning style preferences for visual, auditory, and kinesthetic learners. The following learning style models, with learning style inventories, were reviewed: VAK Learning Style Model, Felder Silverman Learning Style Index, Multiple Intelligences, the Kolb Learning Style Model and Learning Style Inventory (LSI), and the Odessa Learning Style Inventory.

**Felder-Silverman Learning Styles Index**

Dr. Richard Felder and Barbara Solomon developed the Felder-Solomon learning styles model in the late 80’s (Eye, 2015). Many years later in 2002, Felder made revisions to the model after establishing a learning style index with Linda Silverman (Eye, 2015). Felder and Silverman’s Index of Learning Styles (ILS) is a “self-scoring web-based instrument that assesses preferences on the Sensing/Intuitive, Visual/Verbal, Active/Reflective, and Sequential/Global dimensions” (Felder & Silverman, 1988, p. 2). The four learning styles identified in the Felder-Silverman learning index are outlined in the diagram below:
Figure 1: The Index of Learning Styles (Eye, 2015, Figure 1 adapted from "The Index of Learning Styles," by Dr Richard Feldman and Barbara Soloman.)

The Felder-Silverman ILS was designed to identify learning style preferences based on a continuum, one learning style preference on the left side and the opposing style on the right side (Eye, 2015).

Upon completing the learning style index, learners were able to identify where they were on the spectrum for deciphering facts and general themes, integrating visual and verbal aspects into learning, experiencing and evaluating learning, and being detailed
without losing sight of the big picture overall concepts (Eye, 2015). The table below gives a general description of each learning style on the continuum:

Table 4

*Felder-Silverman Index of Learning Styles (ILS)*

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory-Intuitive</td>
<td>Provide both hard facts and general concepts</td>
</tr>
<tr>
<td>Visual-Verbal</td>
<td>Incorporate both visual and verbal cues.</td>
</tr>
<tr>
<td>Active-Reflective</td>
<td>Allow both experiential learning and time for eval. and analysis.</td>
</tr>
<tr>
<td>Sequential-Global</td>
<td>Provide detail in a structured way, as well as the big picture.</td>
</tr>
</tbody>
</table>

(Eye, 2015, adapted from "The Index of Learning Styles," by Dr Richard Feldman and Barbara Soloman)

The overarching theme of the Felder-Silverman ILS was for the learner to understand the importance of finding balance in their learning by understanding how to maximize their learning outcomes (Eye, 2015). In Felder’s journal on Learning and Teaching Styles (1988), he introduced an additional learning style called Inductive-Deductive (Felder & Silverman, 1988). This additional learning style was added as a fifth dimension of learning and teaching styles described in the writing (Felder & Silverman, 1988).

Felder shifted to discuss techniques in which teaching can be adapted to incorporate all learning styles into instruction:

1. Teaching Techniques to Address All Learning Styles
2. Motivate learning. As much as possible, relate the material being presented to what has come before and what is still to come in the same course, to material in other courses, and particularly to the students’ personal experience (inductive/global).

3. Provide a balance of concrete information (facts, data, real or hypothetical experiments and their results) (sensing) and abstract concepts (principles, theories, mathematical models) (intuitive).

4. Balance material that emphasizes practical problem-solving methods (sensing/active) with material that emphasizes fundamental understanding (intuitive/reflective).

5. Provide explicit illustrations of intuitive patterns (logical inference, pattern recognition, generalization) and sensing patterns (observation of surroundings, empirical experimentation, attention to detail), and encourage all students to exercise both patterns (sensing/intuitive).

6. Do not expect either group to be able to exercise the other group’s processes immediately. Follow the scientific method in presenting theoretical material. Provide concrete examples of the phenomena the theory describes or predicts (sensing/inductive); then develop the theory or formulate the mod (intuitive/inductive/sequential); show how the theory or mod can be validated and deduce its consequences (deductive/sequential); and present applications (sensing/deductive/sequential).
7. Use pictures, schematics, graphs, and simple sketches liberally before, during, and after the presentation of verbal material (sensing/visual). Show films (sensing/visual.) Provide demonstrations (sensing/visual), hands-on, if possible (active).

8. Use computer-assisted instruction—sensors respond very well to it (sensing/active).

9. Do not fill every minute of class time lecturing and writing on the board. Provide intervals—however brief—for students to think about what they have been told (reflective).

10. Provide opportunities for students to do something active besides transcribing notes. Small-group brainstorming activities that take no more than five minutes are extremely effective for this purpose (active).

11. Assign some drill exercises to provide practice in the basic methods being taught (sensing/active/sequential) but do not overdo them (intuitive/reflective/global). Also provide some open-ended problems and exercises that call for analysis and synthesis (intuitive/reflective/global).

12. Give students the option of cooperating on homework assignments to the greatest possible extent (active). Active learners generally learn best when they interact with others; if they are denied the opportunity to do so they are being deprived of their most effective learning tool.
13. Applaud creative solutions, even incorrect ones (intuitive/global).

14. Talk to students about learning styles, both in advising and in classes. Students are reassured to find their academic difficulties may not all be due to personal inadequacies. Explaining to struggling sensors or active or global learners how they learn most efficiently may be an important step in helping them reshape their learning experiences so that they can be successful (all types).

(Felder & Silverman, 1988, p. 680)

Though Felder and Silverman’s research introduced one of the first indexes for understanding learning styles, theorists before them established learning style theories and learning styles inventories that are still popular today (Laliberte, 2005).

**Multiple Intelligences**

Howard Gardner’s Multiple Intelligences (1983) established a theory that each individual has seven distinct intelligences, different minds that allow them to learn, perform, remember, and understand in different ways (Lane, 2009). Gardner believed with the broad spectrum of learners, learning could be more effective if instruction included the seven intelligences he discovered, versus the standard linguistic approach the educational system was founded upon (Lane, 2009). According to Gardner, "We are all able to know the world through language, logical-mathematical analysis, spatial representation, musical thinking, the use of the body to solve problems or to make things, an understanding of other individuals, and an understanding of ourselves. Where individuals differ is in the strength of these intelligences - the so-called profile of intelligences -and in the ways in which such intelligences are invoked and combined to
Howard Gardner’s seven domains were initially identified as:

**Table 5**

*Howard Gardner’s Multiple Intelligences*

<table>
<thead>
<tr>
<th>Intelligence Type</th>
<th>Capability and Perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linguistic</td>
<td>words and language</td>
</tr>
<tr>
<td>Logical-Mathematical</td>
<td>logic and numbers</td>
</tr>
<tr>
<td>Musical</td>
<td>music, sound, rhythm</td>
</tr>
<tr>
<td>Bodily-Kinesthetic</td>
<td>body movement control</td>
</tr>
<tr>
<td>Spatial-Visual</td>
<td>images and space</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>other people's feelings</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>self-awareness</td>
</tr>
</tbody>
</table>

(Gardner, 2012; Chapman, 2003-2014, p. 1; Lane, 2009)

Multiple Intelligences (MI) (1983), presented new theoretical understanding about a learner’s ability to demonstrate learning through the contextual lens in which individuals generally see the world (Lane, 2009; “Learning Styles Explained,” 2015). Gardner’s seven domains described learners’ abilities as follows:

**Visual/Spatial Intelligence** - *Ability to perceive the visual.* These learners tend to think in pictures and need to create vivid mental images to retain information. They enjoy looking at maps, charts, pictures, videos, and movies.
Verbal/Linguistic Intelligence - Ability to use words and language.
These learners have highly developed auditory skills and are generally elegant speakers. They think in words rather than pictures.

Logical/Mathematical Intelligence - Ability to use reason, logic and numbers. These learners think conceptually in logical and numerical patterns making connections between pieces of information and are always curious about the world around them. These learners ask lots of questions and like to do experiments.

Bodily/Kinesthetic Intelligence - Ability to control body movements and handle objects skillfully. These learners express themselves through movement. They have a good sense of balance and eye-hand coordination (e.g. ball play, balancing beams). Through interacting with the space around them, they are able to remember and process information.

Musical/Rhythmic Intelligence - Ability to produce and appreciate music. These musically inclined learners think in sounds, rhythms and patterns. They immediately respond to music either appreciating or criticizing what they hear. Many of these learners are extremely sensitive to environmental sounds (e.g. crickets, bells, dripping taps).

Interpersonal Intelligence - Ability to relate and understand others.
These learners try to see things from other people's point of view in order to understand how they think and feel. They often have an uncanny ability to sense feelings, intentions and motivations. They are great organizers, although they sometimes resort to manipulation. Generally they try to
maintain peace in group settings and encourage cooperation. They use both verbal (e.g. speaking) and non-verbal language (e.g. eye contact, body language) to open communication channels with others.

**Intrapersonal Intelligence** - Ability to self-reflect and be aware of one’s inner state of being. These learners try to understand their inner feelings, dreams, relationships with others, and strengths and weaknesses.

(“Learning Styles Explained,” 2015, p. 2; Gardner, 2012; Kanninen, 2009)

In recent years, Gardner’s theory (1983) has been strengthened by the use of multimedia and other technologies (Lane, 2009). Utilizing Gardner’s Multiple Intelligences (MI) theory, coupled with the use of multimedia, satisfies the many types of learning preferences that one person may embody, or that a class embodies when learning (Lane, 2009). While Gardner’s theory is highly regarded among educators, David Kolb’s learning style model continues to be referenced throughout research and is widely applied within organizations as a reliable learning style inventory (Chandler, 1999-2015; Jain, 1999-2015; HayGroup, 2015).

**Kolb Learning Styles**

David Kolb’s learning styles model and experiential learning theory were published in 1984 (Jain, 1999-2015). From his learning style model, he developed the learning style inventory; it is one of few that has been validated and is the only learning theory that focuses on learning style, rather than developmental stages of learning (Jain, 1999-2015; McLeod, 2010-2013). Kolb’s learning style inventory (LSI) is known as one of the most reputable and popular learning style indexes of choice (HayGroup, 2015; Kanninen, 2009). David Kolb’s learning styles model encompassed his belief that
learning was the process of creating knowledge through experience (McLeod, 2010-2013). His model was based on four stages of *The Experiential Learning Cycle* that each learner would experience through their learning process:

1. **Concrete Experience** – (A new experience or situation is encountered, or a reinterpretation of existing experience).

2. **Reflective Observation** – (Of the new experience. Of particular importance are any inconsistencies between experience and understanding).

3. **Abstract Conceptualization** – (Reflection gives rise to a new idea, or a modification of an existing abstract concept).

4. **Active Experimentation** – (The learner applies them to the world around them to see what results). (McLeod, 2010-2013, p. 1)

It was believed that a learner could begin the cycle at any point; however, each of the four phases of the cycle must be completed in order for effective learning to take place (McLeod, 2010-2013). After developing his four-phased learning process, Kolb developed learning styles associated with each phase of his learning process model (McLeod, 2010-2013). The premise of Kolb’s learning style theory was that, “different people naturally prefer a certain single different learning style. Various factors influence a person's preferred style” (McLeod, 2010-2013, p. 1). As a result, he developed a new model that incorporated his learning model and subsequent theory shown on two continuums: East-West, Processing continuum and North-South, Perception continuum (McLeod, 2010-2013). The model hinged on four learning styles: accommodating (feeling and doing), diverging (feeling and watching), converging (thinking and doing),
Kolb’s learning style model are described and displayed below:

**Diverging** (feeling and watching - CE/RO)

These people are able to look at things from different perspectives. They are sensitive. They prefer to watch rather than do, tending to gather information and use imagination to solve problems. They are best at viewing concrete situations from several different viewpoints.

**Assimilating** (watching and thinking - AC/RO)

The Assimilating learning preference is for a concise, logical approach. Ideas and concepts are more important than people. These people require a good clear explanation rather than practical opportunity. They excel at understanding wide-ranging information and organizing it in a clear logical format. People with an assimilating learning style are less focused on people and more interested in ideas and abstract concepts. People with this style are more attracted to logically sound theories than approaches based on practical value.

**Converging** (doing and thinking - AC/AE)

People with a converging learning style can solve problems and will use their learning to find solutions to practical issues. They prefer technical tasks and are less concerned with people and interpersonal aspects. People with a converging learning style are best at finding practical uses for ideas and theories. They can solve problems and make decisions by finding solutions to questions and problems. People with a converging learning
style are more attracted to technical tasks and problems than social or interpersonal issues. A converging learning style enables specialist and technology abilities. People with a converging style like to experiment with new ideas, to simulate, and to work with practical applications.

**Accommodating** (doing and feeling - CE/AE)

The Accommodating learning style is 'hands-on,' and relies on intuition rather than logic. These people use other people's analysis and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences and to carrying out plans. They commonly act on 'gut' instinct rather than logical analysis. People with an accommodating learning style will tend to rely on others for information than carry out their own analysis. This learning style is prevalent within the general population. (McLeod, 2010-2013, p. 1)
Knowing a person's (and your own) learning style enables learning to be orientated according to the preferred method. That said, everyone responds to and needs the stimulus of all types of learning styles to one extent or another - it's a matter of using emphasis that fits best with the given situation and a person's learning style preferences. (McLeod, 2010-2013, p. 1)

Kolb’s overall learning theory, learning model, and ultimately the development of his learning style inventory provide statistical support of the value in understanding and incorporating learning style preferences to improve learning outcomes (McLeod, 2010-2013; Kanninen, 2009).

Kolb’s learning style inventory provided two purposes: (1) an educational resource to increase understanding of the process of learning an individual’s experience
and approach to learning and (2) a research tool for discovering experiential theory and characteristics of individual learning preferences (Kolb & Kolb, 2005, p. 8). The LSI was designed as a self-assessment exercise and tool to emphasize the uniqueness of an individual’s preference for learning (Kolb & Kolb, 2005). Kolb’s learning styles inventory has been adopted and adapted by other researchers and educators to fit their research parameters (kolb learning styles, 2015).

**VAK**

As research on learning style gained more popularity and notoriety, a general theme emerged that the foundation of all learning style preferences were based on three human senses: sight (visual), hearing (auditory), and touch (kinesthetic) (Kanninen, 2009; Bernier, 2009; Jain, 1999-2015; “VAK Learning Styles,” 2015). Psychologists and theorists from 1920 until now recognized the VAK learning style model as a resource for understanding and explaining an individual’s preferred or dominant thinking and learning style and strengths (Bernier, 2009; “VAK Learning Styles,” 2015).

The VAK learning styles model provides a very easy and quick reference inventory to assess people's preferred learning styles, and then most importantly, to design learning methods and experiences that match people's preferences:

**Visual** learning style involves the use of seen or observed things, including pictures, diagrams, demonstrations, displays, handouts, films, flip-charts, etc. (“VAK Learning Styles,” 2015, p. 1).

**Auditory** learning style involves the transfer of information through listening: to the spoken word, of self or others, of sounds and noises (“VAK Learning Styles,” 2015, p. 1).
Kinesthetic learning involves physical experience - touching, feeling, holding, doing, practical hands-on experiences (“VAK Learning Styles,” 2015, p. 1).

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Traits</th>
<th>Teaching Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Seeing, reading</td>
<td>Use graphs, charts, videos.</td>
</tr>
<tr>
<td>Auditory</td>
<td>Hearing, speaking</td>
<td>Have learner verbalize questions.</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>Touching, doing</td>
<td>Use demonstrations of skills.</td>
</tr>
</tbody>
</table>

Figure 3: VAK Learning Styles (Visual, Auditory, and Kinesthetic Learners (VAK), 2015, p. 1)

Visual learners prefer watching to learn (Bernier, 2009; Jain, 1999-2015). Individuals who learn through visual stimulation are likely to learn through visual aids, diagrams, charts, and/or videos (Bernier, 2009; Jain, 1999-2015). These learners commit to memory what they see (Bernier, 2009; Jain, 1999-2015). Unlike visual learners, auditory learners prefer listening or hearing to process and understand information (Bernier, 2009; Jain, 1999-2015). Participatory discussions or lectures are common ways for auditory learners to synthesize information (Bernier, 2009; Jain, 1999-2015). Auditory learners rely on hearing variances in pitch, tone, and sound to process learning input (Bernier, 2009; Jain, 1999-2015). Finally, kinesthetic learners use touch or motion to secure learning outcomes (Bernier, 2009; Jain, 1999-2015). Tactile learners learn only after, “they touch something, put something together, take something apart, or otherwise use their hands” (Bernier, 2009; Jain, 1999-2015, p. 1). These learners involve their surroundings by learning through exploration (Jain, 1999-2015).
Odessa Learning Style Inventory Survey

A variation of a VAK learning style inventory developed to identify the learning style preference of an individual learner is the Odessa Learning Style Inventory Survey (Odessa College, 2015). Developed by the Student Success Center at Odessa College in Odessa, Texas, this survey instrument consists of 24 statements to assist learners in identifying their natural proclivity to a visual, auditory, or kinesthetic learning style preference (Odessa College, 2015). The researcher for this study used the three-point scale to capture individual learning preferences by correlating participant responses of often, seldom, and sometimes to the associated questions (Odessa College, 2015). Overall scores for each statement were calculated to identify their learning preference when using their vision, hearing, or touch (Odessa College, 2015). “A score of 21 points or more in a modality indicates a strength in that area. The highest of the three scores indicates the most efficient method of information intake for an individual. The second highest score indicates the modality which boosts the primary strength” (Odessa College, 2015, p. 4).

<table>
<thead>
<tr>
<th>VISUAL</th>
<th>AUDITORY</th>
<th>TACTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO.</td>
<td>PTS.</td>
<td>NO.</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>11</td>
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<tr>
<td>14</td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>23</td>
<td>18</td>
</tr>
</tbody>
</table>

VPS = Visual Preference
APS = Auditory Preference
TPS = Tactile Preference

Figure 4: Odessa Learning Style Inventory Scoring Interpretation (Odessa College, 2015, p.2)
The online inventory is publically available for all students and online users as a link on the college website under Online Resources (Odessa College, 2015). In addition to the survey being available on the Odessa College website, this specific learning style inventory has been adopted by Gavilan College, Penn State University and San Jose State University to determine the learning style preferences for their student populations (Gavilan College, 2015; Bixler, 2015; San Jose State University, 2015). The Odessa Learning Style Inventory, like many other learning style inventories, was developed as type indicators (Pelley, 2008).

“A type preference only means that you trust one way of thinking of thinking over the other” (Pelley, 2008, p. 1). Research supports that knowing an individual learning style, or type preference, can empower learners to become:

- More productive,
- Increase achievement,
- Be more creative,
- Improve problem solving,
- Make better decisions, and
- Learn more effectively (Van, 2013, p. 4).

Research consistently suggests incorporating various learning styles during training will enhance the overall learning experience for all learners; therefore, utilizing the appropriate instrumentation becomes important (Felder & Silverman, 1988; Gee, 1990). Employing various strategies to integrate multimedia applications and a blended learning approach is specifically encouraged for training adult learners (Macdonald, 2006; Felder & Silverman, 1988).
Strategies for Teaching Adult Learners

Based on literature and research, it is important to consider the following twelve variables in developing a training model for adult learning:

Table 6

12 Variables to Consider for Teaching Adult Learners

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differences</td>
<td>Values</td>
</tr>
<tr>
<td>Commonalities</td>
<td>Identities</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Uniqueness</td>
</tr>
<tr>
<td>Learning</td>
<td>Learning Styles</td>
</tr>
<tr>
<td>Needs</td>
<td>Theoretical Framework</td>
</tr>
</tbody>
</table>

(Dettlaff, 2003, p. 4)

Strategies for engaging adult learners include starting with the knowledge they possess, establishing rapport by showing genuine consideration toward their experiences, and valuing their time and contribution throughout the learning experience (Hermanson, 1996; Billington, 1996; Bernier, 2009). There are three differences between adult learners and other students: first is where learning takes place; second is, the motivation for continued learning (Hermanson, 1996; Dickinson, 1992).

“Ultimately, the effect of the learners' perceptions facilitates their engagement in more effective instructional behaviors which, in turn, increases achievement of desired learning outcomes” (Gee, 1990, p. 12). Third is location; learning can take place in a traditional classroom setting; however, learning for adults is more likely to occur in the
workplace (Hermanson, 1996). Learning in the workplace is mandatory, meaning, expanding an adult learner’s knowledge is a requirement for job security, long-term success, and contributes to their livelihood (Hermanson, 1996; Billington, 1996). While adult learners are often clumped into one large category, indeed there may be differing generational perspectives on approaches to learning and consideration for learning style preferences (Hermanson, 1996).

**Adult Learning**

Adult learners, also referred to as lifelong learners, are between the ages of 20 and 40 years old (Macdonald, 2006; Hermanson, 1996, p. 1). These learners are characterized by their need and appreciation for the flexibility offered through the blended learning approach (Macdonald, 2006). A unique fact for adult learners is they incorporate their personal experiences that can influence their learning success (Billington, 1996). “Students are more likely to learn effectively when they are presented with situations in which they construct meaning for themselves and relate any new information to the experiences they already have” (Macdonald, 2006, p. 122). Adult learners often require a learning environment that is balanced, stimulating and engaging, yet comfortable and enjoyable (Billington, 1996; Finlayson & Francis, 2001, p. 1). The material must have relevance and be presented in a way that makes the learner feel appreciated for experience, time, and effort (Billington, 1996).

**Generational Overview**

A generation is identified as a group that shares birth years, age, location and significant life events at critical developmental stages (Parry & Urwin, 2011, p. 79;
Marston, 2010; Cox, 2004). It is suggested that generational existence is made possible by five characteristics of our society:

1. new participants in the cultural process are emerging;
2. former participants are continually disappearing;
3. members of a generation can participate in only a temporally limited section of the historical process; so
4. cultural heritage needs to be transmitted; and finally
5. the transition from generation to generation is continuous.

(Parry & Urwin, 2011, p. 81)

Generational studies have uncovered the differences between the generational cohorts and the importance of understanding their values (Parry & Urwin, 2011; Marston, 2010; Hendryx, 2008). Research confirms that generations are influenced, and often defined by events, culture, attitudes, behaviors, music, and technology (Parry & Urwin, 2011; Hendryx, 2008). The bond between generational cohorts also influences work practices, ethics, and expectations (Parry & Urwin, 2011).
<table>
<thead>
<tr>
<th>Generational Cohort</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Traditionalists -Born Prior to 1946 | - Came of age during the Great Depression and World War II  
- Driven by ideals of duty and sacrifice and loyalty  
- Place great faith in institutions  
- Value quality over speed and efficiency |
| Baby Boomers -Born 1947-1964 | - The original 'Me' generation  
- Came of age during postwar prosperity, the Cold War, and the 1960s  
- Focused on prosperity  
- In charge  
- Work ethic measured in face time  
- Committed to “team”  
- Seek services that help them regain control of their time  
- Concerned with status and individuality |
| Generation X -Born 1965-1980 | - Question authority and institutions  
- Carpe diem attitude  
- Dislike hierarchy  
- Prefer open communication  
- Focus on efficiency  
- Loyal to people, not companies  
- A tough sell  
- Can spot a phony a mile away  
- Embrace technology |
| Generation Y (Millennials) -Born 1981-1994 | - Coddled and protected from birth  
- Economic uncertainty after living their entire lives in a growing economy  
- Extremely tech-savvy  
- Gravitate to people who can help them achieve their goals.  
- Seek open, constant communication  
- Torn between a desire for individuality and the need to fit in  
- Want to be like their peers – but with a twist  
- Consider global impact of decisions |

(Marston, 2010, p. 1)
For the first time in history, the workplace is comprised of five generations: Traditionalists, Baby Boomers, Generation X, Generation Y, and entering the workforce is Generation Z (Weinstein, 2015; Carerra, 2012; HayGroup, 2015; Conley, 1996-2015). The graph below represents the current labor distribution by generation:

Figure 5: United States Total Labor Force Participation by Generation (Conley, 1996-2015, p. 1)

This study concentrated on the four established generational cohorts, as there was limited employee data concerning Generation Z given their recent entry into the workforce (Bursch & Kelly, 2014).

Given the time period in which each of the four generational groups were born, the historical happenings of their time, and their involvement and exposure to technology, their perceptions about learning with technology may differ (Marston, 2010; Meet the Generations, 2015). Additionally, their perception about learning may provide deeper understanding into their natural inclination or preferred learning style (Carerra, 2012;
In a master’s thesis, Jennifer Hendryx (2008) of University of Wisconsin, supported that generational differences go beyond the obvious difference of age and include social, economic, environmental, political, and technological differences that greatly impact and define each generation and how they learn as a cohort (Hendryx, 2008).

**Traditionalists - Born Prior to 1946**

Adult learners born prior to 1946 are called Traditionalists (Meet the Generations, 2015). Traditionalists prefer learning face to face, through a facilitator-led instructional style (Meet the Generations, 2015). “Traditionalists, the oldest, most experienced workers, have passed retirement age and, for the most part, are quickly exiting the workplace” (Conley, 1996-2015, p. 1). They like structure, specific directions, and working independently (Rayborn, 2014). “Matures value sacrifice and duty, and they will expect you to ‘earn’ the connection with them, to earn their trust” (Marston, 2010, p. 1). Members of this cohort typically do not like change, texting, and casual work attire (Rayborn, 2014). Additionally, Traditionalists tend to believe their own sacrifices, hard work, and seniority allow for them to expect a certain amount of respect for that authority (Marston, 2010). Of all the generations, this generational cohort is the least likely to point out a mistake or error for fear of appearing rude or insubordinate, specifically to leadership (Marston, 2010).

Learners in this phase of their lives, enjoy storytelling, which may be one way they connect to learning outcomes. Instructional design for these learners would have a limited technical component (Casey Carlson & Deloitte & Touche Study, 2015).
While they may not be “poster-children” for advancements made through technology, certainly their success in applying various forms of technology is recognized (Casey Carlson & Deloitte & Touche Study, 2015). From a historical perspective, Traditionalists have wisdom and insight that may be invaluable to the corporate sector; however, according to recent studies, Traditionalists represent less than 4% of the current workforce (Bursch & Kelly, 2014). According to recent research, Traditionalists are accustomed to the standard training approaches businesses have adopted throughout the years:

Approximately 10% of all learning takes place in formal training.

Approximately 20% of learning comes from materials and access to IT systems such as books, manuals, procedures, systems, and embedded methodologies. The employees learn by doing and reading using the information provided in both structured (i.e. a website) and unstructured form. 70% of learning occurs “on the job.” (Casey Carlson & Deloitte & Touche Study, 2015, p.10)

**Baby Boomers - Born 1947-1964**

Baby Boomers, born between 1946 and 1965, are the largest generational cohort (“Baby Boomers,” 2015). “Boomers” are named after the “baby boom” that occurred following World War II (“Baby Boomers,” 2015; Bursch & Kelly, 2014). This cohort specifically has mixed levels of positional titles within the workplace; many are in leadership roles (Bursch & Kelly, 2014; Marston, 2010). In general, Baby Boomers are optimistic, enjoy mentoring, and team environments (Rayborn, 2014).
“They like to feel like they are part of the team, involved in planning and leadership” (Marston, 2010, p.1). In the workplace, this group does not like clock-watchers, missed deadlines, or receiving negative feedback (Rayborn, 2014). In the workplace, Baby Boomers are said to relate to everyone in the same way they relate to their peer group and are often identified or referred to as “like my parents” by the younger generations (Marston, 2010). “Baby boomers are becoming the aging workforce; every day 8,000 to 10,000 boomers turn 60 years of age” (Conley, 1996-2015, p. 1). Many Baby Boomers respect hierarchy and authority; however, they are often resistant to change in the workplace (Parry & Urwin, 2011, p. 10).

Their adaptability to technology has strengthened their security within the workforce; however, much like their Traditionalist parents, boomers prefer face-to-face instruction (Bursch & Kelly, 2014). “Many Boomers are adept at technology, but still value the human touch” (Marston, 2010, p.1). As a result of their upbringing and generational placement in history, they are drawn to reading articles and books for information. Additionally, they may also appreciate learning by hearing perhaps due to their consistent exposure to radio broadcasting (“Baby Boomers,” 2015). Many of them are nearing or at retiring age; however, their drive and financial necessity forces them to embrace the age of technology in order to stay competitive in the workplace (Bursch & Kelly, 2014).

**Generation X - Born 1965-1980**

These adult learners were born between 1966 and 1980 (Meet the Generations, 2015). Members of the Generation X cohort are often characterized as skeptical, tech-savvy individuals who appreciate work-life balance (Rayborn, 2014). As a rule, this
group is frustrated by disorganization, micromanagement, and corporate politics (Rayborn, 2014).

Generation X has learned to be skeptical of just about everything. Be straightforward with them – don’t try to sugarcoat anything. They’ve been hit with slick advertisements since they were infants and can spot a phony a mile away – be straight and clear. They will be suspicious of any “pie in the sky” scenarios or goals. Address their innate cynicism with back-up plans for the inevitable time when a problem arises. Xers expect problems and they will appreciate your willingness to concede that plans may go awry. Gen Xers tend to research and “fact check” everything themselves. They will Google you and the company and the training program, if they haven’t already. They seldom rush into any decision hastily. They will find out everything they want to know on their own. (Marston, 2010, p.1)

Members within Generation X are loyal; however, unlike their Baby Boomer parents, work-life balance and independent goals supersede corporate initiatives (Marston, 2010; Parry & Urwin, 2011; Conley, 1996-2015). Xers are reliable; therefore, they have expectations that others will respond to work in a like manner (Marston, 2010).

As the first generational cohort to explore the surge of computer technology and experience the shift from analog to digital, Generation X is the bridge between the “old and new ages” (Bursch & Kelly, 2014; Conley, 1996-2015, p. 1). Research supports that these independent learners are highly adaptable and eager to learn how to reach their full potential (Bursch & Kelly, 2014). Some believe this generation may have the best of both worlds, born to Boomer parents who were focused on independence and equality,
yet have the technical savvy, ambition and confidence to accomplish their goals (Bursch & Kelly, 2014). Their work ethic is founded on finding the appropriate work-life-balance (Bursch & Kelly, 2014). Their success in the workplace has been on the rise, but not without hard work and dedication pushing them to the top (Ware, Craft, & Kerschenbaum, 2007). These learners are comfortable in any environment, traditional or online, as their primary concern is that learning is relevant, convenient, and applicable (Bursch & Kelly, 2014). Generation X employees prefer information that is informal, yet effective (Bursch & Kelly, 2014).

Generation X prefers training that includes the following aspects:

- Web-based training
- Allow them to ask questions and challenge the concepts
- Keep the training materials brief and easy to read
- Offer multi-media learning opportunities
- Ensure access to simple, logically organized knowledge database
- Sensitive to design and graphics
- This group maintains short attention span.

(Casey Carlson & Deloitte & Touche Study, 2015)

**Generation Y (Millennials) - Born 1981-1994**

Born 1981-1994, this generation has a strong sense of connectivity to the world around them due to their immediate access to information via the Internet, video gaming, saturation of social media, and the unrestricted, uncensored nature of media in general (Reeves, 2006; Bursch & Kelly, 2014; Meet the Generations, 2015). “This generation is also the most diverse generation ever and will redefine diversity in the workplace”
(Bursch & Kelly, 2014, p. 8). In light of the increase in “Boomer” retirement, the door has opened to provide more employment opportunities for Millennial successors as “Gen Y’ers” climb their way to the top (Bursch & Kelly, 2014).

As a newer and second largest cohort to enter the workforce, individuals from Generation Y value community outreach and diversity over money, are results-oriented, and are loyal to people versus the company (Rayborn, 2014). In general, their dislikes include rigid work schedules, corporate speak about finances, and conforming to old styles and rules (Rayborn, 2014). For this reason, Generation Y are often viewed as “flighty” due to their expectation to change jobs more frequently than their generational counterparts (Marston, 2010; Parry & Urwin, 2011). “In some cases, Millennials can appear demanding of or ‘entitled’ to involvement in leadership and privileges that usually comes after years of experience” (Marston, 2010, p.1). This generation’s priority is to get the job done, rather than conform to strict schedules and timelines (Hendryx, 2008). Millennials, or Generation Y, are the only generational cohort who have never known life without technology (Reeves, 2006; Bursch & Kelly, 2014; Conley, 1996-2015). “To this generation, computers are not new technology” (Hendryx, 2008, p.16).

In the workplace, these generational learners are comfortable with hands-on learning as a form of experimentation. They need immediate application and gratification through successful outcomes (Reeves, 2006; Dickinson, 1992). This group prefers to receive immediate feedback and need consistent praise for a work performed (Bursch & Kelly, 2014). “Millennials are adept at all communication technology. In fact, they are dependent on it. They are accustomed to their text messages and emails being acknowledged or answered instantly and are daily users of social networking and social
media” (Marston, 2010, p.1). Due to their comfort with technology, Millennials easily adapt to the innovative technical training that is currently provided to staff across organizations (Bursch & Kelly, 2014; Conley, 1996-2015).

Training for Generation Y should include an opportunity where:

- They thrive in multi-media environment
- They can learn any time anywhere
- They need flexibility
- Multi-tasking
- Enable internet reliance (Webinars, IM, Blogs, Podcasts, Avatars, YouTube)
- Enable social networking through internet (My Space, Friendster)
- Provide with simulations
- Provide with the structured learning regardless of the form
- Connect me with everything
- True team players

(Casey Carlson & Deloitte & Touche Study, 2015).

**Teaching & Adult Learning in Healthcare**

**Training with Technology**

“The word ‘training’ in organizations is typically interpreted as an event, or a discrete set of material with an accompanying process that achieves a specific learning goal” (Raytheon, 2014, p. 6). Professionals at Raytheon conducted a study to examine the training programs, initiatives, and strategies of 252 companies dealing with onboarding new employees to combat organizational concerns with boomer retirement
(Raytheon, 2014). In August 2014, the companies reported their organizations’ strategies, effectiveness, and best practices for a variety of training initiatives (Raytheon, 2014).

Below are three graphs from the study showing which industries were included in the research, effective and ineffective modality for training, and the outcomes for transfer of knowledge after training is complete.

Figure 6: Industries Represented in the Raytheon Study (Raytheon, 2014, p.25)

The Healthcare industry, including Pharmacology and Medical, represented nearly one-fourth, or 9%, of the responses for the Raytheon study.
The study also showed of 171 companies, 71% stated facilitator-led training was the most effective training modality for their staff. In the same study, seventy-four companies were categorized as having ineffective onboarding programs. Fifty-eight percent (58%) that group reported facilitator-led training as an ineffective mode of training (Raytheon, 2014). The results showed separate percentages for the use of e-learning (57%), videos (51%), and computer-based training (41%) (Raytheon, 2014).
Lastly, the Raytheon study identified the top three best practices to ensure knowledge transfer is work shadowing (71%), coaching (64%), and paired work (54%) (Raytheon, 2014). These results indicate while technology can enhance the learning experience, learners may retain more information through human interaction. Technology can be the tool that connects the student to knowledge, the student to other students, and the student to the teacher (Hendryx, 2008). Moreover, research indicates it is also important to consider student access to and comfort with current technology and
software packages (Hendryx, 2008; Cox, 2004). Research conducted by Thomas Cox (2004) of University of Memphis on learning styles and technology provide information about various ways in which technology-enhanced learning takes place and its significance in increasing learning (Cox, 2004). According to his findings, whether the studies produced significant results or not, the perpetual theme among the research was the implication to understand and incorporate a variety of learning styles in training utilizing technology (Cox, 2004).

**Healthcare Training with Technology**

Dorothy Billington, Ph.D. (1996) conducted a study on adult learners showing the inseparable relationship between significant growth and personal development. The results of the study showed adults can continue to learn throughout their lives, well into “maturity,” in age and thought process (Billington, 1996). Her research extended beyond the school setting and into the work environment to investigate the effects of corporate training programs (Billington, 1996).

According to Dr. Billington (1996), “Those who fail to continually teach and train employees quickly slide into obsolescence” (p. 1). Due to the accelerated changes in technology, training and development deserve greater attention within the workplace (Billington, 1996). “As corporations take into consideration the diversity of their employees and the acceleration of change in the marketplace, it is apparent that traditional organizations, training methods, and ways of doing business must either adapt to constant change or become proactive in many ways” (Dickinson, 1992, p. 1).

Newer technologies, such as extensible markup language and learning content management systems, will enable organizations to create training content once but deliver
it in multiple formats. The key to these technologies is to separate authoritative content from its presentation by allowing the same training and communication to be translated appropriately to the specific generational audiences. By combining this content with well-structured delivery architecture and effective search tools, organizations will enable users to find and download content quickly in the delivery medium of their choice (Ware et al., 2007, p. 3).

Many employers have shifted their expectations to employ intelligent and independent workers who can adapt to the organization’s increasing reliance upon technology (Dickinson, 1992). Healthcare is among the organizations that have embraced the technical age (Learn EHR Basics, 2014; Benefits of Electronic Health Records (EHRs), 2014). Implementation of an electronic health record is widespread among 2,400 hospitals represented nationwide (Green, 2012).

There are more than 500 electronic health record operating system options, and among those raked in the top five as identified by Centers for Medicare & Medicaid Services (CMS), the hospitals represented in this study currently utilize three of them (Green, 2012; Rouse, 2009-2015). The healthcare industry adopted the philosophy of employing the best of the best for its clinical professionals. Now, with the implementation of the electronic health record system, healthcare corporations must reconsider their hiring and training strategies to ensure its non-clinical positions are equally prepared, informed, and fully-trained to perform the technical aspects of their positions (Learn EHR Basics, 2014; Wolfson, Cavanagh, & Kraiger, 2014).
Healthcare Staff Demographics

The healthcare facilities that participated in this study have similar staff demographic who perform similar job functions after receiving training through technology. Staff identified for this research study provide patient access tasks including, but not limited to patient registration, appointment scheduling, healthcare coverage confirmation, and some aspects of revenue cycle applications through payment collections. Members of the patient access teams at some hospital, clinic, or satellite locations also perform various billing and patient account analysis depending upon the patient’s need and services rendered. At each site, the offices are staffed with diverse members. More specifically, staff are representative of the five generations that are currently within the workplace environment (Carerra, 2012; Dickinson, 1992).

No matter the generational cohort, historical perspective, or otherwise differentiating factors, all patient access staff are required to utilize the EHR to perform their daily tasks (Learn EHR Basics, 2014; Wolfson, Cavanagh, & Kraiger, 2014). Additionally, these staff receive the same technical training despite their familiarity with technology and/or ability to learn through the method selected by the organization (Learn EHR Basics, 2014). Moreover, their learning style preference may not be represented in the presentation of the training material.

Generational Learning with Healthcare Technology

The current structure for healthcare training delivered through technology incorporates a blended learning approach (Macdonald, 2006; Learn EHR Basics, 2014). The facilitator-led training is a small portion of the initial training, intended as an introduction to the general technical component the position entails. While this training
method is attractive to any Traditionalist or Baby Boomer, this traditional approach to training is time consuming for organizations that are transitioning into the technical age of training (Casey Carlson & Deloitte & Touche Study, 2015). The second phase of training generally includes step-by-step guides staff can read and attempt to match their screens to the images printed on the page. For independent, visual learners, this method of training is effective (Dickinson, 1992). Perhaps for some Generation X learners who are more comfortable with technology, having the ability to read and understand the steps, in addition to navigating through the technical aspects of the EHR, perhaps this approach is appropriate (Casey Carlson & Deloitte & Touche Study, 2015).

Finally, if additional training is needed, staff are able to access the learning management system to browse e-learning courses, video tutorials, or other media type files that generally appeal to the Millennial generational cohort (Casey Carlson & Deloitte & Touche Study, 2015). There are also email communication updates noting changes to processes, upgrades to the system, and/or new programs to add to the existing complex system that all staff are expected to understand and incorporate into their daily work life.

Though there is a general understanding of learning style and generational learning preferences for healthcare training delivered through technology, greater emphasis is needed for specific training development based on generational perspective. “Avoiding the trap of understanding generational differences cannot be overstated. It is critical for to KNOW the new generation, connect with their preferred style and expectations” (Casey Carlson & Deloitte & Touche Study, 2015, p.10). The single factor
that impacts performance and outcomes is training (Casey Carlson & Deloitte & Touche Study, 2015).

Summary

Learning style theory recognizes learning styles as an individual’s preferred mode, or natural inclination for learning (Felder, 2010). As the standard definition of a student became inclusive of adult learners, the need to explore the rules for teaching and engaging learners and the setting in which learning could take place also became more important. “Research suggests that students taught in a manner matched to their learning style preference tend to learn more than students taught in a highly mismatched manner” (Felder, 2010, p. 5). Moreover, specifically for adult learners, learning style may depend on the subject, level, learning objectives of the course, and the backgrounds and skills of the learner (Felder, 2010).

Advancements in technology also contributed to the need to better understand learning style preferences for generational learners and the potential organizational implications if learning style is not considered in workplace training programs (Cox, 2004; Hendryx, 2008; Raytheon, 2014). Felder (2010) ascertains optimal teaching style balances between each dimension of a selected learning styles model. Specifically for participants in this study, “Acquainting students with their learning styles can enhance their awareness of some of their natural learning strengths, and it can also alert them to learning needs which, if unaddressed, could create academic difficulties for them” (Felder, 2010, p. 5). For healthcare training delivered through technology, consideration should be given to learning style preferences of generational learners.
CHAPTER III: METHODOLOGY

The following section will restate the purpose statement and research questions, discuss the research design, population and sample, survey instrumentation, validity and reliability of the instrument, explain the data collection and analysis processes, and reiterate the limitations of the study.

Purpose Statement

The purpose of this mixed-method study was to determine the degree of perceived differences for auditory, visual and kinesthetic learning styles of Traditionalist, Baby Boomer, Generation X and Millennial generational healthcare workers participating in technology-assisted healthcare training.

Research Questions

Five research questions guided this study:

1. To what degree do Traditionalist adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

2. To what degree do Baby Boomer adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

3. To what degree do Generation X adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?
4. To what degree do Generation Y (Millennial) adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

5. Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in technology-assisted healthcare training?

Each research question attempts to identify the value in understanding four generational perceptions of learning with technology in healthcare training. Equally important is identifying if there are significant differences between learners from these specific generational cohorts: Traditionalists, Baby Boomers, Generation X, and Generation Y (Millennials).

**Research Design**

A mixed-method design was most appropriate for this study. “With the mixed method designs, researchers are not limited to using techniques associated with traditional designs, either quantitative or qualitative” (McMillan & Schumacher, 2010, p. 25). Moreover, “an important advantage of mixed-method studies is that they can show the result (quantitative) and explain why it was obtained (qualitative)” (McMillan & Schumacher, 2010, p. 25). The researcher for this study collected quantitative and qualitative data simultaneously. Creswell & Plano (2011) described this mixed-method approach to data collection as a convergent parallel design (Creswell & Plano, 2011). This was the most suitable method to conduct research for this study because it allowed the researcher to use concurrent timing to implement the quantitative and qualitative
strands during the same phase of the research process (Creswell & Plano, 2011). While conducting research, the researcher prioritized the methods equally, kept the strands independent during analysis, and then mixed the results during the overall interpretation of the data (Creswell & Plano, 2011).

Upon further analysis and comparison of the separate results obtained, the data showed different yet complementary data on the same topic (Creswell & Plano, 2011). The researcher found this mixed-method fitting because it is an efficient design permitting a dual (quantitative and qualitative) data collection process (Creswell & Plano, 2011). For this study, the investigator focused on quantitative data collection through an online survey instrument that included two open-ended qualitative questions.

**Quantitative Data Collection**

The Odessa Learning Style Inventory Survey (2015) was used to collect quantitative and qualitative data for this study. “In a survey research design, the investigator selects a sample of subjects and administers a questionnaire or conducts interviews to collect data” (McMillan & Schumacher, 2010, p. 22). This instrument produced interval data outcomes the researcher used to compare significant differences between generational learning style preferences. For this mixed-method design, the researcher used causal-comparative as the quantitative portion of the design.

“In a comparative design, the researcher investigates whether there are differences between two or more groups on the phenomena being studied” (McMillan & Schumacher, 2010, p. 22). There are two essential characteristics of a causal-comparative study: “(1) researchers observe and describe some current condition, and (2) researchers look to the past to try to identify the possible cause(s) of the condition”
The causal-comparative design allowed the researcher to determine differences among the generational learning style preferences collected from quantitative data collection. The following variables were considered for this study: generational learners and their preferred learning style when participating in healthcare training delivered through technology.

**Qualitative Data Collection**

Qualitative data was gathered from the open-ended interview questions at the end of the survey instrument. Qualitative data provides meaning and understanding (McMillan & Schumacher, 2010). The qualitative portion of this study focused on factors that were most beneficial and least beneficial to the learning experiences of generational learners. The researcher obtained this information by incorporating two open-ended, interview-style questions at the end of the survey. In qualitative research, “researchers gather data that must be analyzed through the use of informed judgment to identify major and minor themes expressed by participants” (Patten, 2012, p. 9). Data gathered in this method allowed the researcher to identify patterns and themes that were later analyzed to make general claims about generational preferences for visual, auditory, and kinesthetic learning.

**Population**

Organizations around the world are dealing with a rapidly growing population of aging adult learners (Wolfson, Cavanagh, & Kraiger, 2014). According to research conducted by Kaiser (2016), there are approximately 12 million healthcare professionals in the United States (Kaiser Family Foundation [Kaiser], 2016). The researcher for this study considered the target population as all healthcare workers nationwide within the
generational birth years represented in this study (McMillan & Schumacher, 2010). In
the same workforce report, Kaiser identified approximately 1 million healthcare workers
in the State of California (Kaiser, 2016). The survey sample in this study was selected
from three healthcare organizations within San Diego County (McMillan & Schumacher,
2010). The sample consisted of 300 healthcare workers who met the following criteria:
(1) are at least 18 years of age, (2) work for a healthcare organization for three or more
years, (3) are located in greater San Diego geographical area for convenience sampling,
and (4) have received healthcare training through technology.

Sample

The researcher used nonprobability, purposeful convenience sampling to identify
the sample group for this study from healthcare organizations located in San Diego
County (Patten, 2012). Purposive sampling is a sampling method in which elements are
chosen based on the purpose of the study (Patten, 2012). Convenience sampling is a non-
probability sampling method that relies on data collection from population members who
are conveniently available to participate in the study (Patten, 2012). Nonprobability,
purposeful convenience sampling was selected for this study for its simplicity and ease of
research, historical use in generational studies, timeframe for data collection, and overall
cost effectiveness (Patten, 2012).

As it pertains to this research, approximately 250 healthcare members were
selected to participate in this generational study. There were approximately 25-100
representatives from each of the three large healthcare facilities within San Diego
County. The participants in this study met the following criteria: (1) are at least 18 years
of age, (2) work for a healthcare organization for three or more years, (3) are located in
greater San Diego geographical area for convenience sampling, and (4) have received healthcare training through technology necessary for performing patient access related tasks within their department. Smith (2011) states: “From sample results, the researcher generalizes or makes claims about the population” (p. 75).

**Instrumentation**

The Odessa Learning Style Inventory Survey (2015) was selected to collect data about individual participant’s learning style preferences. The researcher found this instrument identified learning style preferences for visual, auditory, and kinesthetic learning. The electronic survey instrument contained 24 statements that assisted learners in identifying their natural proclivity to a visual, auditory, or kinesthetic learning style preference (Appendix D; Odessa College, 2015).

The researcher added two sections to the survey instrument; the first section included a dropdown menu for participants to select their generational cohort based on their birth year:

- Born Prior to 1946
- Born 1947 – 1964
- Born 1965 – 1980

The second section included two open-ended qualitative questions:

1. Thinking of your healthcare training courses, what teaching techniques were most beneficial to your learning experience?
2. Thinking of your healthcare training courses, what teaching techniques were least beneficial to your learning experience?
In this study, the survey was emailed to all participants as an online link using Survey Gizmo, an online survey data collection service. The survey allowed respondents to select their visual, auditory, or kinesthetic learning preferences. The researcher analyzed participant’s responses. The scores for each of the 24 statements were totaled to provide an index score for each visual, auditory, and kinesthetic learning style preference, per individual respondent. “A score of 21 points or more in a modality indicates strength in that area. The highest of the three scores indicates the most efficient method of information intake. The second highest score indicates the modality which boosts the primary strength” (Odessa College, 2015, p. 4). This index score will be used to determine significant differences for generational learners using a One-Way ANOVA. An ANOVA, or analysis of variance statistical test, was optimal for data collection in this study because the survey results yielded individual mean scores the researcher used to compare the differences between learning style preferences as identified by generational grouping.

The survey instrument was publically available on the Odessa College website and has been adopted as the learning style inventory of choice by Gavilan College, Penn State University, and San Jose State University to determine the learning style preferences for their student populations (Gavilan College, 2015; Bixler, 2015; San Jose State University, 2015). Research supports surveys aide researchers in collecting data to describe the attitudes, beliefs, and behaviors of a population (Patten, 2012).

**Validity and Reliability**

Confirming the validity and reliability of the survey instrument used in this study was an important aspect of research development (Biddix, 2009). The Odessa survey
instrument was first validated through a survey diagnostic tool offered through Survey Gizmo. The researcher utilized this option to conduct a system generated field test to help ensure the instrument functioned as designed, produced the outcomes intended for the user, and was statistically useful for the researcher. The system generated field test could identify survey glitches during testing and confirmed the software performed under real-world conditions that could disrupt the data collection processes. There were three additional survey validation methods used in this study: (1) expert opinion, (2) a field-test with human participants, and (3) Literature Review Matrix alignment (Appendix A).

**Expert Validation**

Kimberlin and Winterstein (2008) state, content validity addresses how well the items are developed to determine a certain measure. Moreover, “because there is no statistical test to determine whether a measure adequately covers a content area or adequately represents a construct, content validity usually depends on the judgment of experts in the field” (Kimberlin & Winterstein, 2008, p. 2279). Using instruments that are valid and reliable is a crucial component of research quality (Kimberlin & Winterstein, 2008). To ensure the validity of the instrument, two experts in the field of generational learning were asked to review the content and questions in the instrument to determine the validity of the survey:

2. Michael Stadler, Ed.D., La Verne University – Adjunct Professor, University of La Verne, expertise in VAK.
These experts thoroughly reviewed the content of the instrument to ensure the clarity of the survey instructions and subsequent questions. Upon their review, they provided individual feedback to the researcher regarding the content of the instrument that was incorporated into the survey prior to deploying it to study participants in a formal data collection process.

Field Test

Field-testing is an important step in determining the reliability of a survey instrument (Field Test, 2015). In this research study, the researcher used a field test to ensure survey participants understood the questions and were not confused by the descriptors. Additional factors that contribute to the reliability of a survey instrument include usability, ease of access to the survey for participants, and using clear language that can be easily interpreted by the participants (Biddix, 2009). Research supports, when conducting research, field testing helps with quality assurance, standard outcomes, and confirming survey administration processes (Field Test, 2015).

The researcher for this study conducted a field test to validate the Odessa Learning Style Inventory Survey (2015). Ten participants were selected to complete the electronic survey using non-probability purposeful convenience sampling. Volunteers for the field test shared comparable demographic and job roles, similar to the larger target population. Once the survey participants were identified, each completed the survey twice over a two-week period. The researcher had each participant complete the survey twice in order to compare and analyze the survey results from both occurrences. This analysis was necessary in determining the consistency in responses for each respondent. The researcher reviewed, compared, and noted any differences for individual responses in
order to confirm the survey’s reliability. Ultimately, confirming the reliability of the survey instrument for this study determined how the researcher would approach compiling the data to make broader correlations to the generations represented in the study.

**Ethical Considerations**

Creswell and Plano (2011) state, “Permission needs to be sought from multiple individuals and levels in organizations, such as individuals in charge of sites, from people providing the data…and from campus-based institutional review boards (IRBs) to collect data from individuals and sites” (p. 175). In regard to this study, the protection of human subjects was completed as per the requirements of the Brandman University Institutional Review Board (BUIRB). The researcher was given consent to conduct this study from hospital leadership via email. An informed consent statement was included at the start of the online survey for participants. All participants received a standard introduction, general information about the research, how to contact the researcher, and instructions to complete the survey. An application for an Expedited Review was submitted to the BUIRB. The approval from BUIRB was received on February 26, 2016 and can be found in Appendix C. The approval was dated February 26, 2016.

**Data Collection**

The researcher for this study collected data through an electronic survey adapted to gather both quantitative and qualitative data. The Odessa Learning Style Inventory Survey (2015) (Appendix D) was used to collect data for this study. In order to receive electronic responses from study participants, the following survey components were manually entered into an online survey service called Survey Gizmo: (1) a birth-year
dropdown menu, (2) twenty-four survey statements, and (3) two interview-style questions. The birth-year dropdown menu allowed the respondents to identify their generational cohort based on their birth year.

Responses to the survey statements provided quantitative data the researcher could use to determine the learning style preferences for each respondent. Lastly, the interview questions allowed individuals to share their story, providing themes and patterns the researcher analyzed to show commonalities and differences among the generations.

The researcher activated and tested the survey to confirm the instrument functioned as intended for accurate data collection. Then, the researcher created a survey link. Once the survey was approved by BUIRB and permission was granted to implement data collection, the instrument was disseminated to 250 survey participants among three hospitals within the greater San Diego area. Of the 250 staff members who received the survey, 140 individuals completed the survey. The rate of return was 56%. Each participant was required to electronically agree to the informed consent document before being allowed to proceed to survey questions. The survey remained available to participants for a two-week period.

**Data Analysis**

Windows SPSS Statistics was utilized for quantitative data analysis, and NVivo Statistical software was utilized for qualitative data analysis. Descriptive statistics were used to describe the collected survey data. Patten (2012) states, “Descriptive statistics summarize data, so they can easily be comprehended” (Patten, 2011, p.103). During this
analysis, themes and patterns from the qualitative, open-ended responses were identified and analyzed to triangulate and support the statistical data collected from the study.

The 24 survey statements used in the study allowed respondents to identify their preferred learning style based on a 3-point interval using Often (3), Sometimes (2), and Seldom (1). In non-experimental studies, variables may be considered dependent or independent (Patten, 2012). The dependent variable is caused by the independent variable and provides analyzable measurements (McMillan & Schumacher, 2010). This study used adult learners as the independent variable and their preference for VAK learning styles as the dependent variables. Descriptive statistics were used to describe the degree adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles (Field, 2009). Inferential statistics were used to make population generalizations related to the differences among learning style preference by generation (Patten, 2012). A One-Way Anova was used to compare the differences between learning style preferences as identified by generational groupings.

The researcher established five research questions to direct this study.
Table 8

*Data Analysis by Research Question*

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what degree do Baby Boomer adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>To what degree do Generation X adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>To what degree do Generation Y (Millennial) adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>To what degree do Traditionalist adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in health care technology-assisted training?</td>
<td>One-Way ANOVA, Descriptive Statistics</td>
</tr>
</tbody>
</table>

**Limitations**

The following limitations may apply to this study:

1. This study was limited to three organizations; therefore, participant responses may not be representative of all healthcare organizations.
2. Learning styles preferences were related to computer-based healthcare training, which may change depending on the professional occupation of a participant.

3. Participants self-reported their preferences to learning computer-based healthcare training, responses to demographic and questionnaire survey instruments, which could result in bias if certain questions were misunderstood.

**Summary**

This section reintroduced the purpose statement, research questions and described the mixed-method design for this research study. The research design connected the survey instrument to the study and identified the population and the sample. Lastly, the researcher highlighted the processes for data collection and analysis and study limitations specific to this study. In Chapter IV, an analysis of the data collected in this mixed method study is provided.
CHAPTER IV: RESEARCH, DATA COLLECTION, AND FINDINGS

Overview

Chapter 4 begins with the purpose statement, research questions, and summary of the methodology. This section provides an overview of the sample population, and data collection procedures utilized in the research. This analysis includes a detailed report of the quantitative and qualitative data findings of the research outcomes represented in data tables, graphs, and supporting descriptive statistics to describe the data results. The chapter concludes with a brief summary and transition to the final chapter of recommendations for further research.

Purpose Statement

The purpose of this mixed-method study was to determine the degree of perceived differences for auditory, visual, and kinesthetic learning styles of Traditionalist, Baby Boomer, Generation X, and Millennial generational healthcare workers participating in technology-assisted healthcare training.

Research Questions

Five research questions guided this study:

1. To what degree do Traditionalist adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

2. To what degree do Baby Boomer adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?
3. To what degree do Generation X adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

4. To what degree do Generation Y (Millennial) adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

5. Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in health care technology assisted training?

Research Methods and Data Collection Procedures

As it pertains to this study, the protection of human subjects was completed as per the requirements of the Brandman University Institutional Review Board (BUIRB). The researcher was given consent to conduct this study from hospital leadership via email. An informed consent statement was included at the start of the online survey. A standard introduction, general information about the research, researcher’s contact information, instructions to complete the survey, and a copy of the Participant’s Bill of Rights was also incorporated.

The researcher activated and tested the survey to confirm the instrument functioned as intended for accurate data collection. The survey link was disseminated to approximately 250 survey participants from three hospitals within the greater San Diego area. Each participant was required to electronically agree to the informed consent
document before being allowed to proceed to survey questions. The survey remained available to participants for a two-week period.

**Population**

The survey sample in this study was selected from three healthcare organizations within San Diego County (McMillan & Schumacher, 2010). The sample consisted of approximately 250 healthcare workers that met the following criteria: (1) were at least 18 years of age, (2) worked for a healthcare organization for three or more years, (3) were located in the greater San Diego geographical area for convenience sampling, and (4) have received healthcare training through technology.

**Sample**

For this study, approximately 250 healthcare members received the survey link from their respective hospital leadership in order to participate in this generational study. The participants in this study met the following criteria: (1) were at least 18 years of age, (2) worked for a healthcare organization for three or more years, (3) were located in the greater San Diego geographical area for convenience sampling, and (4) have received healthcare training through technology necessary for performing patient access related tasks within their department.

Smith (2011) states: “From sample results, the researcher generalizes or makes claims about the population” (p. 75). Fifty-six percent (56%) of the sample population completed the survey. Approximately 9% of respondents declined to participate.

This nonprobability, purposeful convenience sampling was optimal for this study because of its simplicity and ease of research, historical use in generational studies, timeframe for data collection, and overall cost effectiveness (Patten, 2012). The
researcher used nonprobability, purposeful convenience sampling to identify the sample group for this study from healthcare organizations located in San Diego County (Patten, 2012). There were approximately 25-100 representatives from each of the three large healthcare facilities within San Diego County. Purposive sampling is a sampling method in which elements are chosen based on the purpose of the study (Patten, 2012). Convenience sampling is a non-probability sampling method that relies on data collection from population members who are conveniently available to participate in the study (Patten, 2012). The analysis for this chapter reports only on those results from staff who consented to participate and completed the survey by meeting the required criteria.

Demographic Data

Study participants for this research met the aforementioned criteria and were representative of four generational groups present in the workplace. This demographic data was collected when survey participants selected their birth year from a dropdown category list built into the online survey instrument. The table below is an overview of the sample population by generation.

Table 9
Sample Population by Generation

<table>
<thead>
<tr>
<th>Generation</th>
<th>Birth</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditionalist</td>
<td>Born prior to 1946</td>
<td>5</td>
</tr>
<tr>
<td>Baby Boomer</td>
<td>Born 1946 and 1964</td>
<td>35</td>
</tr>
<tr>
<td>Generation X</td>
<td>Born 1965 and 1980</td>
<td>61</td>
</tr>
<tr>
<td>Generation Y (Millennials)</td>
<td>Born 1981 and 1994</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>All Birth Years</td>
<td>140</td>
</tr>
</tbody>
</table>
In earlier chapters, it was noted the birth year options are associated to the following generational cohorts: Traditionalist, Baby Boomer, Generation X, and Generation Y (Millennials). Survey data was collected from n = 140 subjects.

Generational participation was represented by Baby Boomers (n=35), Gen X (n=61), and Gen Y (n=39). Because of a low sample size, the Traditionalist (n=5) generation was excluded from the final analysis, however, was recorded in the graph below used to report the initial data output.

Figure 9: Survey Responses by Generation

The graph above shows the generational breakdown of responses by percentage. These figures align with the current generational labor distribution as reported in the United States Labor Report (Conley, 1996-2015) and will be referred to throughout this chapter. Facts from the data will be presented about the three generations that represented significant outcomes based on the number of responses.

Generation X represents the largest group currently within the workforce at 43%, Generation Y is the youngest and fastest growing population in the workplace at 28%,
and Baby Boomers are representative of the generation exiting the workforce with 25% of responses. The next sections focus on analyzing and describing the data outcomes as indicated by collective generational responses and their learning style preferences. The following sections analyze the data by generation based on the research questions.

**Presentation and Analysis of Data**

Quantitative and qualitative data was collected through an online survey instrument. The survey statements correlated responses to visual, auditory, and tactile subgroupings; each statement was rated 1, 3, or 5, based on an individual respondent’s learning style preference. In addition, the subjects themselves were divided into four generations upon their selection of their birth-year from a dropdown category list. Before the close of the survey, respondents were asked two interview-style, open-ended questions pertaining to the most beneficial and least beneficial aspects of their healthcare training experiences when using technology. The following sections report the data results for both quantitative and qualitative survey data collected for this research study.

Qualitative data was collected from two open-ended, interview-style questions that were built into the online survey: (1) Thinking of your healthcare training courses, what teaching techniques were most beneficial to your learning experience? and (2) Thinking of your healthcare training courses, what teaching techniques were least beneficial to your learning experience? A total of 140 responses were compiled from the qualitative questions.

Individual responses were filtered by generation and grouped into visual, auditory, and kinesthetic learning style categories. The figure below shows the overall
percentage of qualitative responses by generation: 36% responses were from Baby Boomers, 14% from Generation X, and 29% from Millennials (Gen Y).

![Percentage of Qualitative Responses by Generation](image)

*Figure 10: Percentage of Qualitative Responses by Generation*

**Research Question 1**

Research Question 1 asked, “To what degree do Baby Boomer adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles”?

Survey participants who identified with the Baby Boomer generation responded to a learning style survey, including 24 statements and two open-ended, qualitative questions pertaining to their learning style preferences.

This section will describe the themes and patterns that materialized from this cohort’s collective responses to the survey as it pertained to their visual, auditory, and kinesthetic learning preferences when participating in computer-based health care training.
Consistent responses related to a visual preference were placed into 7 categories. Handouts (38%) and visual aids (25%) were considered the most helpful for Baby Boomer learning. Combined, these two categories represent 63% of the responses for a visual learning style preference. Conversely, 90% of respondents stated reading only is the least beneficial method of learning. The visual category had the greatest number of descriptors to convey Baby Boomer preference for this method of learning.

Coupled with a visual aid, nearly 90% of Baby Boomer respondents replied lectures or verbal instruction were the best mode to learn when participating in computer-based healthcare training. As shown on the boxplot graph, the auditory score is the secondary learning preference. However, 81% of participants responded only listening during healthcare training was least beneficial. This comment supports the research that suggests Baby Boomers prefer listening with a visual component.

Five categories were identified for the kinesthetic learning preference for this cohort. Of these groups, 44.4% find value in hands-on application of the training material. Completing specific training exercises and having practice were combined to account for 33.4% of the responses. The overall qualitative responses for Baby Boomer preferred learning style align with and accurately reflect the quantitative data analysis.
Table 10

*Baby Boomer’s Most Beneficial Training Techniques*

<table>
<thead>
<tr>
<th>Visual</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>eLearning</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Handouts</td>
<td>9</td>
<td>38%</td>
</tr>
<tr>
<td>Modeled</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>PowerPoint</td>
<td>3</td>
<td>13%</td>
</tr>
<tr>
<td>Videos</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Visual aids</td>
<td>6</td>
<td>25%</td>
</tr>
<tr>
<td>Webinar</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auditory</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>5</td>
<td>56%</td>
</tr>
<tr>
<td>Verbal Instructions</td>
<td>3</td>
<td>33%</td>
</tr>
<tr>
<td>Audio</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kinesthetic</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercises</td>
<td>3</td>
<td>16.7%</td>
</tr>
<tr>
<td>Hands on</td>
<td>8</td>
<td>44.4%</td>
</tr>
<tr>
<td>Notetaking</td>
<td>3</td>
<td>16.7%</td>
</tr>
<tr>
<td>One on one</td>
<td>1</td>
<td>5.6%</td>
</tr>
<tr>
<td>Practice</td>
<td>3</td>
<td>16.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 11

*Baby Boomers’ Least Beneficial Training Techniques*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading Only</td>
<td>9</td>
<td>90%</td>
</tr>
<tr>
<td>Watching Films</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>Auditory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of instruction</td>
<td>4</td>
<td>19%</td>
</tr>
<tr>
<td>Listening Only</td>
<td>17</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td><strong>Kinesthetic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not doing</td>
<td>8</td>
<td>80%</td>
</tr>
<tr>
<td>Puzzles</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>Repetition</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Research Question 2**

Research Question 2 asked, “To what degree do Generation X adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?”

Survey participants who identified with Generation X responded to a learning style survey, including 24 statements and two open-ended, qualitative questions pertaining to their learning style preferences. This section will describe the themes and patterns that materialized from this cohort’s collective responses to the survey as it pertained to their visual, auditory, and kinesthetic learning preferences when participating in computer-based health care training.

Though Generation X is the largest generation represented in the workforce, based on the qualitative data, they had the least amount of commentary to decode. Many
of the open-ended survey responses from this generation entered “N/A”, or single word answers like, “lecture”, “hands on”, or “listening.” Four categorical themes emerged from the data supporting this generation’s visual learning style preference. The specific use of PowerPoint presentations accounted for 40% of the responses. Sixty percent (60%) of the other responses were evenly distributed between receiving handouts, seeing behaviors modeled, and using other visual aids.

Sixty-five percent (65%) of respondents commented that reading only is least helpful. This result implies that this generation also prefers an accommodating learning style when participating in computer-based healthcare training.

One hundred percent (100%) of Gen X’ers who responded to the question about aspects of computer-based healthcare training that were least beneficial to their learning experience stated that ‘listening only’ was least beneficial. The data also revealed 63% of respondents from this generation expressed when listening, lectures are the best mode for their auditory learning experience. One-fourth of Generation X respondents replied open forum discussions were also helpful when receiving computer-based healthcare training.

Generation X responses indicated hands-on activities were the best approach to kinesthetic learning. This cohort showed diverse responses for this learning style: 42.1% specifically stated hands on; roleplaying was reported with 16.7%, which speaks to the value this group places on seeing activities modeled; 67% of all responses for this group replied, “Not doing” an activity was least beneficial. The overall qualitative responses for Generation X and their preferred learning style align with and accurately reflect the quantitative data analysis.
### Table 12

*Generation X’s Most Beneficial Training Techniques*

<table>
<thead>
<tr>
<th>Visual</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handouts</td>
<td>1</td>
<td>20%</td>
</tr>
<tr>
<td>Modeled</td>
<td>1</td>
<td>20%</td>
</tr>
<tr>
<td>PowerPoint</td>
<td>2</td>
<td>40%</td>
</tr>
<tr>
<td>Visual aids</td>
<td>1</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auditory</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>5</td>
<td>63%</td>
</tr>
<tr>
<td>Open Forum</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Storytelling</td>
<td>1</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kinesthetic</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing</td>
<td>1</td>
<td>5.3%</td>
</tr>
<tr>
<td>Exercises</td>
<td>2</td>
<td>10.5%</td>
</tr>
<tr>
<td>Hands on</td>
<td>8</td>
<td>42.1%</td>
</tr>
<tr>
<td>Interactive Courses</td>
<td>2</td>
<td>10.5%</td>
</tr>
<tr>
<td>Notetaking</td>
<td>1</td>
<td>5.3%</td>
</tr>
<tr>
<td>Practice</td>
<td>1</td>
<td>5.6%</td>
</tr>
<tr>
<td>Roleplaying</td>
<td>3</td>
<td>16.7%</td>
</tr>
<tr>
<td>Tests</td>
<td>1</td>
<td>6.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td></td>
</tr>
</tbody>
</table>
Research Question 3 asked, “To what degree do Generation Y (Millennial) adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles”?

Survey participants who identified with the Generation Y responded to a learning style survey, including 24 statements and two open-ended, qualitative questions pertaining to their learning style preferences. This section will describe the themes and patterns that materialized from this cohort’s collective responses to the survey, as it pertained to their visual, auditory, and kinesthetic learning preferences when participating in computer-based health care training.

Table 13

*Generation X’s Least Beneficial Training Techniques*

<table>
<thead>
<tr>
<th>Visual</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>eLearning</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Email</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>PowerPoint</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Reading Only</td>
<td>17</td>
<td>65%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auditory</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening Only</td>
<td>24</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Kinesthetic</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group activities</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Not doing</td>
<td>12</td>
<td>67%</td>
</tr>
<tr>
<td>Testing</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Writing</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td></td>
</tr>
</tbody>
</table>
The participant responses for Generation Y were closely distributed for all visual learning aspects presented by their group. Seventy percent (70%) of the respondents preferred a visual aid when participating in computer-based healthcare training. Combined totals for other visual components include more technology-based learning applications, such as videos and eLearning. Nearly 80% perceive ‘reading only’ to be the least beneficial contribution to their learning experience.

The auditory learning preference was the least diverse component of the Millennial learning experience. Three categories were identified. Eighty-eight percent (88%) of the responses combined were in favor of lecture and verbal instructions. Ninety-two percent (92%) report ‘listening only’ is least beneficial to their learning experience. The consistency of responses for opposing questions on auditory learning style preference was representative of the individual likeness within the larger number of generational respondents in this study.

Nearly 59% of Generation Y respondents responded hands-on activities were most beneficial when participating in computer-based healthcare training. Similar to the results from the auditory preference, the scores for the least beneficial aspect of training is the exact opposite of the most beneficial. Sixty percent (60%) of this generation responded ‘not doing’ was least beneficial to their learning experience.

Generation Y showed little disparity between or for a particular learning style preference. Overall, auditory learning was 8% less than kinesthetic, and there was a 5% difference between visual and kinesthetic preferences. As the quantitative data suggests, the qualitative supports Gen Y had fairly even scores across the visual, auditory, and kinesthetic learning spectrum.
The overall qualitative responses for Generation Y and their preferred learning style align with and accurately reflect the quantitative data analysis.

Table 14

*Generation Y’s Most Beneficial Training Techniques*

<table>
<thead>
<tr>
<th>Visual</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>eLearning</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Flashcards</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Handouts</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Modeled</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>PowerPoint</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Videos</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Visual Aids</td>
<td>9</td>
<td>45%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Auditory</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>4</td>
<td>50%</td>
</tr>
<tr>
<td>Open forum</td>
<td>1</td>
<td>13%</td>
</tr>
<tr>
<td>Verbal Instructions</td>
<td>3</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kinesthetic</th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercises</td>
<td>3</td>
<td>10.3%</td>
</tr>
<tr>
<td>Hands on</td>
<td>17</td>
<td>58.6%</td>
</tr>
<tr>
<td>Notetaking</td>
<td>2</td>
<td>6.9%</td>
</tr>
<tr>
<td>Practice</td>
<td>5</td>
<td>17.2%</td>
</tr>
<tr>
<td>Roleplaying</td>
<td>1</td>
<td>3.4%</td>
</tr>
<tr>
<td>Tests</td>
<td>1</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 15

*Generation Y’s Least Beneficial Training Techniques*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eLearning</td>
<td>2</td>
<td>14%</td>
</tr>
<tr>
<td>Emails</td>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>Reading only</td>
<td>11</td>
<td>79%</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Auditory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listening Only</td>
<td>11</td>
<td>92%</td>
</tr>
<tr>
<td>Virtual courses</td>
<td>1</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Kinesthetic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group training</td>
<td>2</td>
<td>40%</td>
</tr>
<tr>
<td>Not doing</td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
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</tr>
</tbody>
</table>

**Research Question 4**

Research Question 4 asked, “Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in health care technology assisted training”?

The researcher for this study first used an ANOVA to determine if there were significant difference in responses to each subgroup of questions by generation. To assess whether there is a relationship to responses for the visual, auditory, and kinesthetic question types and generation, the investigator fit a linear mixed model with fixed effects for generation, question type, and their interaction. A random intercept term was included to account for within-subject correlations.

The results of the One-Way ANOVA are in Table X below. The test did not result in a statistically significant difference between generations within each question type.
There is not a significant difference between generations when looking within each question type separately.

Table 16

*One-Way ANOVA results for differences across generation within each question type*

<table>
<thead>
<tr>
<th>Generation</th>
<th>Baby Boomer</th>
<th>Gen X</th>
<th>Gen Y</th>
<th>Overall</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>3.80 (0.62)</td>
<td>3.74 (0.66)</td>
<td>3.53 (0.64)</td>
<td>3.69 (0.65)</td>
<td>0.161</td>
</tr>
<tr>
<td>Auditory</td>
<td>3.27 (0.75)</td>
<td>3.43 (0.55)</td>
<td>3.44 (0.60)</td>
<td>3.39 (0.62)</td>
<td>0.421</td>
</tr>
<tr>
<td>Tactile</td>
<td>3.04 (0.58)</td>
<td>3.03 (0.49)</td>
<td>3.25 (0.60)</td>
<td>3.10 (0.55)</td>
<td>0.118</td>
</tr>
</tbody>
</table>

A second statistical test was conducted to determine significant differences between a generation and question interaction. The results of the linear mixed effect model fit to include all of the data and account for within-subject correlation. The subsequent mixed model ANOVA is included below in Table 17. The results showed a significant effect for both question type (p < .001***) and a Generation×Question interaction (p = 0.023*) in the ANOVA table. The results were driven largely by a significant regression coefficient for Visual questions (β = 0.529, p < .001***) and the interaction of Gen Y and visual questions (β = −0.439, p = 0.015*). The interpretation of these results is that the visual score appears to be higher when compared to Auditory and Tactile across generation, except for in the Gen Y group. For Gen Y, the Visual score appears to be more in line with the Auditory and Tactile scores (Table 16).
Table 17

Linear mixed effect model regression results. Degrees of freedom for the t-test are approximated using the Satterthwaite method.

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 3.271    | 0.102      | 368.772 | 31.940  | <.001*** |
| Gen X          | 0.155    | 0.128      | 368.772 | 1.205   | 0.229    |
| Gen Y          | 0.171    | 0.141      | 368.772 | 1.211   | 0.227    |
| Tactile        | −0.236   | 0.130      | 264.000 | −1.811  | 0.071    |
| Visual         | 0.529    | 0.130      | 264.000 | 4.060   | <.001*** |
| Gen X: Tactile | −0.158   | 0.163      | 264.000 | −0.966  | 0.335    |
| Gen Y: Tactile | 0.043    | 0.179      | 264.000 | 0.242   | 0.809    |
| Gen X: Visual  | −0.217   | 0.163      | 264.000 | −1.329  | 0.185    |
| Gen Y: Visual  | −0.439   | 0.179      | 264.000 | −2.447  | 0.015*   |

Figure 11 below is a boxplot graph of the averaged scores by question type and generation. The x-axis represents the generational groups, and the y-axis is representative of the average scores per learning style question type. According to the survey scoring interpretation, the survey was comprised of 8 visual, 8 auditory, and 8 tactile questions. In the graph below, each learning style is color coded for ease of identification. The learning styles are in the following order: auditory (red), tactile or kinesthetic (green), and visual (blue).
This graph shows the relationship between each generation and preference for learning style. The interpretation of the data for Baby Boomers and Gen X showed a significant preference for visual learning.

While there was proof that Gen Y’ers had some visual learning preferences, this group appeared to have a better-rounded or comparable appreciation for all three learning styles. This inference can be made due to the close proximity of the average responses for learners in this cohort. In the boxplot graph below, the boxes representing visual, auditory, and linesthetic learning style preferences are touching which indicates little variance between responses per each mode of learning. Additionally, the horizontal line across each box correlates to a number on the x-axis. The difference between those numbers are not significant which confirms intergenerational similarity among all three learning styles. Assessing the data further, Baby Boomers’ learning preferences for auditory and kinesthetic learning had less disparity between the two styles. For Gen X, there is clearer distinction between all learning styles, which indicates greater individual preference for one style compared to another within the larger generational grouping.
Overall, the ANOVA statistical reports provided quantitative results showing the generations represented in this study utilize some degree of all three learning styles: visual, auditory, and kinesthetic. The qualitative data reports were compared to the quantitative findings in order to identify themes and patterns that support the quantitative outcomes.

**Analysis of Qualitative Survey Questions**

Upon further analysis of the responses from all survey participants, 16 themes emerged from the qualitative data based on the collective responses for each generational group for the most beneficial aspects of computer-based healthcare training. Fourteen themes were identified for the aspects of computer-based healthcare training that were least beneficial.

This section used descriptive statistics to describe each of the generational perceptions of the most beneficial and least beneficial aspects of computer-based healthcare training. Frequency tables were created to organize the themes and patterns.
presented in the data. The frequency distribution represents the percentage each theme or node was present in the responses per generational grouping and learning style preference.

**Summary**

Chapter 4 began with the purpose statement, research questions, and summary of the methodology. The sample population and data collection procedures utilized in the research were also reviewed. This analysis of quantitative and qualitative comparisons showed the three generations represented in this study utilized some degree of all three learning styles: visual, auditory, and kinesthetic when participating in computer-based healthcare training. Both quantitative and qualitative data collection outcomes were represented in data tables and graphs, and supporting descriptive statistics were used to describe the data results. Chapter V will report subsequent conclusions and recommendations pertaining to this study.
CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this mixed-method study was to determine the degree of perceived differences for auditory, visual and kinesthetic learning styles of Traditionalist, Baby Boomers, Generation X and Millennial generational healthcare workers participating in technology-assisted healthcare training. The study was guided by five research questions pertaining to each generation’s preferred learning style when participating in computer-based healthcare training:

1. To what degree do Traditionalist adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?
2. To what degree do Baby Boomer adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?
3. To what degree do Generation X adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?
4. To what degree do Generation Y (Millennial) adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?
5. Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in health care technology assisted training?

One hundred forty healthcare staff members participated in the study. This sample population was conveniently selected due to their role as patient access representatives, or front-line healthcare staff, within three large hospitals in the greater San Diego region. The study participants were (1) at least 18 years of age, (2) worked for a healthcare organization for three or more years, (3) were located in the greater San Diego geographical area for convenience sampling, and (4) have received healthcare training through technology.

In this final chapter, a summary of the major findings of the study are reviewed as related to the literature. Implications for practice in adult education are discussed and suggestions for future research are provided. This chapter concludes with reflections on the research process.

**Major Findings**

This section is a summary of the major findings in this study. The outline begins with the research question and a summary of the data results by generation supported from the literature review.

**Major Finding 1**

To what degree do Traditionalist adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

Due to the limited number of survey respondents from Traditionalists (n=5), the
generation was not included in the formal data analysis. Four percent (4%) of the respondents were Tradationalists. Based on the raw quantitative data results, Traditionalists prefer auditory learning. One qualitative statement supported this result noting Traditionalists prefer lectures followed by hands-on practice.

Literature supported that members of this generation enjoy connecting with others through storytelling (Casey Carlson & Deloitte & Touche Study, 2015). Exposure to technology was limited and much of their experience with technology was associated with industrialism, railroads, and structures, versus the current standard of computer technology in the 21st century (Meet the Generations, 2015).

Indeed, Traditionalists represented less than 5% of the current workforce (Bursch & Kelly, 2014). Those who are employed represented a small percentage of full-time workers, performing only in modified job roles. In recent years, their experience has had greater value as advisors and respected mentors for emerging employees.

**Major Finding 2**

To what degree do Baby Boomer adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?

Baby Boomers are considered the largest generational cohort. In this study, twenty-five percent (25%) (n=35) of the respondents were Baby Boomers. This generation showed a significant preference for visual learning. The quantitative results showed a distinct visual preference, with slight variations between auditory and kinesthetic learning style preferences. According to the data, Baby Boomers are likely to learn by seeing and reinforce learning by hearing. The qualitative outcomes supported these findings. Respondents for this generation had the greatest number of descriptors used to describe
their learning preference. Nearly half of the qualitative responses were from this generation.

Boomers were introduced to technology as new technologies emerged like the first computers and fax machines; however, throughout the years, they have been able to adapt to newer technologies (Dziuban et al., 2004). This group is at retirement age. Those members who remain in the workforce have specific reasons as to why they are employed and have successfully embraced computer-based training in order to stay competitive (Bursch & Kelly, 2014). Baby Boomers are not digital natives; however, their experiences and willingness to learn technology has allowed them continue growth in the workplace (Bursch & Kelly, 2014).

Major Finding 3

*To what degree do Generation X adult learners participating in technology assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?*

Like the Baby Boomers, forty-three percent (43%) of the study participants were part of Generation X (n=61). This group also showed a significant preference for visual learning. Another significant finding with Generation X is 100% of the respondents reported ‘listening only’ was the least beneficial aspect of their learning experience when participating on computer-based healthcare training.

Despite this generation being the largest cohort represented in the workplace, they had the least number of responses for qualitative data collection. Gen X is indeed familiar with technology and reportedly are independent learners. The data results for this group show the greatest variability between learning style preferences that indicated
greater individuality versus cohesiveness among the generation. Likewise, the data showed appreciation for open forums, which is noted in the literature (Marston, 2010).

Technology has influenced this generation, which affords them an awareness and greater adaptability to the ever-changing requirements in the workplace as technology drives the change. Generation X are tech-savvy; however, technology is not the only driving force behind their success (Rayborn, 2014). Members within this generation are motivated by work-life balance (Bursch & Kelly, 2014). Their appreciation for technology speaks to their drive for efficiency and relevance in order to get the job done (Bursch & Kelly, 2014).

**Major Finding 4**

To what degree do Generation Y (Millennial) adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles? Twenty-eight percent (28%) of the respondents were from Generation Y (n=39). This generation showed the greatest consistency in data outcomes than any other generation represented in the study. The quantitative figures, qualitative data, and literature review aligned and reported congruent perspectives and ideas. The data presented fairly even responses for all learning styles. These results indicated that this generation is able to adapt to visual, auditory, and kinesthetic learning styles. Additionally, the lack of extreme variation between individual and collective responses for quantitative and qualitative data showed unity among the generation.

Literature suggests that Millennials are the most technologically diverse generation (Reeves, 2006; Bursch & Kelly, 2014). They are considered the generation who has never known life without technology. The research results showed their
diversity, versatility, and resilience to this technical age. Gen Y definitely finds value in hands-on, experimental learning, which is supported by the qualitative data and literature (Reeves, 2006). These findings support their undeniable influence of technology.

**Major Finding 5**

*Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in health care technology assisted training?* Interpretation of the data presented a significant difference for a visual learning style preference for Baby Boomers and Generation X. Baby Boomers showed less variation in the relationship between auditory and kinesthetic learning style preferences per question and within the generation. Conversely, Generation X had greater dissimilarity among the auditory and kinesthetic questions and within the generation. Among all three generations, Generation X exhibited the most variation between learning style questions and intergeneration responses.

**Conclusions**

Three conclusions were drawn from this study about generational learners who participate in computer-based healthcare training. First, all generations represented in this study have varying degrees of visual, auditory, and kinesthetic learning style preferences. According to Cox (2004), whether studies produced significant results or not, the perpetual theme among the research was the implication to understand and incorporate a variety of learning styles in training utilizing technology (Cox, 2004). Incorporating all learning styles in training is considered the best approach to ensure lasting learning outcomes. In fact, it is said that students who complete online
coursework followed by interactive, face-to-face class activities have richer educational experiences (Epignosis LLC, 2014).

Second, generational studies have helped to uncover differences between the generational cohorts and the importance of understanding their values (Parry & Urwin, 2011; Marston, 2010; Hendryx, 2008). Research confirms that generations are influenced, and often defined by events, culture, attitudes, behaviors, music, and technology (Parry & Urwin, 2011; Hendryx, 2008). Data from this research confirmed the reality of these facts for Generation Y. The consistency of their responses found in the quantitative and qualitative results implied the individual responses were representative of the entire group. This phenomenon reaffirms that generations are shaped by historical perspective, current happenings the group experienced simultaneously, and other factors that influence their learning style preferences.

Lastly, the concluding thought of this research is that vision is the primary learning source and is enhanced and/or complimented by a secondary learning style. Further, the secondary, or supporting learning style, is the determining factor for how an individual performs beyond receiving the information. It is suggested that students taught in a manner matched to their learning style preference tend to learn more than those taught in a highly mismatched manner (Felder, 2010). Specifically for adult learners, learning style may depend on the subject, level, learning objectives of the course, and the backgrounds and skills of the learner (Felder, 2010). In these instances, determining the most beneficial methods of learning for adult learners has greater significance when involving technology due to the unnatural dependency of some adult learners.
Implications for Action

The rise of technology has afforded organizations worldwide endless opportunities to progress, create efficiencies by streamlining processes, and automate services. The healthcare industry has taken advantage of the advancements technology has to offer. Across the nation, the electronic health record has been implemented in thousands of hospitals as the primary documenting medical resource for patient care. While the benefits are clear from an organizational standpoint, the disadvantages have the potential to impact the number one resource in any company: the people.

Implication 1

The results of this study, coupled with relevant historical data pertaining to the value of quality training practices, should not be ignored (Macdonald, 2006; Dziuban et al., 2004; Cambiano et al., 2001). Healthcare leaders have the responsibility to deliver superior services to the communities in which they serve. It is important to recognize the importance of investing in the staff by providing the necessary training for all roles, especially the staff responsible for making the first impression of the organization. The front-line staff deserves training plans that incorporate expected behaviors modeled in a reproducible manner. Additionally, the instruction they hear needs to be based on realistic facts, not perceived outcomes. Training should also be practiced in a live-environment, or simulated under similar circumstances. Ideally, computer-based healthcare training should incorporate facilitator-led discussion while screen-sharing so staff can receive immediate individual assistance while operating the system. Web-based training systems exists, however, incorporating this type of solution has not been fully
explored in healthcare training. Enhancing training through the use of technology is important because traditional classroom training often limits exposure to the reality of the work and does not always incorporate the blended approach to learning that is a best practice for lasting learning outcomes.

**Implication 2**

For many companies, new hire best practices often involve testing at some level. It is recommended that patient access representatives complete a learning style inventory prior to beginning their new role (Macdonald, 2006; Ruiz et al., 2006; Kolb & Kolb, 2005). Upon completion, these staff members will be partnered with inter-departmental mentors that will train them according to their individual learning preference. The department mentor program will require qualifying existing staff to attend separate training prior to be assigned to a newcomer. In its initial phase, training time per individual may increase; however, the return on investment is that staff will be better-prepared, more confident, and productive by learning in an environment where they can thrive.

**Implication 3**

Moving forward, facilitator-led training must include aspects from all learning styles (Kanninen, 2009; Bernier, 2009; Jain, 1999-2015). Based on this research, individuals participating in healthcare computer-based training learn first by seeing, and then a combination of hearing and doing or practicing and receiving feedback. Nonetheless, it is critical that all staff is exposed to all styles of learning in order to achieve optimal learning outcomes.
Recommendations for Further Research

1. This study considered the learning style preferences of generational learners currently receiving computer-based healthcare training but did not consider Generation Z: the newest generation emerging into the workforce. Further study would determine if there is significant difference between their learning style and that of other generations represented in this study.

2. This study considered the learning style preferences of patient access front-line staff and not clinical staff. Clinical staff also receives computer-based healthcare training in order to provide patient care. Understanding how they learn may help to improve patient care outcomes.

3. This study focused on learning style preferences of end users who participated in computer-based healthcare training. Shifting the focus to healthcare trainers may provide insight into how individual learning style preference influences training outcomes for staff.

4. The results from this study provided evidence that the primary source of learning is based on visual interpretation. Further research could examine the secondary, complimentary learning style that influences learning outcomes for adult learners.

5. This study discussed how technology has influenced healthcare and training implications for healthcare staff. Further research could explore technology as the single driver for workplace success.

Concluding Remarks and Reflections

When I was accepted into the Organizational Leadership Doctoral Program at Brandman University two and a half years ago, the one thing I knew for sure was I
wanted to be successful. From elementary school until now, it was my desire to obtain a doctorate degree. After several years of studying human development, a few years of teaching early education, and beginning my higher education journey, I began a career in healthcare. Through this research study, I had the phenomenal opportunity to combine my passion for education and 20 years of healthcare experience.

As an educator, it has been my privilege to teach, train, and empower learners at all stages of their development. Recently, my focus has been working solely with adult learners. This was a motivating factor to research and understand how they learn, moreover, how outcomes from my research might influence their success.

For this study, it was important for me to find an appropriate survey instrument that would allow me to gather information about individual learning style preferences. Though the survey data results were not significant for all generational participants, I believe the overall outcomes were noteworthy and useful for organizations to integrate an assessment of individual employee training preference into their training programs.

Thinking back to my first Immersion, I recall hearing, “Enjoy the process.” In that moment, I began my transformation from believing “something” was possible, to ensuring what I believed most actually happened.

Throughout this journey, I have experienced change with a different mindset, not just accepting change, but understanding why change is important, sustaining change to recreate it, and sharing change processes that influence others to embrace their own transformation. The doctoral program and dissertation research process stretched me and reinforced my belief that all things are temporary, and if I persevere, I can overcome any challenge to reach my full potential.
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http://dx.doi.org/10.4300/JGME-D-11-00221.1


APPENDICES

APPENDIX A

Synthesis Matrix

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131
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## APPENDIX B

Data Analysis by Research Question

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<th>Research Questions</th>
<th>Data Analysis</th>
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<tr>
<td>To what degree do Baby Boomer adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>To what degree do Generation X adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>To what degree do Generation Y (Millennial) adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>To what degree do Traditionalist adult learners participating in technology-assisted healthcare training prefer the auditory, visual and kinesthetic learning styles?</td>
<td>Descriptive Statistics</td>
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<tr>
<td>Is there a significant difference in the auditory, visual and kinesthetic learning style preferences of Traditionalist, Baby Boomer, Generation X, and Millennial generational adult learners when participating in health care technology-assisted training?</td>
<td>One-Way ANOVA</td>
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APPENDIX C

Brandman IRB Approval

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
IRB Application Action – Approval

Date: 02/17/16

Name of Investigator/Researcher: Michaelle Knight

Faculty or Student ID Number: B0046645

Title of Research Project:
Generational Learning Style Preferences Based on Computer-based Healthcare Training

Project Type: ✓ New  ❌ Continuation  ❌ Resubmission

Category that applies to your research:
✓ Doctoral Dissertation EdD

DNP Clinical Project
Masters’ Thesis
Course Project
Faculty Professional/Academic Research

Other:

Funded: ✓ No  ❌ Yes
(Funding Agency; Type of Funding; Grant Number)

Project Duration (cannot exceed 1 year): 1 Year

Principal Investigator’s Address: 121 E Queen Anne Drive - Chula Vista, CA 91911

Email Address: mknight@mail.brandman.edu  Telephone Number: 619-779-5617

Faculty Advisor/Sponsor/Chair Name: Dr. Douglas DeVore

Email Address: ddevore@brandman.edu  Telephone Number: 623-293-2421

Category of Review:
✓ Expedited Review  ❌ Exempt Review  ❌ Standard Review

I have completed the NIH Certification and included a copy with this proposal

☐ NIH Certificate currently on file in the office of the IRB Chair or Department Office

Michaelle Knight
Signature of Principal Investigator:______________________ Date:______________________

Digitally signed by Michaelle Knight
DN: cn=Michaelle Knight, ou=, o=, c=US
Date: 2016.02.17 16:21:17 -08'00'

Signature of Faculty Advisor/Sponsor/Dissertation Chair:______________________ Date:______________________

Digitally signed by Doug DeVore
DN: cn=Doug DeVore, ou=Brandman University, o=EDOL, mailto:devore@brandman.edu, c=US
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BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
IRB APPLICATION ACTION – APPROVAL
COMPLETED BY BUIRB

IRB ACTION/APPROVAL

Name of Investigator/Researcher: ____________________________

☐ Returned without review. Insufficient detail to adequately assess risks, protections and benefits.

☐ Approved/Certified as Exempt form IRB Review.

☐ Approved as submitted.

☑ Approved, contingent on minor revisions (see attached)

☐ Requires significant modifications of the protocol before approval. Research must resubmit with modifications (see attached)

☐ Researcher must contact IRB member and discuss revisions to research proposal and protocol.

Level of Risk: ☐ No Risk  ☑ Minimal Risk  ☐ More than Minimal Risk

IRB Comments:

Please include the Odessa Instrument mentioned in your application

Dr. Alan Enomoto

Telephone: ____________________________ Email: enomoto@brandman.edu

BUIRB Chair: ____________________________ Date: 2/25/16

REVISED IRB Application  ☑ Approved  ☐ Returned

Name: Doug DeVore

Telephone: 623-293-2421 Email: ddevore@brandman.edu Date: 2/25/16

BUIRB Chair: ____________________________

APPENDIX D

Odessa Learning Style Inventory

Learning Style Inventory

Thank you for participating in this short survey regarding the generational learning style preferences of healthcare representatives who receive computer-based healthcare training. To better understand your preferred learn style, mark the appropriate option after each statement.

**Use the dropdown option to select the year you were born.**

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**Directions**

Read the following statements about learning style preferences. For each statement, mark how frequently you prefer that learning style.

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<tr>
<th></th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
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</thead>
<tbody>
<tr>
<td>1. I can remember best about a subject by listening to a lecture that includes information, explanations and discussions.</td>
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<tr>
<td>2. I prefer to see information written on a chalkboard and supplemented by visual aids and assigned readings.</td>
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<tr>
<td>3. I like to write things down or to take notes for visual review.</td>
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<tr>
<td>4. I prefer to use posters, models, or actual practice and other activities in class.</td>
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<tr>
<td>5. I require explanations of diagrams, graphs, or visual directions.</td>
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<td>6. I enjoy working with my hands or making things.</td>
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<tr>
<td>7. I am skillful with and enjoy developing and making graphs and charts.</td>
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<td>8. I can tell if sounds match when presented with pairs of sounds.</td>
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<td>9. I can remember best by writing things down.</td>
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<td>10. I can easily understand and follow directions on a map.</td>
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<td></td>
<td>11. I do best in academic subjects by listening to lectures and tapes.</td>
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<td></td>
<td>12. I play with coins or keys in my pocket.</td>
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<td></td>
<td>13. I learn to spell better by repeating words out loud than by writing the words on paper.</td>
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<td></td>
<td>14. I can understand a news article better by reading about it in a newspaper than by listening to a report about it on the radio.</td>
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<td></td>
<td>15. I chew gum, smoke or snack while studying.</td>
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<td></td>
<td>16. I think the best way to remember something is to picture it in your head.</td>
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<td></td>
<td>17. I learn the spelling of words by “finger spelling” them</td>
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<td></td>
<td>18. I would rather listen to a good lecture or speech than read about the same material in a textbook.</td>
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<td>19. I am good at working and solving jigsaw puzzles and mazes.</td>
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<td>20. I grip objects in my hands during learning periods.</td>
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<td></td>
<td>21. I prefer listening to the news on the radio rather than reading the paper.</td>
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<td>22. I prefer obtaining information about an interesting subject by reading about it.</td>
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<td>23. I feel very comfortable touching others, hugging, handshaking, etc.</td>
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<td></td>
<td>24. I follow oral directions better than written ones.</td>
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(Reference: http://www.odessa.edu/dept/govt/dille/brian/courses/1100orientation/learningstyleinventory_survey.pdf)

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<td>1. Thinking of your healthcare training courses, what teaching techniques were most beneficial to your learning experience?</td>
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<td>2. Thinking of your healthcare training courses, what teaching techniques were least beneficial to your learning experience?</td>
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