Learning Styles of Physical Therapy and Physical Therapy Assistant Students in Accredited Physical Therapy Programs

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ABSTRACT

The purpose of this study was to determine the learning styles of Doctor of Physical Therapy (DPT) students and associate degree Physical Therapist Assistant (PTA) students and identify any association between their learning styles and examine the association between gender and age by learning style. Participants included 337 DPT and PTA students attending CAPTE accredited institutions with doctoral DPT or associate PTA programs in Tennessee and southwest Virginia. The Felder (1996) and Soloman Index of Learning Styles (ILS) was used to determine learning style preferences within 4 learning style dimensions (active-reflective, sensing-intuitive, visual-verbal, and sequential-global). Demographics included program of study, gender, age, ethnicity, and highest level of education. Participants were 18-63 years (mean age 25.87, standard deviation 5.62, median age 24); 205 (60.8%) DPT students, 132 (39.2%) PTA students; 205 (60.8%) female, 132 (39.2%) male.

Five research questions with 20 null hypotheses were evaluated using Cross-tabulated tables with frequency counts, percentages, and chi square tests. Statistical significance was established using a .05 alpha. Only one null hypothesis was rejected (Ho51: There is no difference in the active- reflective learning style among PTA students by age). There was no significant difference between the learning styles of DPT and PTA students. Participants were found to be balanced on the active-reflective dimension, sensing on the sensing-intuitive dimension, visual on the visual- verbal dimension, and balanced on the sequential-global dimension; preferences were toward the active, sensing, visual, and sequential learning styles.

This study demonstrated that DPT and PTA students have a balanced learning style with a strong preference toward active, sensing, visual, and sequential. Therefore, teaching methods should provide an instructional environment that addresses these learning style preferences. The student's awareness of his or her learning style will enable the learner to capitalize on strengths and develop areas of weakness. This ability to employ effective learning strategies will equip an individual for the challenges of his or her chosen profession and lifelong learning.

INTRODUCTION

Learning styles are as old and confusing as humankind. Intuitively we have known that individuals tend to have a preference for how they perceive their environment, process information, and operationalize that information. These preferences have become the basic tenets of the research surrounding learning styles. Over the past 40 years the concept of learning styles has engendered great controversy and support (Coffield, Moseley, Hall, & Eccle-

stone, 2004). Like many cognitive processes, the ability to understand or have an awareness of how one learns holds great promise for the individual and the educator. "Recognizing and defining the styles by which a person learns is as important to the learning process as diagnostic tests are to the healing process in the field of medicine" (Friedman & Alley, 1984, p. 77).

Doctor of physical therapy (DPTs) students and physical therapy assistants (PTAs) are important members of the healthcare team. An investigation of the learning styles of these team members is critical to prepare physical therapy students to meet academic and clinical challenges. Gaining an understanding of one's preference for receiving and processing information will benefit the student, the healthcare team, and ultimately the patient. Assessment of learning style preferences enables students to organize and process information to their advantage. Also, knowledge of the various learning styles within a class helps instructors apply various pedagogical techniques. Educators are able to provide effective learning experiences based on preferred learning styles and strengthen non-preferred learning styles only when the students' learning styles have been identified (French, Cosgriff, & Brown, 2007).

Over the past 40 years learning styles have been studied in an attempt to help educators be more responsive to diverse student needs, communicate information in a more efficient way, and determine if students with specific learning style preferences are attracted to certain professions (Hauer, Straub, & Wolf, 2005). Felder and Brent (2005) agreed that if instructors understand the learning style differences in their class they have a better chance of meeting the needs of those diverse learners. However, it is impractical to even consider tailoring completely individualized instruction for each student in the class and just as impractical is the idea that if an instructor were to adopt only one approach to teaching that the needs of every student would be met (Felder & Brent, 2005). In the healthcare field a balance is needed to provide effective learning experiences based on preferred learning styles and the need to strengthen non-preferred learning styles (French et al., 2007). The literature is replete with learning style data about baccalaureate and masters prepared nursing and various allied health professionals. However, there is a dearth of information related to the learning styles of community college allied health students. This study will provide valuable information related to the DPT student and the PTA student.

This study will also contribute data to the already existing body of knowledge on the learning styles of allied health students. Specifically, this study will expand the body of knowledge by identifying the learning style preferences of PTA students. The results gleaned will help equip both educator and student with the tools to embark on a lifelong journey of learning and the integration of knowledge into clinical practice.

As the field of physical therapy becomes more complex, the need for lifelong learning has become a fundamental skill and a necessary component in staying abreast of best practices. The PTA's role requires the development of inductive and deductive reasoning processes to provide optimum care for the patient and to support the DPT. Not only is there a paucity of information regarding the learning styles of DPTs and PTAs, research regarding their learning styles remains relatively untouched. The purpose of this study is to provide information about the learning styles of DPTs and PTAs. Learning styles are an important component of learning, imperative for effective team relationships within a challenging healthcare environment, and a critical component to become an effective life-long learner.

LITERATURE REVIEW

Learning style research is diverse, extensive, and has touched virtually every healthcare program of study. The value of learning styles to students, educators, practitioners, and patients cannot be overstated, especially in an age where technological advances push the boundaries of our imagination. Skills for lifelong learning, interpersonal skills, and communication skills are paramount for healthcare workers today.

The provision of healthcare has changed over the past decades with interdisciplinary teams providing highly specialized care concurrently. "If communication and hence performance, of teams is influenced by how team members view and interpret clinical information do other differences in information-processing styles impact team performance" (Sandmire et al., 2000, p. 143)? Various assessment tools to identify learning styles have been developed. However, the Kolb's Learning Style Inventory (LSI) has become the most frequently used method for assessing learning style in health science literature (French et al., 2007; Hauer et al., 2005; Katz & Heimann, 1991; Sandmire et al., 2000; Wessel et al., 1999).

Research has been conducted to identify the learning styles of allied health students using various forms of the Kolb Learning Style Inventory. One such study found occupational therapist students were assimilators, nursing students were divergers, and physical therapist students were identified as convergers (Hauer et al., 2005). French et al. (2007) found that the two most prevalent learning styles for occupational therapist students were converger and diverger. In contrast, Katz and Heimann (1991)

found that occupational therapy students and practitioners were accommodators.

Learning styles of allied health students were initially studied in the 1970s. Rezler and French (1975) developed their own Learning Preferences Inventory (LPI) and included six dimensions (abstract, concrete, individual, interpersonal, student-structured, and teacher-structured). Physical therapy students were high on teacher-structured, concrete, and interpersonal learning. Barris, Kielhofner, and Bauer (1985) found that both occupational therapist and physical therapist students preferred teacher-structured, concrete, and interpersonal learning. In addition physical therapy students showed less preference for teacher-structured learning compared the occupational therapy students. This study also found that physical therapy students valued wisdom, preferred abstract learning, and were satisfied with their education.

Peyton, Hueter, and McDonald (1979) studied learning style preferences of physical therapy students in the United States and found physical therapy and nursing students needed more organization and direct experience than all other groups studied. A study to identify the learning styles of Australian physiotherapy students found that the most frequently preferred learning style was assimilators (reflector) (Mountford, Jones, & Tucker, 2006). Another study found that a majority of Canadian physiotherapy students exhibited assimilative or convergent learning styles. Student in both groups (assimilative and convergent) used abstract conceptualization as a predominant learning preference. The assimilators coupled this with reflective observation, whereas the convergers coupled this with active experimentation. Therefore, physical therapy students seem to learn by thinking and place less emphasis on personal involvement with people (Wessel et al., 1999).

Careful attention to the learning style literature demonstrates that there are a variety of opinions and definite flaws in the research, but no one refutes the idea that individuals have preferred ways of taking in and processing information. "We each are born with predisposition for learning in certain ways. We also are products of external influences, especially within our immediate family, extended community, and culture" (Guild, 2001, The Nature vs. Nurture Issue, para. 1).

> [A] key to educational and professional success is the ability to adapt to different situations – including adapting one's learning style. Style flexibility is required for choosing or developing an appropriate strategy for and employing appropriate tactics in a novel situation. (Curry, 1999, p. 411)

Flexibility in learning styles is echoed by Loo (2002), "There appear to be substantial benefits to students who develop the ability to adopt different learning styles in different situations, recognize their own learning strengths and preferences, and approach learning situations with flexibility" (Loo, 2002, p. 256). Will learning styles remain relevant within educational theory and pedagogic concepts? Despite the controversy and debate concerning learning styles and the validity of learning style measurement instruments,

> [E]fforts to better define and utilize learning style theory is an area of growing research. A better knowledge and understanding of learning styles may become increasingly critical as classroom sizes increase and as technological advances continue to mold the types of students entering higher education. (Romanelli, Bird, & Ryan, 2009, p. 4)

With debate and controversy surrounding decades of psychological and educational research on learning styles, the advances in neuroscience and Functional Magnetic Resonance Imaging (fMRI) may provide empirical evidence for individual differences associated with preferences and lend support for evidenced-based instructional and teaching practices.

RESEARCH METHODOLOGY

The purpose of this study was to determine the learning styles of doctor of physical therapy (DPT) students and physical therapist assistant (PTA) students and identify any association between their learning styles. In addition, this study examined the learning style dimensions frequently associated with DPT and PTA students. This study also examined the association between demographic characteristics and learning styles. This chapter describes the research design, study population, data collection procedures, data collection instrument, psychometrics of the instrument, the research questions, and null hypotheses.

A nonexperimental study design using a convenience sample was used to examine learning styles of students enrolled in the first, second, and third year of DPT education programs and during the first and second year of PTA education programs at selected Commission on Accreditation in Physical Therapy Education (CAPTE) (2016a) accredited universities and community colleges in Tennessee and southwest Virginia. Learning style and demographic data were gathered from each study participant. Approval from the East Tennessee State University (ETSU) Institutional Review Board was obtained before the start of the study.

Research Questions

The following research questions were developed as a focus for this study.

RQ1: Is there a significant difference between doctor of physical therapy students and physical therapist assistant students in each of the four learning styles of the Felder-Soloman Learning Styles Inventory: Active and Reflective learners, Sensing and Intuitive learners, Visual and Verbal learners, and Sequential and Global learners?

Ho11: There is no difference in the Active and Reflective Learning Style (active, balanced, and reflective) between doctor of physical therapy students and physical therapist assistant students.

Ho12: There is no difference in the Sensing and Intuitive Learning Style (sensing, balanced, and intuitive) between doctor of physical therapy students and physical therapist assistant students.

Ho13: There is no difference in the Visual and Verbal Learning Style (visual, balanced, and verbal) between doctor of physical therapy students and physical therapist assistant students.

Ho14: There is no difference in the Sequential and Global Learning Style (sequential, balanced, and global) between doctor of physical therapy students and physical therapist assistant students.

RQ2: Among doctor of physical therapy students is there a significant difference between Male and female students in each of the four learning styles of the Felder-Soloman Learning Styles Inventory: Active and Reflective learners, Sensing and Intuitive learners, Visual and Verbal learners, and Sequential and Global learners?

Ho21: Among doctor of physical therapy students there is no difference in the Active and Reflective Learning Style (active, balanced, and reflective) between male and female students.

Ho22: Among doctor of physical therapy students there is no difference in the Sensing and Intuitive Learning Style (sensing, balanced, and intuitive) between male and female students.

Ho23: Among doctor of physical therapy students there is no difference in the Visual and Verbal Learning Style (visual, balanced, and verbal) between male and female students.

Ho24: Among doctor of physical therapy students there is no difference in the Sequential and Global Learning Style (sequential, balanced, and global) between male and female students.

RQ3: Among physical therapist assistant students is there a significant difference between male and female students in each of the four learning styles of the Felder-Soloman Learning Styles Inventory: Active and Reflective learners, Sensing and Intuitive learners, Visual and Verbal learners, and Sequential and Global learners?

Ho31: Among physical therapist assistant students there is no difference in the Active and Reflective Learning Style (active, balanced, and reflective) between male and female students.

Ho32: Among physical therapist assistant students there is no difference in the Sensing and Intuitive Learning Style (sensing, balanced, and intuitive) between male and female students.

Ho33: Among physical therapist assistant students there is no difference in the Visual and Verbal Learning Style (visual, balanced, and verbal) between male and female students.

Ho34: Among physical therapist assistant students there is no difference in the Sequential and Global Learning Style (sequential, balanced, and global) between male and female students.

RQ4: Among doctor of physical therapy students is there a significant difference among age groups in each of the four learning styles of the Felder-Soloman Learning Styles nventory: Active and Reflective learners, Sensing and Intuitive learners, Visual and Verbal learners, and Sequential and Global learners?

Ho41: Among doctor of physical therapy students there is no difference in the Active and Reflective Learning Style (active, balanced, and reflective) based on age.

Ho42: Among doctor of physical therapy students there is no difference in the Sensing and Intuitive Learning Style (sensing, balanced, and intuitive) based on age.

Ho43: Among doctor of physical therapy students there is no difference in the Visual and Verbal Learning Style (visual, balanced, and verbal) based on age.

Ho44: Among doctor of physical therapy students there is no difference in the Sequential and Global Learning Style (sequential, balanced, and global) based on age.

RQ5: Among physical therapist assistant students is there a significant difference among age groups in each of the four learning styles of the Felder-Soloman Learning Styles Inventory: Active and Reflective learners, Sensing and Intuitive learners, Visual and Verbal learners, and Sequential and Global learners?

Ho51: Among physical therapist assistant students there is no difference in the Active and Reflective Learning Style (active, balanced, and reflective) based on age.

Ho52: Among physical therapist assistant students there is no difference in the Sensing and Intuitive Learning Style (sensing, balanced, and intuitive) based on age.

Ho53: Among physical therapist assistant students there is no difference in the Visual and Verbal Learning Style (visual, balanced, and verbal) based on age.

Ho54: Among physical therapist assistant students there is no difference in the Sequential and Global Learning Style (sequential, balanced, and global) based on age.

Sample

The participants in this study included DPT and PTA students attending CAPTE accredited universities or colleges that offer a DPT program or PTA associate program in Tennessee and southwest Virginia.

Participants in this study represented DPT students from two universities and PTA students from four community colleges who agreed to participate in this study. The participants were enrolled during the fall semester of 2015 at one of the participating institutions. DPT students attending one of the two universities were in their first, second, or third year of a doctoral degree program. PTA students attending one of the four community colleges were in their first or second year of an associate degree program.

The Commission on Accreditation in Physical Therapy Education (CAPTE) is the only accreditation agency recognized by the United States Department of Education (USDOE) and the Council for Higher Education Accreditation (CHEA) to certify entry-level DPT and PTA education programs (CAPTE, 2016b). Accreditation is a valuable service to the public, students, educational institutions, the programs, and the profession to assure that graduates from an accredited program meet standards set by the profession. CAPTE accredits first professional (entry-level) programs in the US for DPTs at the master and doctoral levels and for PTAs at the associate level. CAPTE assures quality and continuous improvement by establishing and applying standards in the preparation of DPTs and PTAs. Accreditation assures that standards reflect the evolving nature of education, research, and practice and are adhered to by universities and colleges offering entry-level preparation of DPTs and PTAs (CAPTE, 2015).

There were 337 student participants in this study. Demographic data collected included program of study, gender, age, ethnicity, and highest level of education obtained in any area prior to the current program of study. Participants' ages ranged from 18 to 63 years with a mean age of 25.87 and standard deviation of 5.62; the median age was 24. Of the 337 participants 205 (60.8%) were doctor of physical therapy (DPT) students and 132 (39.2%) were physical therapist assistant (PTA) students. There were 205 (60.8%) female and 132 (39.2%) male participants. Among female participants 121 (59.0%) were DPT students; among male participants 84 (63.6%) were DPT students. The majority of participants held a baccalaureate degree as the highest level of education prior to beginning the current program of study. There were 91 (27.0%) participants holding an associate degree or lower, 237 (70.3%) participants at the Baccalaureate level, and nine (2.7%) holding a masters or higher degree.

Instrumentation

The Felder and Soloman Index of Learning Styles (ILS) instrument developed in 1991 was used in this study to ascertain the learning styles of DPT and PTA students. The ILS instrument was adapted from the Felder and Silverman model developed in 1987.

Considering the plethora of learning style models and instruments to assess learning styles the Felder and Silverman model was chosen for this study because the model dimensions were formulated from studies particularly relevant to science education (Felder, 1993). The Felder and Silverman model was designed to be particularly applicable to assess learning style differences among engineering students and identify learning preferences based on four dimensions (Felder & Spurlin, 2005):

- *sensing (concrete,* practical, oriented toward facts and procedures) or *intuitive*
- (abstract thinker, innovative, oriented toward theories and underlying meanings);

- *visual* (prefer visual representations of presented material, such as pictures, diagrams and flow charts) or *verbal* (prefer written and spoken explanations);
- *active* (learn by trying things out, enjoy working in groups) or *reflective* (learn by thinking things through, prefer working alone or with a single familiar partner);
- *sequential* (linear thin+king process, learn in small incremental steps) or *global* (holistic thinking process, learn in large leaps). (Felder & Spurlin, 2005, p. 103)

Felder and Soloman developed the 44-item forced-choice ILS instrument to assess preferences on the four scales of the Felder and Silverman model (Felder & Brent, 2005). A pencil-and-paper version of the instrument was put on the Internet in 1996 and an online version was made available in 1997. Permission was obtained from Dr. Richard Felder to use the Felder-Soloman ILS instrument (Appendix A) and the Index of Learning Styles Report Form (Appendix B). The ILS is available at no cost to individuals who wish to assess their own preferences and to instructors and students who wish to use it for classroom instruction or research (Felder & Spurlin, 2005). The ILS learning styles dimensions are dichotomous, consisting of 11 forced-choice items for each domain with scores ranging from -11 to +11 in increments of 2 (-11, -9, -7,... 7, 9, 11). The dimensions represent continua rather than either/or categories and scoring indicates that one's preferences may be strong, moderate, or almost nonexistent

Data Collection

Permission to conduct this study was obtained from the East Tennessee State Institutional Review Board. After IRB approval was granted from ETSU and each participating institution, the directors of the DPT and PTA programs at each of the participating institutions were contacted to determine a convenient time to conduct the ILS survey with students. Study participants were asked to complete the Index of Learning Styles Questionnaire (Appendix A), Student Demographic Information Form (Appendix C), and the Participant Informed Consent Form (Appendix D).

After receiving IRB approval from each institution, each program director was contacted for permission to visit and talk with students about the study and scheduled a date and time for the visit. The researcher met with the students at each institution to inform them of the study, answer questions, and distribute the packets. Participant packets consisted of the Index of Learning Styles Questionnaire, Student Demographic Information Form, and Participant Informed Consent Form; each participant was asked to complete all packet materials. To assure anonymity no identifying information was requested or recorded. After a mutually agreed upon time was established, the researcher traveled to each institution to distribute and collect the ILS and other materials contained in the participant packet.

Data Analysis

Descriptive statistics and inferential statistics were calculated and reported in this study.

Specifically, cross-tabulated tables with frequency counts and percentages and a series of chi square tests were used to address the research questions. Statistical significance was established using an alpha level of .05. Data were analyzed using the Statistical Package for the Social Sciences (SPSS).

Research Findings

Of the 20 null hypotheses evaluated, only one was rejected (Ho51: Among physical therapist assistant students, there is no difference in the Active and Reflective Learning Style (active, balanced, and reflective) based on age). Among PTA students, 41.9% of those age 24 and younger reported an active learning style compared to 21.7% of PTA students age 25 and older. There were no other findings that were of statistical or practical significance.

Although not subjected to statistical testing, univariate descriptive statistics for each of the four learning style dimensions provided insight into the learning styles of students in physical therapy programs regardless of the type of program, gender, or age of students in each program:

1. On the active-reflective dimension the majority of students (56.3%) were balanced. When combined with students who scored active on the continuum, 84.3% scored either active or balanced on this continuum. Almost 16% scored reflective on the continuum.
2. On the sensing-intuitive dimension the majority of students (62.8%) were sensing. When combined with students who were balanced, 95.5% were either sensing or balanced; a small percentage (4.5%) of students were intuitive.
3. On the visual-verbal dimension the majority of students (55.4%) were visual. Almost 96% were either visual or balanced on this learning style continuum; a small percentage (4.5%) of students were verbal.

4. On the sequential-global dimension the majority of students (58.6%) were balanced. When combined with students who were sequential, 93.4% were either sequential or balanced; a small percentage (6.6%) of students were global.

There was no difference in the learning styles of the DPT students and the PTA students. Of interest, although not statistically significant, was the highest percent difference between the DPT students and the PTA students were the sensing-intuitive and visual-verbal dimensions.

Results of the study revealed that 69% of the PTA students were sensing [practical, oriented toward facts and details, and concrete thinker (Felder & Silverman, 1988)] and 58.7% of the DPT students were sensing. In contrast 45.3% of all students were intuitive [innovative, creative, prefer principles and theories, and abstract thinker (Felder & Silverman, 1988)]. The next highest percent difference between DPT students and PTA students was the visual-verbal dimension; 59% of the DPT students were visual [prefer pictures, diagrams, flow charts, films, and demonstrations (Felder & Silverman, 1988)] and 49.6% of the PTA students were visual. In contrast 45.2% of all students were verbal [prefer written and spoken explanations (Felder & Spurlin, 2005)].

A statistically significant difference was found in the active-reflective learning style dimension among PTA students based on age. Among PTA students 41.9% of students age 24 and younger reported an active learning style compared to 21.7% of PTA students age 25 and older. However, among PTA students age 24 and younger 53.2% were balanced and for PTA students age 25 and older 63.8% were balanced on the active-reflective learning style dimension. There was a high percentage (74.1%) of PTA students age 24 and younger and 69.1% age 25 and older who were sensing on the sensing-intuitive learning style dimension. A slightly higher percentage of PTA students (52.6%) age 24 and younger and 52.4% age 25 and older were visual on the visual-verbal learning style dimension. The sequential-global learning style dimension was balanced among PTA students based on age.

A statistically significant difference was not found among DPT students across any learning style dimension based on age. Slightly higher percentages were found for balanced on the active-reflective and sequential-global learning style dimensions among DPT students based on age. Also, slightly higher percentages were found for sensing and visual among DPT students based on age for the corresponding sensing-intuitive and visual-verbal learning style dimensions.

There were no statistically significant differences among DPT students or PTA students across the four learning style dimensions (active-reflective, sensing-intuitive, visual-verbal, sequential-global) based on gender. The majority of students among DPT and PTA students were balanced on the active-reflective dimension, sensing on the sensing-intuitive dimension, visual on the visual-verbal dimension, and balanced on the sequential-global dimension based on gender. Findings of interest among the PTA students show that 57% of the female students and 1.9% of the male students were visual on the visual-verbal dimension. Also, on the visual- verbal dimension 56.1% of male and 43% of female students were balanced.

Recommendations for Future Practice

Pedagogy. Learning styles are not mutually exclusive categories but preferences as to how one perceives and processes information. Therefore, the aim of teaching is not to match teaching style to learning style but to achieve a balance in providing an instructional environment that addresses learning style preferences and provides pedagogical activities that strengthen as many learning styles as possible. The findings of this study show that both the DPT and PTA student's preferences are:

- Balanced on the active-reflective dimension with a preference toward the active; therefore, DPT and PTA students learn by trying things out and enjoy working in groups.
- Sensing on the sensing-intuitive dimension; therefore, DPT and PTA students are concrete thinkers, practical, and oriented toward facts and procedures.
- Visual on the visual-verbal dimension; therefore, DPT and PTA students prefer visual representations of presented material such as pictures, diagrams, and flow charts.
- Balanced on the sequential-global dimension with a preference toward sequential; therefore, DPT and PTA students learn in small incremental steps and prefer linear thinking processes.

Educators of DPT and PTA students should as much as possible create a learning environment that addresses the active, sensing, visual, and sequential learning style preference and provides activities to strengthen the reflective, intuitive, verbal, and global learning styles. This balance will help prepare the students for a successful career as a physical therapy professional within this ever-changing healthcare environment.

Learning strategies. Each learning style possesses its own strengths and weaknesses. However, one learning style is neither preferable nor inferior to another but is simply different. An awareness of learning styles will enable the

learner to capitalize on their strengths and develop their areas of weakness. This ability to employ effective learning strategies will equip an individual for the challenges of his or her chosen profession and lifelong learning. One of the many advantages of Felder and Soloman's ILS is that the instrument is available online free of charge and includes learning strategies for each identified learning style. The capability for accessing learning strategies will help the student and teacher if remediation is required.

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