

3rd World Conference on Learning, Teaching and Educational Leadership (WCLTA-2012)

Learning styles of undergraduate and graduate physical therapy students in Taiwan

Wang, Pei-Jung^a, Lee, Wen Shya^b, Hu, Ming-Hsia^a, Wu, Ying-Tai^{a*}

a School and Graduate Institute of Physical Therapy, College of Medicine, National Taiwan University, Taipei, Taiwan

b Center for Teaching and Learning Development, National Taiwan University, Taipei, Taiwan

Abstract

The research was conducted to identify the learning styles of undergraduate and graduate physical therapy students in Taiwan and to examine the associations between learning style and academic performance. Basic data and Kolb's Learning Style Inventory were obtained from 52 participants from one university. The most commonly occurring style of learner was assimilator (44%), followed by diverger (23%), accommodator (15%), and converger (17%). There was no significant difference in academic performance among the four different styles of learners. Qualitative analyses provided further understanding of the preferred learning and teaching strategies. The different strategies are recommended to meet students' learning preferences.

© 2013 The Authors. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and peer review under responsibility of Prof. Dr. Ferhan Odabaşı

Keywords: learning style, physical therapy, undergraduate and graduate students

1. Introduction

A learning style is the way that an individual prefers to perceive and process new information (Cavanagh, Hogan, & Ramgopal, 1995). Kolb's experimental learning theory is widely accepted as a comprehensive and generalized model. Four dimensions of the learning cycle have been identified; these include concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE) (Kolb, 1984). By combining the scores on the dimensions of perceiving and processing, learners can be classified into one of four learning styles: accommodating (CE and AE), diverging (CE and RO), converging (AC and AE), and assimilating (AC and RO).

Studies have been reported on the learning styles of students in various health-related disciplines. Nursing students were found to be mostly divergers or assimilators (Hauer, Straub, & Wolf, 2005), while occupational therapy students were divergers or assimilators (French, Cosgriff, & Brown, 2007; Titiloye & Scott, 2001). Bennett and Fox (1984) found that physical therapy (PT) practitioners were mainly accommodators (Bennet & Fox, 1984). Studies on PT students in Canada and America found that convergers and assimilators were predominant (Hauer, et al., 2005; Kaz & Heiman, 1991; Wessel et al., 1999). However, little about the learning styles of PT students in Asia has been studied.

* Corresponding author. Tel.: +886-2-33668129; fax: +886-2-33668161.

E-mail address: ytw@ntu.edu.tw

Understanding students' learning styles helps educators to improve the curriculum design and the teaching process in higher education (Claxton & Murrell, 1987), and this may promote students' learning effectiveness (Carnwell, 2000; Sim & Sims, 2006). Researchers suggested that teaching strategies should match with students' learning styles to foster a better learning environment (Anderson, 1998; Sim & Sims, 2006). Learning styles have been shown to influence student performance (An & Yoo, 2008; Haislett, Hughes, Atkinson, & Williams, 1993). Studies demonstrated that when instructional strategies are congruent, higher grade-point averages can be achieved than when they are incongruent (Nelson et al., 1993). Additional findings indicate that students had higher achievements if the learning contexts match with their learning styles (Kolb, 1984).

The purposes of this study were (1) to identify the learning styles of the undergraduate and graduate PT students in Taiwan, and to examine the differences in learning characteristics among them and examine the associations between their learning style and academic grades; and (2) to qualitatively examine the factors that contribute to their optimal learning experiences.

2. Methods

2.1 Study design

This study used a combination of quantitative survey and qualitative interview methods. Semi-structured interviews were conducted to understand the participants' learning preferences and experiences in the PT program.

2.2 Subject characteristics

Twenty-six third-year students (juniors) (21.2 ± 1.4 years old; 18 females) and 26 graduate students (25.1 ± 3.1 years old; 11 females) from the PT school of one university in Taipei were recruited. All the participants completed questionnaires of basic data and the Kolb's LSI. Included were 9 students, 3 undergraduates (21.3 ± 0.6 years old; 2 females) and 6 graduate students (24.0 ± 0.9 years old; 4 females), who agreed to be interviewed.

2.3 Measures

Kolb's LSI (version 3), consisting of 12 questions to describe various learning contexts, was used (Kolb, 1984). Kolb's LSI was reported to be reliable with Cronbach's alpha scores from 0.43 to 0.79, and test-retest reliability from 0.91 to 0.97 (Veres, Sims, & Locklear, 1991). Its validity has been supported by many studies in a few countries, including the United States, Canada, and the United Kingdom (Kayes, 2005).

Participants scored each question on a four-point scale: from a score of 4, if the item best described their learning style, to 1, if it least described their style. Scores were calculated to identify preferences along the abstract/concrete scale and the active/reflective scale, and a point was plotted on a grid as CE, RO, AC, or AE. The grid quadrants were identified as the preferred learning styles: diverger, assimilator, converger, and accommodator.

In addition to Kolb's LSI, semi-structured interviews were conducted to get additional information regarding students' learning experiences in the PT program. The interview questions mainly covered students' (1) individual optimal and frustrating learning experiences in PT courses, (2) perception of personal learning preferences and strategies, and (3) personal viewpoints on effective teaching to promote their own optimal learning experiences.

2.4 Data analysis

Quantitative data were analyzed for normality first and descriptive statistics using SPSS 17.0 (SPSS, Inc., Chicago, IL 2007). A chi-square test was used to analyze the difference in learning styles among the students and the association of learning styles and students' academic performance. The alpha level (two-tailed) was set at 0.05.

3. Results

3.1 Demographic data and learning styles

Included in the study were 26 junior students, 10 (42%) first-year graduate students, and 16 second-year graduate students. Most graduate students (85 %) had clinical experience of less than two years. There were no significant differences in the learning-style distribution among the three groups of PT students ($\chi^2 = 1.76$; $P = 0.94$) (Table 1); the number of assimilators was the highest, and that of accommodators was the lowest.

Table 1. Comparisons of the learning style among the physical therapy students (n=52)

Learning styles	Junior (n=26)	1st year Master (n=10)	2nd year plus Master (n=16)	Total
Diverger	7 (27%)	3 (30%)	2 (13%)	12 (23%)
Assimilator	11 (42%)	4 (40%)	8 (50%)	23 (44%)
Converger	4 (15%)	2 (20%)	3 (19%)	9 (17%)
Accommodator	4 (15%)	1 (10%)	3 (19%)	8 (15%)

3.2 Association of learning styles and students' academic performance

There were no significant differences in the distribution of academic performance among the four styles of learners (Table 2, $\chi^2 = 11.2$; $P = 0.08$).

Table 2. Relationship of learning styles and academic performances for physical therapy students (n=52)

Learning styles	Upper 25% (n=16)	Middle 50% (n=22)	Lower 25% (n=14)
Diverger	1 (6 %)	7 (32 %)	4 (28 %)
Assimilator	8 (50 %)	10 (45 %)	5 (36 %)
Converger	6 (38 %)	2 (9 %)	1 (7 %)
Accommodator	1 (6 %)	3 (14 %)	4 (29 %)

3.3 The qualitative results of interviews with the students

Interviews were held for 9 students (2 divergers, 3 assimilators, 2 convergers, and 2 accommodators). Students with diverging and assimilating styles expressed their preference for courses with a half-lecture and half-discussion format; while those with converging and accommodating styles preferred courses offering more opportunity for practice (such as 30% lecture and 70% practice). When asked about their frustrating learning experiences, all students stated that they disliked large, lecture-only-style classes, because of the lack of interaction with teachers.

The four different styles of learners also indicated their preferences for teaching strategies. The divergers appeared to like their teachers to be a motivator by giving feedback often. In contrast, the assimilators preferred to have the theoretical concepts first, and they considered teachers to be information communicators. The convergers preferred being guided through experimentation rather than receiving oral instruction, and they like their teachers to be like a coach. The accommodators reported a preference for group activity with peer/teacher feedback.

4. Discussions

Our study found that the predominant style of learner among the PT students was assimilators, regardless of whether they were undergraduate or graduate students. There were no significant differences in academic performance among the four different styles of learners.

Assimilators comprised almost half of the PT students of our program. Wessel et al. (1999) reported that 60% of students from year 2 to 4 of their baccalaureate PT program in Canada were convergers; while Hauer et al. (2005) reported convergers and assimilators were more popular among Austrian PT undergraduate students. The differences among the findings might be attributable to subject characteristics, such as culture, educational system, or preparation (Kaz & Heiman, 1991; Wessel, et al., 1999). Different educational system and program requirements in different countries may attract students with a specific learning style (Sutton & Griffin, 2000) or the previous teaching methods students' have encountered may induce or facilitate some learning types. Zoghi et al. (2010) suggested that educators in the health science field might need to use both AC and RO to learn professional knowledge (Zoghi et al., 2010). We suggest that diverse teaching methods might be needed to meet the diverse learning styles of the students, mainly based on our interview results.

There were no significant differences in academic performance among the PT students with different learning styles in our study. There may be more factors associated with academic performance, such as learning context, examination formats, and teaching styles (Holley & Jenkins, 1993; Miglietti & Strange, 2001). We noticed that convergers seemed to be slightly more in the upper 25%; however, there were only 9 convergers. Converging styles were reported to be suitable in practical uses of ideas and theories (Hsu, 1999; Sim & Sims, 2006) that may be closely related to PT itself. Further studies are needed to explore the relation between the nature of work or teachers' characteristics and the students' learning styles in a large sample of students.

The quantitative results demonstrated no differences in academic performance; however, the interview confirmed specific characteristics of favorite and disliked courses among students with different learning styles that were largely delineated as Kolb's theory (Kolb, 1984). Students with four different learning styles clearly stated the reasons they like or dislike the teaching strategies or methods. Several previous studies reported that learners' retention could be enhanced if instructional strategies were based on students' learning styles (Kolb, 1984; Nelson, et al., 1993). Some students preferred small-sized classes, which may be too ideal to implement; however, students' interactions with teachers could be improved even in large-sized classes. Diverse teaching strategies or methods may be needed since students have different learning styles. Further studies are needed to investigate if learning styles can be changed or enhanced with different teaching strategies.

This study provides some insight for the students and teachers of PT programs in Taiwan. It has several limitations. First, the sample size was relatively small. Second, there may be difficulties in generalizing the findings to other PT schools, since all study participants were from the same facility.

5. Conclusions and recommendations

Among our undergraduate and graduate PT students, the assimilating learning style was the most common learning one. Educators should bear in mind the characteristics of the learning-style types to understand how students perceive and process information. It is also important for educators to adopt various teaching and evaluation strategies to enhance students' learning effectiveness or to balance their learning capabilities.

Acknowledgements

The authors would like to thank all the participants for their time, cooperation, and assistance.

References

- An, G. J., & Yoo, M. S. (2008). Critical thinking and learning styles of nursing students at the Baccalaureate nursing program in Korea. *Contemporary Nurse, 29*, 100-109.
- Anderson, J. K. (1998). Orientation with style: matching teaching/learning style. *Journal for Nurses in Staff Development, 4*, 192-197.
- Bennet, N., & Fox, R. (1984). Learning style in continuing medical education. *The Journal of continuing education in the health professions, 4*, 89-92.
- Carnwell, R. (2000). Pedagogical implications of approaches to study in distance learning: developing models through qualitative and quantitative analysis. *Journal of Advances in Nursing, 31*, 1018-1028.
- Cavanagh, S. J., Hogan, K., & Ramgopal, T. (1995). The assessment of student nurse learning styles using the Kolb Learning Styles Inventory. *Nurse Educ Today, 15*, 177-183.
- Claxton, C. S., & Murrell, P. H. (1987). *Learning styles: Implications for improving practices*. Washington, D. C: ASHE.
- French, G., Cosgriff, T., & Brown, T. (2007). Learning style preferences of Australian occupational therapy students. *Australian Occupational Therapy Journal, 54*, S58-S65.
- Haislett, J., Hughes, B., Atkinson, G., & Williams, C. (1993). Success in Baccalaureate nursing programs: a matter of accommodation? *Journal of Nursing Education, 32*, 64-70.
- Hauer, P., Straub, C., & Wolf, S. (2005). Learning styles of allied health students using Kolb's LSI-IIa. *Journal of Allied Health, 34*, 177-182.
- Kayes, D. C. (2005). Internal validity and reliability of Kolb's Learning Style Inventory version 3 (1999). *Journal of Business and Psychology, 11*, 239-245.
- Kaz, N., & Heiman, N. (1991). Learning styles of students and practitioners in five health professions. *Occupational Therapy Journal of Research, 11*, 238-244.
- Kolb, D. A. (Ed.). (1984). *Experimental learning: Experience as the source of learning and development*. NJ: Prentice Hall.
- Nelson, B., Dunn, B., Griggs, S. A., Primavera, L., Fitzpatrick, M., & Miller, R. (1993). Effects of learning style intervention on college students' retention and achievement. *Journal of College Student Development and Psychopathology, 34*, 364-369.
- Sim, R., & Sims, S. (Eds.). (2006). *Learning styles and learning: A key to meeting the accountability demands in education*. Hauppauge, NY: Nova publisher.
- Sutton, G., & Griffin, M. A. (2000). Transition from student to practitioner: The role of expectations, values and personality. *British Journal of Occupational Therapy, 63*, 380-388.
- Titiloye, V. M., & Scott, A. H. (2001). Occupational therapy students' learning styles and application to professional academic training. *Occupational Therapy in Health Care, 15*, 145-155.
- Veres, I., Sims, R., & Locklear, T. (1991). Improving the reliability of Kolb's Revised Learning Style Inventory. *Educational and Psychological Measurement, 51*, 143-150.
- Wessel, J., Loomis, J., Rennie, S., Brook, P., Hoddinott, J., & Aherne, M. (1999). Learning styles and perceived problem-solving ability of students in a baccalaureate physiotherapy programme. *Physiotherapy Theory and Practice, 15*, 17-24.
- Zoghi, M., Brown, T., Williams, B., Roller, L., Jaberzadeh, S., Palermo, C., & McKenna, L. (2010). Learning style preferences of Australian health science students. *Journal of Allied Health, 39*, 95-103.