

Learning Style and Its Association with Academic Performance among Physiotherapy Students of  
Universiti Kebangsaan Malaysia  
(*Gaya Pembelajaran dan Perkaitannya dengan Prestasi Akademik dalam Kalangan Pelajar  
Fisioterapi Universiti Kebangsaan Malaysia*)

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ABSTRACT

Physiotherapy students require relevant learning style according to years of study in order to optimise learning outcomes. To date, learning styles among this student group are not known. This study aimed to identify the learning styles among physiotherapy students of Universiti Kebangsaan Malaysia and their association with academic performance. A cross-sectional study was conducted involving 61 physiotherapy students. Participants completed a self-administered questionnaire which consists of two sections, namely a demography section and a learning styles section. Questions in the learning style sections were adopted from items of the Kolb Learning Style Inventory. Summary of Kolb Learning Theory and Learning Style Inventory was explained to the participants prior to the questionnaire completion. All data were analysed descriptively and with the use of inferential statistics. All 61 participants returned the questionnaire (response rate of 100%). Results shown that a total of 44.26% (n=27) and 39.30% (n=24) of the participants used Assimilative and Divergent learning style, respectively. Students in the senior year were more likely to utilise divergent learning style as compared to the juniors. However, no significant association was found between learning styles and the academic performance ( $r=0.02$ ,  $p=0.801$ ). In conclusion, physiotherapy students of UKM utilise mostly assimilative and divergent learning styles. Both learning styles are considered appropriate for physiotherapy study as watching and thinking concepts, and feeling while processing information are needed especially during clinical practices.

Keywords: learning styles, academic performance, physiotherapy education

ABSTRAK

*Pelajar fisioterapi memerlukan gaya pembelajaran yang relevan mengikut tahun pengajian bagi mengoptimumkan keberhasilan pembelajaran. Sehingga kini, gaya pembelajaran dalam kalangan kumpulan pelajar ini tidak diketahui. Kajian ini bertujuan untuk mengenal pasti gaya pembelajaran dalam kalangan pelajar fisioterapi Universiti Kebangsaan Malaysia dan perkaitannya dengan prestasi akademik. Kajian keratan rentas melibatkan 61 pelajar fisioterapi telah dijalankan. Peserta dikehendaki untuk menjawab soal selidik yang terdiri daripada dua bahagian; bahagian demografi dan bahagian gaya pembelajaran. Soalan pada bahagian gaya pembelajaran diterima pakai daripada item Inventori Gaya Pembelajaran Kolb. Ringkasan mengenai Teori Pembelajaran Kolb dan Inventori Gaya Pembelajaran diterangkan kepada peserta sebelum mereka menjawab soal selidik tersebut. Analisis data dilakukan secara deskriptif dan menggunakan statistik inferens. Kesemua 61 peserta mengembalikan soal selidik (kadar respon adalah 100%). Keputusan menunjukkan bahawa sejumlah 44.26% (n=27) dan 39.30% (n=24) daripada peserta masing-masing menggunakan gaya pembelajaran asimilasi dan divergen. Pelajar senior lebih cenderung menggunakan gaya pembelajaran divergen berbanding dengan pelajar junior. Walau bagaimanapun, tiada hubungan yang signifikan ditemui di antara gaya pembelajaran dan prestasi akademik ( $r=0.02$ ,  $p=0.801$ ). Kesimpulannya, pelajar fisioterapi UKM mengamalkan gaya pembelajaran asimilasi dan divergen. Kedua-dua gaya pembelajaran ini dianggap sesuai untuk bidang pengajian fisioterapi kerana melibatkan konsep pemerhatian dan berfikir, dan merasai semasa memproses maklumat yang diperlukan terutamanya semasa amalan klinikal.*

*Kata kunci: gaya pembelajaran, prestasi akademik, pengajian fisioterapi*

## INTRODUCTION

Learning can be described as ‘behavioral changes that result from experience’ (Beard & Wilson 2018). Learning style refers to a process in which a person understands and retains information, thus gaining skills or knowledge (İlçin et al. 2018). Learning styles may differ from a person to another to reflect differences in the way of managing information or study pattern (Dantas & Cunha 2020).

There are various theories about learning styles, in which specific attitudes and skills of learners within learning contexts are described (Dantas & Cunha 2020). Among most popular theory is Kolb Experiential Learning Theory (Kolb & Kolb 2012), which is an experiential model that covers four-process learning cycle namely Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation. These processes lead to four basic learning styles: Accommodative, Convergent, Assimilative and Divergent. In assessing learning styles, Kolb proposed Kolb Learning Style Inventory (LSI) which consists of 12 statements that describe learning (Lowdermilk 2016). LSI is designed to measure the degree to which individuals portray the different learning styles which derived from experiential learning theory. Using LSI, individuals rank the 12 statements according to what best describes the way they learn. LSI is commonly used in health sciences study because it enables self-examination and discussion to identify the uniqueness, complexity, and variability in individual approaches to learning (Kolb & Kolb 2013).

In the context of physiotherapy education being one of health sciences studies, both academic and professional learning components which based on the practice of physiotherapy are important. Related knowledge, skills and behaviors need to be developed in students (Padmanathan et al. 2013). Other than techniques and characteristics that are applicable to daily physiotherapy practice, skills and proficiency to enable the students to be confident and to develop professionally have to be instilled (Stander et al. 2019). In the recent years, aspects of critical thinking, communication and problem-solving ability are also focused in physiotherapy students’ development (Dahlgren et al. 2022). Students need to have appropriate learning styles to develop these skills.

Studies into learning styles among health sciences students including physiotherapy are still limited. Williams and colleagues (2013) gathered

several studies which used LSI to identify the learning styles of health care professionals and its association with health care disciplines. They found that there is variance in the learning style within and between the different disciplines. A few studies have assessed the influence of learning styles on academic success. While Shirazi & Heidari (2019) found an impact of learning styles on students’ academic achievement, a study by Almigbal (2015) among undergraduate medical students in India reported otherwise. Similarly, Wang and colleagues (2013) reported no association between academic performance and the four different styles of learning according to Kolb Learning Theory.

To date, no study has reported the learning styles among physiotherapy students and attempted to understand how learning styles would affect the students’ performance. Theoretically, learning styles should change with the year of study; the junior students may require didactic learning while the senior students should adopt a learning style which involves critical thinking. Therefore, this study was conducted to identify the learning styles among physiotherapy students in Universiti Kebangsaan Malaysia (UKM) and to determine its association with their academic performance. Findings from this study could be used to enhance the teaching and learning methods in physiotherapy education in UKM and other higher institutions with similar physiotherapy curriculum.

## METHOD

### Study design and location

This was a cross-sectional quantitative survey involving the use of self-administered questionnaires. The study was approved by the Research and Ethics Committee of Universiti Kebangsaan Malaysia Medical Center (study code NN2017-086) and conducted at the Faculty of Health Sciences, located at UKM Kuala Lumpur campus.

### Participants

A total of 61 undergraduate physiotherapy students of the faculty were eligible and invited to participate in this study. The inclusion criteria were full time students and have successfully completed at least two semesters of study, as it is generally understood that students need about one semester to adjust themselves to a tertiary level education. Students who were on long sick leave during the study period were excluded from the study.

## Survey questionnaire

The self-administered questionnaire used in this study consists of two sections, namely A:

Demography and B: Learning Style. The demography section consists of questions on participants' gender, race, year of study and latest cumulative grade point average (CGPA), while Section B consists of statements regarding learning style from Kolb Learning Style Inventory (KLSI). There were 10 statements in four columns labeled as either Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), or Active Experimentation (AE), for participants to score based on scale 1 to 4, in which 1 means 'least described their learning style' and 4 means 'best described their learning style'. The scores by the participants in each column were then sum up and transferred to a Learning Style Grid by placing marks in the grid. The four-column marks were then connected, and the learning style of each participant determined as either Accommodative, Divergent, Assimilative or Convergent. The test-retest reliability for this KLSI

ranges from 0.91 to 0.97 (Wang et al. 2013).

## Survey procedure

The questionnaires were distributed to all eligible participants during a students-get-together event. Briefing about Kolb Learning Theory and Learning Style Inventory was provided prior to the questionnaire completion. The participants were given option to return the questionnaire on the same day or on a later date to the researcher. Consent was inferred by voluntary return of the questionnaire.

## Data analysis

All data were analysed with the use of SPSS version 22. Descriptive statistics were used to analyse demography and categorical data. Relationship between learning styles and demography variables was determined with the use of Chi square and Spearman's correlation test. Level of significance was set at  $p < 0.05$ . Analysis for the subject's individual Kolb LSI component was

TABLE 1. Demographic data of the participants (n=61)

	Race						Total n (%)
	Malay		Chinese		Indian		
	Male	Female	Male	Female	Male	Female	
Year 2	1 (1.64%)	7 (11.48%)	2 (3.28%)	2 (3.28%)	0 (0%)	0 (0%)	12 (19.67%)
Year 3	0 (0%)	7 (11.48%)	3 (4.92%)	11 (18.03%)	0 (0%)	0 (0%)	21 (34.43%)
Year 4	3 (4.92%)	8 (13.11%)	2 (3.28%)	14 (22.95%)	0 (0%)	1 (1.64%)	28 (45.90%)
Total n (%)	4 (6.56%)	22 (36.07%)	7 (11.48%)	27 (44.26%)	0 (0%)	1 (1.64%)	61 (100%)
	26 (42.62%)		34 (55.74%)		1 (1.64%)		

performed based on the available instructions.

## RESULTS

A total of 61 questionnaires were returned, with the response rate of 100%. Table 1 shows the participants' demography. Majority of them were females (n=50, 81.97%) and of the Chinese ethnic group (n=34, 55.74%).

The most dominant learning style among all the

students was Assimilative (n=27, 44.26%), followed by Divergent (n=24, 39.30%), while Convergent and Accommodative was each adopted by only five students (8.20%) (Figure 1). According to the year of study, majority of year 2 and year 3 students adopted Assimilative learning style; 7 of 12 students (58.33%) and 10 of 21 students (47.62%) respectively, while for the year 4 students, the most adopted learning style was Divergent (n=12, 42.86%). However, statistically, no significant difference in the learning style between the year of study was found ( $p = 0.27$ ).

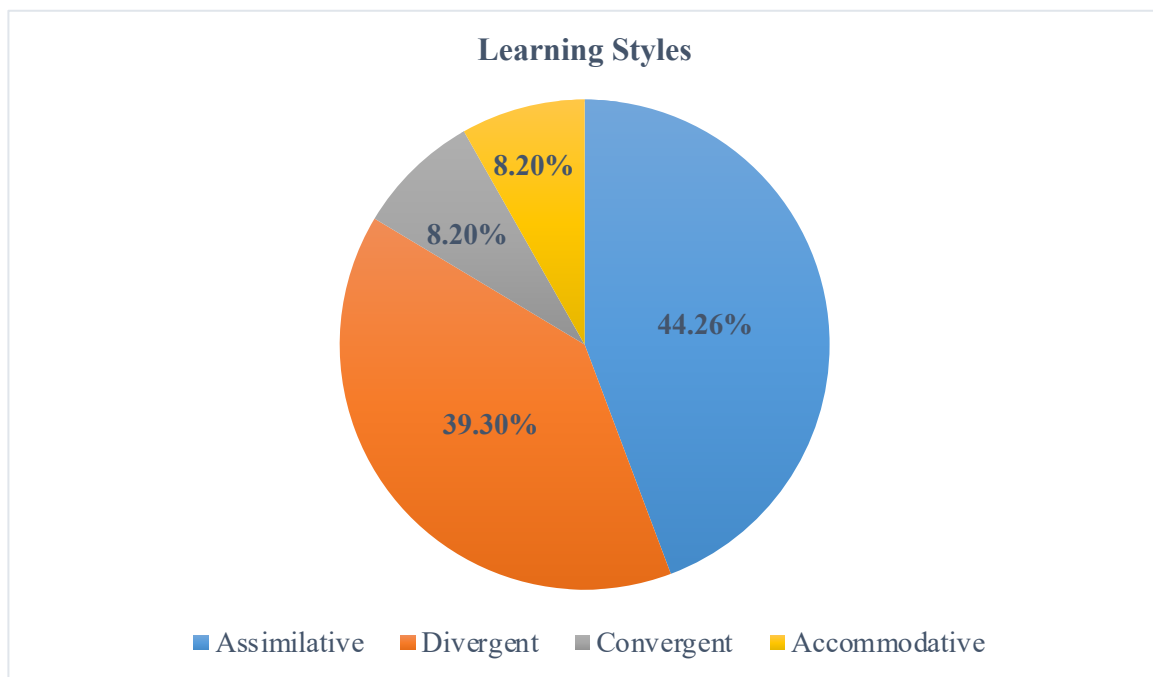


FIGURE 1. Distribution of learning styles among participants (n=61)

Figure 2 shows the distribution of the learning styles according to gender. Among the male students, a larger percentage adopted Assimilative learning style (n=6, 54.55%). On the other hand, female students use Divergent (n=22, 44.00%) and Assimilative (n=21, 42.00%) learning style fairly similarly. No significant difference in learning style between gender was however found ( $p = 0.32$ ). Comparison of learning style between ethnic groups is shown in Table 2. Learning style preference is significantly different between ethnic groups,  $2(6) = 15.692$ ,  $p = 0.02$ , with the majority of the Malay students preferred Divergent learning style (n=12, 19.60%), and the Chinese students adopted Assimilative learning style the most (n=18, 29.51%).

Cumulative Grade Point Average (CGPA) refers to academic performance of the students from previous semester. In term of academic performance,

their mean CGPA was  $3.28 \pm 0.26$ , and ranged from 2.31 to 3.82. Based on the year of study, Year 2 students have the mean of  $3.16 \pm 0.31$ , Year 3 reported the mean of  $3.36 \pm 0.23$ , while Year 4 students have mean CGPA of  $3.25 \pm 0.29$ . Nevertheless, no significant correlation was found between the learning styles and the CGPA of the students,  $r = 0.02$ ,  $n = 61$ ,  $p = 0.87$ .

## DISCUSSIONS

This study found that the most dominant learning styles of the students were Assimilative and Divergent. This result is consistent with the finding of a study among physiotherapy students in Taiwan (Wang et al. 2013), although does not support other studies results reported in Australia, Canada and America where

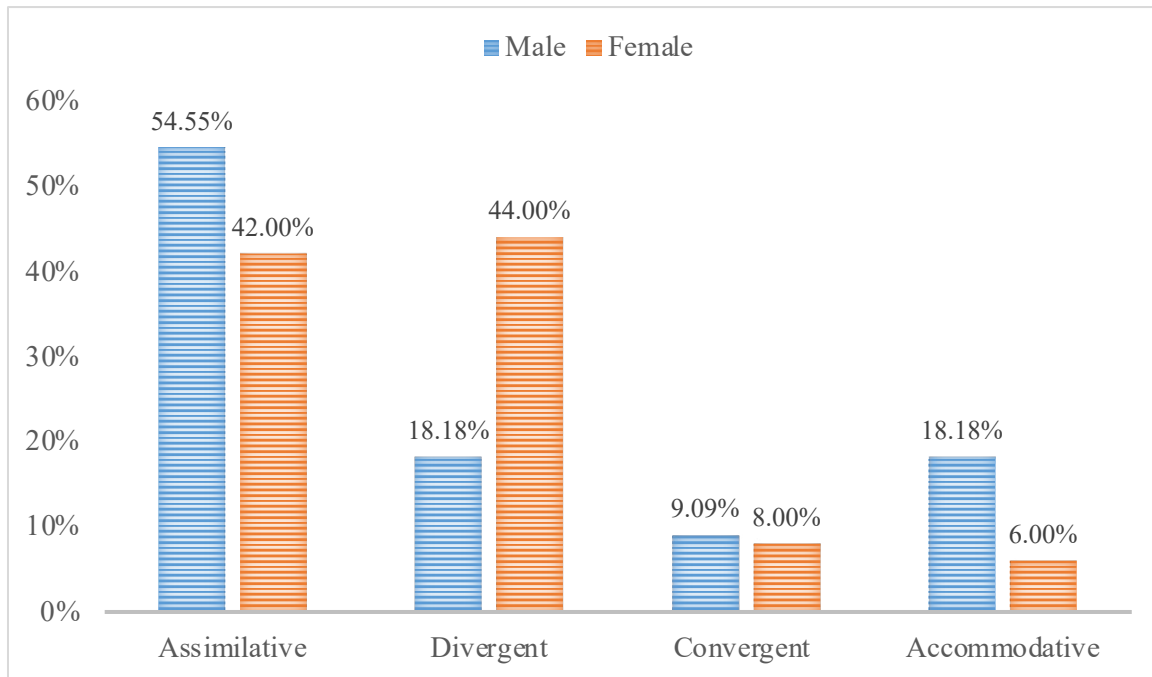


FIGURE 2. Distribution of learning styles within the male (n=11) and female (n=50) students

TABLE 2. Learning style within the different race

		Race			Total n (%)
		Malay	Chinese	Indian	
Learning style	Divergent	12 (19.60%)	12 (19.60%)	0 (0%)	24 (39.30%)
	Assimilative	9 (14.75%)	18 (29.51%)	0 (0%)	27 (44.26%)
	Convergent	3 (4.92%)	2 (3.28%)	0 (0%)	5 (8.20%)
	Accommodative	2 (3.28%)	2 (3.28%)	1 (1.64%)	5 (8.20%)
Total n (%)		26 (42.62%)	34 (55.74%)	1 (1.64%)	61 (100%)

Chi square test:  $2(6) = 15.692$ ,  $p = 0.02$ .

Convergent was predominant (Stander et al. 2019). This inconsistency may be due to educational system and culture differences between the east and the west (Stander et al. 2019; Wang et al. 2013). Physiotherapy students in this study adopted Assimilative and Divergent learning styles almost equally, with more than 40% of the students preferred these learning styles. This percentage somewhat differs slightly from the Taiwan study, which found Assimilative as the more dominant learning style than Divergent (Wang et al. 2013). The result difference may be brought about by the slight difference in the study participants in which the Taiwan study was also participated by postgraduate students. In Assimilative learning style, the focus is on ideas and concepts thus the students learn through reflective observation and abstract conceptualization. This type of activities, although is important in physiotherapy undergraduates, maybe more required in postgraduate study.

In the context of physiotherapy study, both Assimilative and Divergent learning styles are suitable for the students, as Assimilative is more about watching and thinking, and Divergent involved feeling and watching while processing the information learnt (Al Qahtani & Al-Gahtani 2014). These learning styles should be adopted more by Year 4 students due to the focus on clinical practices compared to Year 2 and Year 3 students. Prior to the actual hands-on activities involving the patients, Year 4 students are encouraged to critically plan on what they would be doing on the patients. The hands-on activities duration is usually longer than the planning session. These explain the adoption of more Divergent learning style among the Year 4 students in this study.

In physiotherapy, the Year 2 and Year 3 are considered the pre-clinical years as students are still having theory sessions and mostly under lecturers' supervision during clinical placements, compared to Year 4 students who spend the whole semester undergoing clinical placements under much less supervision. As such, Convergent and Accommodative styles are more suitable for them. These learning styles can be easily said as 'trial-and-error' method, where they can still make mistakes especially during practical classes with the lecturers and peers. The difference in the study focus may be the reason for the adoption of different learning style through the four-year physiotherapy study. The course programme can therefore be structured accordingly if the teachers wish to encourage specific learning style among the students (Williams et al. 2013).

There was a low preference for Convergent and

Accommodative learning styles. This finding was in agreement with the results of a study among pharmacy students in Australia (Williams et al. 2013), indicating that these learning styles may not suit health sciences students. The students with Accommodative learning styles tend to rely on intuition than carrying out their own analysis. They have the preference for concrete experience and active experimentation. Perhaps this style did not assure the students to be concise and accurate, making it the least learning style adopted by the students.

In this study, we also found that there was a significant difference across races in the learning styles adopted by the physiotherapy students. This difference suggests that culture may play a role in determining and reinforcing learning styles among students as different race has slightly different culture and habits (Fogg et al. 2013, Williams et al. 2013). However, there was no significant difference in the learning styles across gender. This showed that both genders have no separation in the learning process thus providing the opportunity for them to learn from each other. They also can be comfortable in mixed-gender classrooms and study groups (Wehrwein et al. 2007). Nonetheless, this finding does not support the finding of a study by Adesunloye (2008) who concluded that Kolb's LSI is sensitive to gender. The reason for this is not known.

We also found no statistically significant association between learning styles and the students' academic performance. When comparing with other studies, we noticed consistent results regarding this. Rai & Khatri (2015) also found the same results among physiotherapy students in an institute in India. A study done among medical students also demonstrated that learning styles were not associated with academic performance (Almigbal 2015). There may be other factors which influence the academic performance, such as teaching styles, learning context and examination formats (Paulraj et al. 2013). Dantas & Cunha (2020) proposed that learning style can be a predictor for academic performances of the students but multiple factors should be considered, which may shape the students' learning styles and academic performance.

The main limitations of this study are a rather small sample size, the use of convenience sampling method, and the study location which is limited to one educational setting. As such, the generalisability of the study results is not possible. Future larger studies are needed, and we recommend that measures of academic performance should also include assessments other than CGPA, such as clinical performance report and measure of problem solving ability.

## CONCLUSION

This study shown that the most dominant learning style of physiotherapy students of the Universiti Kebangsaan Malaysia is Assimilative, followed by Divergent. Although no significant association between learning style and academic performance was found, findings from this study can inform future study to explore the impact of learning style on physiotherapy education within universities. Understanding of the students' learning styles may benefit the educators, as they may adopt various teaching methods and develop potentially effective training strategies to enhance the learning outcomes of the students.

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