



Original Article

ISSN : 2277-3657  
CODEN(USA) : IJPRPM

## ***Relationship between Learning Style and Academic Performance among the Generation Z Students in Kuala Lumpur***

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### ABSTRACT

Every student has a unique learning style. Their personalities are shaped by factors affecting their learning styles. Besides that, it is evident that students' distinctive learning style has a significant impact on their academic success. A cross-sectional study was done to investigate the degree of association between students' learning styles and academic achievement. This research was conducted in Kuala Lumpur, and the participants were first- to third-year biomedical science students. This survey included 84 students, where 24 students were selected from each year. The learning style inventory questionnaire was used to measure students' learning styles through a survey. According to the findings, the majority of students had the highest amount of visual learning styles for each academic year. However, the majority of the first-year students had the second-highest learning style, which scored the highest for visual learning style compared to auditory and kinaesthetic. Furthermore, the academic year affected the mean score of learning styles as demonstrated by two-way ANOVA tests ( $p < 0.01$ ). The correlation test was then performed, and the results show that only audio learning style and CGPA had a positive and significant correlation ( $p < 0.05$ ). In conclusion, this study revealed that academic performance was not influenced by learning style. Nonetheless, students' learning styles are different for the different academic years.

**Key words:** Learning style, Auditory, Visual, Kinaesthetic, Academic performance, Students

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### INTRODUCTION

Everyone has their way of thinking about life. Individuals are born with varied personalities, and each student also has their style, including learning styles. In this context, it is evident that students' learning styles play a critical role in achieving outstanding examination outcomes. Students' gender, age, academic achievement, and culture can influence their learning style [1, 2]. As a result, various learning styles at the educational institution will improve the quality of student learning.

Physical activity also helps students improve their cognitive abilities and academic achievement [3]. Academic performance is also affected by other characteristics such as gender, residency, and lifestyle [4]. In addition, educators play a vital role in encouraging students to participate actively in the classroom [5]. As a result, identifying individuals' unique learning styles does not only improve their motivation during the learning process

but also improves their academic potential. As a result, educators must understand their students' preferred learning styles. With the absence of prior knowledge, educators may assume that all students will understand their explanation based on one or two learning styles, which are predominantly visual and auditory. This belief may not be reliable or appropriate for some students who prefer a kinaesthetic learning style. This study can improve and enlighten educators that some students are excellent but their academic performance is poor due to the teaching method that is not tailored to the needs of a specific group of students. The study's overall goal is to examine the association between learning style and academic performance, academic year, and gender.

A study was conducted on first-year medical students to examine the association between learning style preferences and gender, educational major, and status [6]. A total of 68.5% of the enrolled students were at the professional doctorate level, while the rest were at the undergraduate level from the 184 students who answered and returned the questionnaire (66.3% females, 33.7% males). According to the findings, 48.9% of the students chose the single-modal learning method, while 51.6% favored the multimodal learning style. Male students preferred the kinaesthetic learning approach over female students who chose the aural learning technique.

A study was conducted to determine the learning styles of dentistry students from year one to year five [1]. The study comprised a systematic review of four studies where the dental students demonstrated significant kinaesthetic and aural learning preferences. In a study by a previous researcher, kinaesthetic and aural preferences were less common than reading/writing and visual preferences. The study discovered that students' learning preferences did not change across the first five years of college study [7]. However, additional research is needed to evaluate the relationship between learning style and academic success by academic year.

Furthermore, a study [8] that assessed the preferred learning styles among undergraduate nursing students across all academic years found that the majority of students preferred and preferred Visual learning style, while 30.5 percent preferred Kinesthetic, and 29.5 percent preferred the Auditory learning style. This is similar to a study that examined gifted and talented students with Visual learning styles versus Kinesthetic learning styles [9]. The findings appear to contradict a study conducted on secondary school children, which found that the Kinesthetic learning style was the most favored, followed by Visual and Auditory learning styles [10]. According to a previous study, adult learners have similar numbers of visual and auditory learning preferences, with kinesthetic learning preferences being the least popular [11].

Furthermore, a study was done in a high school class to uncover and explain the distinct features of visual, audio, and kinaesthetic students in understanding mathematics problems using test methodologies, interviews, and questionnaires [12]. According to the study findings, there are differences in the characteristics of understanding problems for visual, auditory, and kinaesthetic students in terms of completeness and regularity of information writing, the quantity of reading questions repeated, marking important information, and activity or movement habits performed while understanding the problem [13].

Furthermore, a study explored the types of learning styles used by secondary school students, the relationship between learning styles and academic achievement, and the comparison between the effects of different learning styles on academic achievement. This study discovered that kinaesthetic learning style was more prevalent than visual and auditory learning styles among secondary school students. Additionally, there is a strong association between kinaesthetic learning style and academic success [10, 14].

The association between learning style and gender, academic year, educational major, and academic accomplishment has been explored in prior research. As a result, the purpose of this study is to investigate whether there is a link between learning styles and academic achievement among biomedical science students in Kuala Lumpur across the academic years.

## MATERIALS AND METHODS

This is a cross-sectional study where the sampling frame was derived from a list of student names. Using the stratified random sample procedure, 28 students were chosen at random from each academic year of the biomedical science program. Overall, 84 respondents were selected. Some respondents were rejected from the recruitment of respondents for having the following criteria: deferred their studies and diagnosed with mental health or chronic disorders. Gpower was used to calculate the sample size, and the total sample size required was 90 [15].

This study used the learning style inventory questionnaire (LSQ) which has been used in previous studies [8]. The LSQ has been tested for the validity and reliability of the studies on students in other countries [8]. This questionnaire is divided into two parts: Part A and Part B. Part A contains 24 questions. Each question corresponds

to one of the three learning styles being investigated. The goal of this section was to determine the respondents' learning styles. The random layout in Part B was identical to Part A. Part B was used to determine whether the respondents have a secondary method of learning or exclusively utilize one primary method. The LSQ's instructions were used to determine the scores in sections A and B. Students were handed the questionnaire based on the list of names. The questionnaire was validated by previous researchers [16, 17].

The Statistical Package for Social Sciences (SPSS) version was used to examine the data. This study employed descriptive bar charts to establish the categorization of learning styles by academic year. The second goal was to compare learning style scores by academic year using chi-square testing, followed by two-way ANOVA. Finally, this study used correlation tests to identify the correlations between two variables.

## RESULTS AND DISCUSSION

### *Sociodemographic data*

A total of 84 biomedical science students in Kuala Lumpur participated in this study. Twenty-seven out of 84 students were from Year 1 (32.1%), 28 students from Year 2 (33.3%), and 29 students from Year 3 (34.5%).

**Table 1.** Mean and Standard Deviation of Mean Score Lsi According to the Academic Year and Gender

Academic Year	n	Mean	SD
1	28	27.18	3.65
2	28	29.29	3.26
3	28	26.08	3.35
Gender			
Male	27	27.31	2.31
Female	57	27.61	4.14

**Table 2.** Preferable Learning Style (Questionnaire 1)

Learning Styles	Number of Students	Percentage
Visual	52	61.90
Auditory	24	28.60
Kinaesthetic	8	9.50
Total	84	100.00

According to **Table 1**, the second-year students had the highest mean score of LSI, followed by first-year students. For gender, the highest mean of LSI was among male students. **Table 2** presents the results from Questionnaire 1. Based on **Table 2**, the learning style preferred by most students was visual with the frequency of 52 out of 84 students (61.9%), followed by auditory learning style with the frequency of 24 (28.6%). And lastly, the least preferable learning style among the students was kinaesthetic with the frequency of only eight students (9.5%).

**Table 3.** Sociodemographic Data On Preferable Learning Style (Questionnaire 2)

Learning Styles	Number of Students	Percentage
Visual	54	64.3
Auditory	1	1.2
Kinaesthetic	29	34.5
Total	84	100

**Table 3** is the result of Questionnaire 2. The data from the second questionnaire was used to support the finding in the first questionnaire. This finding was also used to determine whether the students' learning styles are unimodal or multimodal. Based on **Table 3**, 54 students (64.3%) preferred the visual learning style, followed by 29 students (34.5%) who preferred the kinaesthetic learning style, and only one student (1.2%) preferred the auditory learning style.

*Style category based on academic year*

**Table 4.** Sociodemographic Data of Preferable Learning Styles among Biomedical Students (N = 84) based on an Academic Year (Questionnaire 1)

	Number of Students	Percentage
<b>Year 1</b>	27	100.00
Visual	13	48.15
Auditory	10	37.04
Kinaesthetic	4	14.81
<b>Year 2</b>	28	100.00
Visual	21	75.00
Auditory	4	14.29
Kinaesthetic	3	10.71
<b>Year 3</b>	29	100.00
Visual	18	62.07
Auditory	10	34.48
Kinaesthetic	1	3.45

**Table 4** show the results of the primary strengths of learning styles among the biomedical science students based on their academic year (Year 1, Year 2, and Year 3) from the data collection of Questionnaire 1. **Table 4** show that the pattern of the most preferable learning style based on each academic year was almost the same. Most students from Year 1, Year 2, and Year 3 are strong visual learners with the percentage of 48.15%, 75.00%, and 62.07%, respectively. The second most preferred learning style in all three years was auditory with the percentage of 37.04%, 14.29%, and 34.48% respectively, followed by the least preferred learning style, namely kinaesthetic, with 14.81%, 10.71%, and 3.45% for all of three academic years (n = 84).

**Table 5.** Sociodemographic Data of Preferable Learning Styles among Biomedical Students (N=84) based on an Academic Year (Questionnaire 2)

	Number of Students	Percentage
<b>Year 1</b>	27	100.00
Visual	12	44.44
Auditory	0	0.00
Kinaesthetic	15	55.56
<b>Year 2</b>	28	100.00
Visual	23	82.14
Auditory	0	0.00
Kinaesthetic	5	17.86
<b>Year 3</b>	29	100.00
Visual	19	65.52
Auditory	1	3.45
Kinaesthetic	9	31.03

**Table 5** show the result for the primary strength of learning styles among biomedical science students in Year 1, Year 2, and Year 3 from the data collection of Questionnaire 2. Comparing the result of Questionnaire 1, most students from Year 1 preferred kinaesthetic learning style to visual and auditory with the frequency of 15 (55.56%), 12 (44.44%), and 0 students (0%) respectively. Students from Year 2 mostly preferred the visual learning style with a frequency of 23 out of 28 students (82.14%). The rest were kinaesthetic learners with the frequency of five students (17.86%) and none from Year 2 preferred auditory learning style. Nineteen students in Year 3 preferred visual learning style, 9 (31.03%) preferred kinaesthetic, and only one student (3.45%) preferred auditory.

*Comparison of the score of learning style based on academic year*

**Table 6.** Associations between Types of Learning Style and Academic Year

	Year 1 & Year 2	Year 3
Visual and Auditory	38.2% (n = 21)	37.9% (n = 11)
Kinaesthetic	61.8% (n = 34)	62.1% (n = 18)

**Table 7.** Comparing the Mean Score of LSI and the Interaction Effect between Academic Year, Gender, and Academic Performance

	F	p
Model 1 (Gender and Academic Year)		
Gender	0.016	>0.05
Academic year	5.24	<0.01
Gender x Academic year	2.11	>0.05
Model 2 (Academic Year and Academic Performance)		
Academic year	8.92	<0.01
Academic performance	2.11	>0.05
Academic year x Academic performance	2.23	>0.05

The Chi-square test was used to evaluate the learning style score according to academic year as shown in **Table 6**. Based on the results, the chi-square test was not statistically significant,  $\chi^2(1, n = 84) = 1, p > 0.05$ , although the association between the learning style and students was quite small,  $\phi = 0.002$ . The two-way ANOVA in **Table 7** compares the means of SLI between gender and academic year as main effects and interaction effects. The results indicate no significant interaction effect ( $F = 2.11, p > 0.05$ ). However, the academic year was significant, and Bonferroni's posthoc test indicated the mean difference between Year 2 and Year 3 ( $p < 0.05$ ). After analyzing the interaction effect between academic year and academic performance for Model 2, the results indicate no significant mean difference ( $F = 2.23, p > 0.05$ ) and academic year was significant ( $p < 0.05$ ).

#### *Determination of the relationship between learning styles and academic performance*

Based on the correlation test that was conducted to determine the relationship between students' learning styles (visual, auditory, or kinaesthetic learning styles) and their CGPA based on the academic year. For the first-year students, the variable for CGPA and audio learning style was moderately positively correlated,  $r(26) = 0.476, p < 0.05$ . The variables CGPA and Visual Learning Style & Audio Learning Style were negligibly correlated and negatively correlated respectively. For the second-year students, the variables CGPA and Visual Learning Style, Audio Learning Style & Kinaesthetic Learning Style were marked negatively correlated and not significant.

For third-year students, the variable CGPA and Visual learning style are weakly positively correlated. The variable for CGPA and Audio learning style is negatively correlated. The variable CGPA and Kinesthetic learning style were also negligibly correlated. The findings revealed that learning styles differed depending on the year of study. As a result, educators should focus on the student's preferred learning style to ensure that they understand the courses and perform well, particularly in academics. Furthermore, for the first year, there was a significant relationship between learning style and academic performance. This indicated that first-year students' academic performance is influenced by their learning style. This is substantial because first-year students were just beginning to adjust to the university environment. As a result, a suitable method of teaching can increase their interest in the topic. In the world of education in general, educators should be equipped with a variety of teaching methods, such as blended learning, which includes not only lectures delivered through visual materials, but also practical sessions, problem-based learning, team-based learning, and others [18].

Everyone has a different way of learning. Students' performance can be enhanced if they can fully utilize their preferred learning style. The results in this study revealed no statistically significant difference in learning style scores based on the academic year. Next, visual learning style was more significant among students than auditory and kinaesthetic. These findings implied that the academic year has no bearing on learning style. The academic year has no statistically significant difference. Year 1 students have the highest kinaesthetic learning style, whereas Year 2 students have the highest visual learning style (40.36%) and Year 3 students have the highest auditory learning style (40.36%). As a result, all students in all academic year groups have to learn styles that are

similar to the first-year students, namely visual learning styles, followed by listening and kinesthetics.

Understanding students' diverse learning styles and preferences and their impact on academic success is becoming increasingly important in the educational environment. The VARK questionnaire was used in the current study to identify the learning style preferences of first-year medical students. The majority of the students (61%) had multimodal learning style preferences, which meant they liked several channels of knowledge delivery. Previous studies on first-year medical students from various nations found similar results; however, the percentage of students who preferred multimodal learning styles in these studies ranged from 59 to 85%. This means that the majority of kids will learn well if teaching approaches incorporate a mix of activities that activate the visual, aural, read-write, and kinesthetic sensory modalities. The growing use of multimedia in education can create chances for multiple representations of content (text, video, audio, graphics, and interactive features) to better adapt to students' diverse learning styles [19]. According to neuroscience studies, considerable gains in learning can be made when learning environments cater to the most common learning styles [20].

Visual, Auditory, and Movement (Motion) are the three learning processes (Kinesthetic). The percentages of study sample styles for visual, auditory, and kinesthetic learning were 40.0 percent, 29.5 percent, and 30.5 percent, respectively, according to the previous study [8]. Women favored hearing (auditory) learning methods by 30.3 percent over males by 27.3 percent, while men chose kinesthetic learning styles by 32.3 percent over women by 29.8%. The visual learning style was the most popular among third-year students, followed by auditory and kinesthetic learning styles. As a result, kids would benefit more from particular learning tactics such as reading, viewing material on a chalkboard, or looking at drawings, graphs, or illustrations, which are favored by visual learners. Visual learning tactics not only promote critical thinking skills such as evaluating, analyzing, and interpreting data, but they also improve concentration and decision-making abilities. The auditory learners are mostly served by passive learning strategies such as lectures [21, 22].

In this study, the percentage of auditory learners was lower than that of visual and kinesthetic learners, but higher than that of visual and kinesthetic learners. Our findings were similar to those who investigated the effect of learning styles and study behavior on the achievement of preclinical students in pharmacology. According to him, the majority of our cohort's students were "sufficient" in their study reading. This research stresses that learners who are selective in obtaining important information are better equipped to manage their time when it comes to reading habits. With the growing volume of medical data, medical students are finding it increasingly difficult to read a large number of lecture notes, books, journals, and articles. As a result, good reading strategies such as quick review, selective reading, and surveying appear to be critical for pharmacological success [23].

Most medical students eventually improve their reading skills and adjust their learning strategies to their learning styles. Aspects of study behavior and learning styles are considered to be common drivers of success in a particular learning environment. Students in Biomedical Sciences, on the other hand, were more likely to adopt visual (visual) learning styles, according to the study. This is because, throughout the learning sessions, students taking this course are more likely to look at the photos to grasp and dig into the schematics, particularly on human internal parts. Most students choose to learn by watching videos that have been specifically put on YouTube to help them grasp the course they are taking [24, 25].

According to a previous study, reading/writing was the most desired learning style among first-year medical students in Saudi [26]. However, according to a previous study, the auditory method was the most preferred learning technique among Saudi Arabian medical students [27]. The disparities in learning preferences of students from different nations can be explained by variances in teaching approaches utilized at various levels, as well as exposure to hands-on clinical experiences during the first year of the curriculum [28]. Individual learning styles exist among biomedical students, but they have been found to evolve and develop as students mature and move through their studies. The purpose of this research project was to study the relationship between learning styles and academic performance between academic years. Can be concluded that biomedical students use different learning approaches and the learning approaches depend on individual student characteristics such as sex, age, and previous education. Particularly, 3rd-year students who had global assessments in performance would have higher visual learning scores and lower kinesthetic learning scores than would 2nd-year and 1st-year students in their year who must write a comprehensive, multiple-choice question (MCQ) final examination. The study process questionnaire was included and produced scores for visual, audio, and kinesthetic learning approaches. Students indicated that in the preclinical years, much of the study was rote memorization and indicated the study for MCQ examinations fostered surface learning whereas, studying for free-respond written questions and clinical examinations encouraged deep learning [29].

Based on the findings, a correlation test was run to see if there was an association between students' learning styles

(visual, auditory, or kinesthetic) and their CGPA by academic year. For first-year Biomedical Sciences students, research demonstrates that CGPA and Auditory learning style are marginally positively associated. According to a previous study, there was a minimal but favorable association between auditory learning style and student academic accomplishment. First-year students prefer auditory learning because the subjects presented during the first year are easier to comprehend than those offered in years 2 and 3 [10, 30].

For third-year Biomedical Sciences students, CGPA and Visual learning styles are weakly positively connected [10]. Research also found a very small positive association between visual learning style and student academic accomplishment. When compared to the Kinesthetic learning style, Auditory and Visual learning styles are more beneficial in Biomedical Sciences courses. Our findings also demonstrate that for second-year Biomedical Sciences students, CGPA and Visual, Auditory, and Kinesthetic learning styles were negatively associated and not significant. This is parallel with other studies where there was varies in learning style according to the year of study [31].

The study's findings emphasized the importance of educators embracing teaching styles. In this modern era, educators have no choice but to adapt their teaching style to a variety of methods that are appropriate for the topic and course. Educators cannot continue to teach in the traditional manner of giving lectures and evaluating students solely through exams. To make it more interesting for the student to understand the concept of knowledge on the topics, the methods of evaluation should be varied. This study will add to the body of knowledge and serve as a wake-up call to traditional teaching in this challenging era, particularly in the aftermath of pandemic Covid 19 [27, 32].

## CONCLUSION

Finally, the majority of students have a strong visual learning style throughout all years. An intriguing finding was that there was a difference in learning style over the year. Furthermore, among first-year Biomedical Science students, there was a strong relationship between learning style and academic performance. As a result, educators should use a variety of teaching styles, such as problem-based learning, team-based learning, and different assessment methods, to assist and support students in better understanding topics and achieving high academic performance.

**ACKNOWLEDGMENTS :** The authors would like to express their appreciation to CRIM, Universiti Kebangsaan Malaysia for supporting the publication fee with the research grant GP-2021-K007175.

**CONFLICT OF INTEREST :** None

**FINANCIAL SUPPORT :** Research grant GP-2021-K007175

**ETHICS STATEMENT :** None

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