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THE ASSOCIATION BETWEEN LEARNING STYLE, ACADEMIC PERFORMANCE, AND PARTICIPATION IN CO-CURRICULAR ACTIVITIES AMONG SECOND-YEAR MEDICAL STUDENTS IN UNIVERSITI PUTRA MALAYSIA

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Abstract

The extensive systemic module courses, defined by comprehensive study and frequent assessments, establish a demanding atmosphere for medical students. Students are required to balance their involvement in co-curricular activities. This study explores how learning preferences impact academic performance and participation in extracurricular activities among second-year medical students at Universiti Putra Malaysia. A cross-sectional study design was employed. The connection between the variables was determined through the application of Chi-Square and Fisher's test. The Revised Two-Factor Study Process Questionnaire, comprising 20 questions, was utilised to analyse deep and surface learning approaches. To assess the level of student engagement in co-curricular activities, 9 questions from the College Learning Effectiveness Inventory and Involvement in College Activity Scale were incorporated. Assessment marks were assigned by the Faculty of Medicine and Health Sciences at Universiti Putra Malaysia to evaluate students' academic performance. Among the 87 respondents, 82.8% engaged in the co-curricular activity. A significant majority of respondents, 74.7%, indicated that the deep learning approach aids them in their studies. Regarding academic performance, 78.2% of students attained an average score. The results indicated that the learning style significantly influenced the academic performance of medical students, as demonstrated by a Fisher's test yielding $p = 0.042$. The co-curricular activities of the pupils showed no significant effect on their academic performance, as indicated by a

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Fisher's test value of p = 0.584. Students who often employed a superficial learning approach exhibited below-average academic performance. In contrast, students who employed deep learning approach exhibited enhanced academic outcomes.

Keywords: Academic performance; co-curricular; learning style.

Abstrak

Kursus modul sistemik berganda, yang melibatkan kajian mendalam dan peperiksaan kerap, menjadikan kehidupan pelajar perubatan tidak menyenangkan. Pelajar juga perlu mengurus aktiviti kokurikulum. Kajian ini meneliti pengaruh gaya pembelajaran terhadap prestasi akademik dan penglibatan dalam aktiviti kokurikulum dalam kalangan pelajar perubatan tahun dua di Universiti Putra Malaysia. Kajian keratan rentas digunakan. Hubungan antara pembolehubah ditentukan menggunakan ujian Chi-Square dan Fisher. Soal Selidik Proses Pembelajaran Dua Faktor yang Diubah Suai dengan 20 soalan digunakan untuk membandingkan kaedah pembelajaran mendalam dan permukaan. Untuk menilai penglibatan aktif pelajar dalam aktiviti kokurikulum, 9 soalan daripada Inventori Keberkesanan Pembelajaran Kolej dan Skala Penglibatan Aktiviti Kolej ditambah. Markah penilaian diberikan oleh Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia untuk menilai prestasi akademik pelajar. Daripada 87 responden, 72 (82.8%) aktif melibatkan diri dalam aktiviti kokurikulum. Sebilangan besar responden (74.7%) menyatakan bahawa gaya pembelajaran mendalam membantu mereka dalam pembelajaran. Dari segi prestasi akademik, 78.2% pelajar memperoleh markah purata. Dapatan menunjukkan bahawa gaya pembelajaran mempunyai kesan ketara terhadap prestasi akademik pelajar perubatan dengan ujian Fisher pada p = 0.042. Aktiviti kokurikulum pelajar tidak memberi kesan ketara terhadap kejayaan akademik dengan nilai ujian Fisher pada p = 0.584. Pelajar perubatan yang menggunakan pendekatan pembelajaran permukaan menghadapi masalah akademik, manakala mereka yang menggunakan gaya pembelajaran mendalam mampu mencapai kejayaan akademik sambil turut serta dalam aktiviti kokurikulum.

Kata kunci: Prestasi akademik; kokurikulum; stail pembelajaran

1.0 INTRODUCTION

It is well known that medical students have a very busy schedule between their coursework and co-curricular activities. Finding the ideal balance in adapting the learning environment to other duties may be the most important factor in raising a student's quality of life and academic success (Basser et al., 2022). Prior academic achievement, learning style, attitude, behaviour,

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motivation, time management, and coping methods are all factors that affect academic success for medical students (Steinmayr et al., 2019). Although it is important, academic performance does not guarantee success for medical students alone (Hayat et al., 2020).

According to Hussman and O'Loughlin, a student's "learning style" or "learning strategy" refers to how they consistently react to and use inputs when learning. It has been determined that various learning styles have a significant impact on students' academic progress (Wu et al., 2021). According to Biggs' learning model from 1987, students can be divided into two groups based on their approach to learning, which includes a deep approach and a superficial approach. Deep learners desire to comprehend the concepts and ideas that correspond with their subject matter. Meanwhile, a superficial approach to learning relies on memorising because students are primarily concerned with passing and accumulating marks (Ahmed and Ahmad, 2017).

The current educational process, which is intended to encourage students to become more competitive towards one another, may in some cases be linked to having a superficial learning style, leaving students with no other option but to practise it (Coman et al., 2020). Stressful assessment methods are frequently required students to apply or recall their knowledge, which are only a few examples. Some students may find that learning a keyword or trigger makes it simpler for them to recall the correct response to a question quickly (Endre et al., 2020). As a result, this might help shorten the time needed to understand and memorise the relevant information. Students will eventually have more free time to engage in co-curricular activities. Understanding the connection between extracurricular activities, teaching strategies, and academic success is crucial for effective learning (Agyekum, 2021). Co-curricular activities assist students in becoming more socially confident and lay the groundwork for sound character development. They also motivate them to use learning techniques that will enhance their aptitude for learning and help them do better on tests (Buckley and Lee, 2021). With the aim of cutting down on study time and promoting a positive view on life, this discovery will help teachers develop cutting-edge methods to increase student learning effectiveness (Coman et al., 2020). While studying, adjusting, and getting ready for a career, it's simple to feel overwhelmed. However, this doesn't have to be the case. A study found that students who engaged in co-curricular activities had a better chance of earning a grade point average (GPA) of 3.0 or higher than students who did not (Ritchie, 2018). Another study found that regardless of the students' backgrounds, which may have included living in different regions with diverse degrees of success in the past, their participation in co-curricular and home activities will undoubtedly result in a good effect on their GPA results on

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examinations (Vargas et al., 2020). However, the effects of participating in sports produced contradictory findings (Fernando et al., 2017). On the other hand, the majority of research have shown proof that engaging in athletics improves students' academic performance (Howie and Pate, 2012, Qurban et al., 2018). Additionally, a different study found a beneficial relationship between student athletic participation and academic achievement (Slavinski et al., 2021). However, a study found that playing sports in high school did not enhance academic performance or grades (Joseph, 2022).

It is believed that in order to improve learning effectiveness, instructors must have a clear awareness of the connections between extracurricular activities, learning strategies, and academic performance. The association between individual differences, learning styles, and academic accomplishment in higher education has been found in Biggs' Presage-Process-Product model on student learning (Biggs, 1987). It is argued that extracurricular activities boost pupils' self-confidence, which promotes in-depth learning. Co-curricular activities could relieve academic pressure and stress, which would be good for students' physical and mental health. Ultimately, this will result in an increase in their learning productivity (Slavinski et al., 2021). The relationship between learning styles and co-curricular activities can yield profound insights into student engagement in many situations, rendering it more pertinent for research centred on cognitive and experiential learning processes.

The goal of this study is to assess how co-curricular activities and learning styles relate to academic outcomes among medical students at Universiti Putra Malaysia based on the evidence presented above. The causal impact of a student's preferred learning style may contribute to the development of better medical students who perform well in both academic and co-curricular settings.

2.0 MATERIALS AND METHODS

2.1 Study Design

The study was carried out in the Faculty of Medicine and Health Sciences (FMHS) at Universiti Putra Malaysia (UPM) Serdang. In the 2018-2019 academic year, second-year pre–clinical medical students at UPM participated in this cross-sectional study. Medical students must also be in their fourth semester of study to be eligible to participate. The exclusion requirements were met by students who were second-year repeaters. The study was only focused on second-year medical students so that a comparison of the academic results could be made.

Emails were used to contact potential respondents. The study was conducted over the

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course of three months. The sample frame consisted of 98 students from the list of second-year medical students at FMHS UPM.). This sample calculation indicated a minimum sample size of 93 individuals for Year 2 medical students. However, only 87 questionnaires were completed. Therefore, the response rate was at 93.5%. The bare minimal sample size was reached.

2.2 Sample Size and Calculation

Using a sample size estimates with single group mean from a related study (Chan, 2014), the necessary sample size strata was calculated. Using hypothesis testing for a single incidence rate and an adjustment for the 10% non-response rate, the expected sample size was determined.

The sample size calculation used in Formula 1 (Eq. 1) below.

$$n = \frac{z_{1-\alpha/2}^2}{d^2}\sigma^2$$

where n = sample size, Z = 95% confidence interval, σ = standard deviation, d = margin of error.

The standard deviation was taken at 5.885 (19).

$n = (1.96^2 \times 5.885^2) \div 1.2^2$

n = 93

2.3 Sampling Method

The data was collected using a probability simple random sampling method throughout the entire length of time that the data was being collected. The students were given a number between 1 and 98, and then, with the use of the RANDBETWEEN function in Excel, an estimated sample size was generated, which resulted in 89 study samples being selected from the population. There was no repetition. Every single one of the individuals who responded had an equal chance of getting selected. During the time that the data was being collected, they were given the opportunity to respond to a series of questionnaires. The data was collected using a probability simple random sampling method throughout the entire length of time that the data was being collected. The students were given a number between 1 and 98, and then, with the use of the RANDBETWEEN function in Excel, an estimated sample size was generated, which resulted in 89 study samples being selected from the population. There was no repetition. Every single one of the individuals who responded had an equal chance of getting selected. During the time that the data was being collected, they were given the opportunity to respond to a series of questionnaires.

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2.4 Data Collection

Data was gathered from 87 second-year medical students who had finished all of year 1 and some of year 2 exams during the academic year 2017–2018. The extracurricular activities that students engaged in during this time included sports, volunteerism, entrepreneurship, culture, leadership, public speaking, and creation. They were invited to complete the questionnaire, which consists of a total of 29 Likert scale questions, throughout the data collection period. A formal consent form that was attached to the online survey was given to those who indicated their willingness to participate. Participants in the study were considered to be students who responded to the survey. The survey was distributed through email. The survey came in English and contained three sections: an introduction to the study, a section where participants indicated their approval, a piece where participants provided information, and a section where participants had to fill out the questionnaire consisting of:

i. Section 1: A five-point Likert-type scale namely using the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) was employed to determine the respondents' learning style.
ii. Section 2: The College Learning Effectiveness Inventory (CLEI) and Involvement with College Activity (ICA) Scale were used to determine the respondent's co-curricular activity on a five-point Likert-type scale.

The keys of the questionnaires were based on the respondents choosing the most relatable answers. The questionnaires are based on a 5-point Likert scale.
(1) This item is never or only rarely true of me;
(2) This item is sometimes true of me;
(3) This item is true of me about half the time;
(4) This item is frequently true of me;
(5) This item is always or almost always true of me.
The lowest possible score on each scale is 1.0, and the highest possible score is 5.0. It's important to note that a mean score of 3.5 or higher shows a more positive response pattern and is viewed as a personal strength on any scale.

The first semester doctor of medicine year 2 session 2017/2018 assessment marks was provided by the FMHS, UPM academic department which consist of 7 packages. Package 1 assessed the human body, structure and function. Package 2 evaluates the medical biochemistry, molecular biology and general pharmacology. Package 3 includes the

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introduction to disease module assessment. Package 4 assessed the haematology and immunology section. Package 5 concentrates on the cardio-respiratory system. Package 6 evaluates the excretory and digestive system while package 7 asseses the reproductive and endocrine system. The evaluation and assessment of Package 7 examinations were conducted during the research period, leading to its selection. To determine the overall scores for Package 7, the endocrine and reproductive module total scores were combined. Total scores of less than 50 were considered weak, 50 to 69 were considered average, and scores of more than 70 were considered excellent.

Using the R-SPQ-2F and a set of 20 questions, deep and surface learning strategies were compared. For the superficial learning technique and the deep learning approach, ten questions each were posed. The lowest possible score for each learning approach style is 10, and the highest possible score is 50. For instance, pupils will be deemed to be employing the deep learning technique if their overall score on the deep learning strategy questions is greater than 25. These marking also apply to the superficial learning technique questions.

To gauge students' active involvement in co-curricular activities, an additional 9 questions from the College Learning Effectiveness Inventory (CLEI) and Involvement with College Activity (ICA) Scale were included (21). The CLEI and ICA scale has a minimum and maximum score range of 9 and 45, respectively. For example, students who receive a total score of more than 22.5 will be deemed active, while those who receive a score of less than 22.5 will be deemed inactive. All categorical data listed above were described in terms of frequency and percentage.

2.5 Validity of Questionnaire

The R-SPQ-2F questionnaire demonstrated strong internal consistency for both the deep approach and surface approach scales, with Cronbach's alpha values recorded at 0.80 and 0.76, respectively. Additionally, the content validity score of 0.8 indicates a substantially good level of validity (Mogre and Alba, 2014). The CLEI and ICA questionnaires exhibited Cronbach's alpha coefficients exceeding 0.70, thereby indicating both discriminant and known-group reliability. (Bates & Clark, 2019).

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2.6 Data Analysis

The data were analysed utilising SPSS version 27. Descriptive statistics, including frequencies and percentages, were employed to analyse respondents' academic achievements, learning style, and involvement in co-curricular activities. The data were assessed for normal distribution before conducting statistical analysis. Multiple statistical tests were employed to assess the normality of the data. The analysis of a bell-shaped curve indicates the normality of the data distribution (Maltenfort,2015).

The Fisher's exact test and Chi-Square test were selected for statistical analysis to examine the associations between independent and dependent variables. The selection of these two statistical tests is due to the categorical nature of both the independent and dependent variables utilised in this study. The Chi-Square test is selected when no more than 20% of the expected counts are below 5, whereas the Fisher's exact test is utilised when more than 20% of the expected counts are below 5.

2.8 Ethical Consideration

The research obtained approval from the research ethics committee at the University of Putra Malaysia. The ethical approval code was JKEUPM 20218-155. The students were informed in person, through the document, that their participation was optional and that they had the right to decline. Prior to the respondents engaging with the questionnaire, they were required to sign a consent form.

3.0 RESULTS AND DISCUSSION

Table 1 illustrates the distribution of students' involvement in extracurricular activities, various learning strategies, and their academic performance. Among the 87 respondents, 82.8% engaged in the co-curricular activity. A significant 74.7% of respondents expressed a preference for deep learning as their method for enhancing learning. A significant number of second-year medical responders demonstrated strong academic performance, successfully passing their examinations. A total of 78.2% of second-year medical students achieved an average score. Approximately 11.5% achieved an excellent score on their examination, while the remaining 10.3% did not pass.

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Table 1. Distribution of involvement of students in co-curricular activity, types of learning approach and academic performance

Involvement in Co-curricular Activities	**Frequency, n**	**Percentage, %**
More active	72	82.8
Less active	15	17.2
Types of Learning Approach		
Deep learning approach	65	74.7
Superficial learning approach	22	25.3
Academic Performance		
Weak (<50)	9	10.3
Average (50-69)	68	78.2
Excellent (70-100)	10	11.5
Total	**87**	**100**

It is noteworthy to observe that learning style and academic performance had a statistically significant association as revealed in Table 2 below. In this case, Fisher's exact test was used because 9 cells (50%) have an expected count of less than 5. It had a significant value of 0.042, which was less than 0.05. The outcomes of the pupils' academic performance were immediately impacted by their various learning preferences. This suggests that when compared to students who engage in superficial learning, those who were more likely to employ the deep learning technique will perform better academically. However, results from Table 2, also indicated that there was no statistically significant association between participation in extracurricular activities and academic performance.

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Table 2: Association between types of learning style, co-curricular activity and academic Performance

Variable		Academic Performance			P value
Types of learning style		Weak	Average	Excellent	
	Superficial	7	14	1	0.042[a*]
	Deep	2	54	9	
Co-curricular Activity					
	More active	3	66	3	0.584[a]
	Less active	6	2	7	

[a] - Fisher's Exact Test, *significant at $p<0.05$

Passing rate ≥ 50

Our findings indicated a statistically significant association between poor academic achievement and superficial learning style. According to a study by Cetin, students at Georgia Southern University showed a substantial inverse association between a superficial approach and exam results. This would imply that learners who were superficial in their thinking would see a decline in their academic achievement. These results demonstrated that students with a superficial learning style do not comprehend the fundamental ideas underlying the knowledge they have studied, which results in an incredibly ineffective study method and poor grades (Cetin, 2016). Additionally, Hermann et al.'s multilevel study showed a persistent inverse relationship between academic success and a superficial approach to learning. While organised effort and academic success were found to have a substantial positive relationship, a superficial approach was found to have a large negative association (Hermann et al., 2017). A survey of 82 engineering students at Universiti Teknologi Mara (UiTM) Pulau Pinang indicated that respondents, irrespective of gender, favoured a deep approach to learning, as engineering students recognised the importance of deep learning in cultivating the professional traits essential for their field (Hussin et al., 2017).

In addition, the results of the current study indicated a statistically significant association between good academic performance and deep learning style. According to Redza et al.'s research, there is a positive relationship between different learning styles and academic achievement, and the results imply that students who have a strong propensity for

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employing deep learning methods would perform better on exams (Redza et al., 2013). Students who learnt in a deep way performed better academically because they understood their subject matter better rather than simply memorising it; deep learning focuses on the fundamental idea and has an effective review method (Hermann et al., 2017). In order to manage their hectic schedules, it's conceivable that students who were actively involved in extracurricular activities tended to employ the deep approach in their learning style (Rodrigues and Gomes, 2020).

Table 3 shows that there was no statistically significant relationship between learning style and engagement in extracurricular activities. The critical value for the Chi-Square test was employed to illustrate the correlation between learning style and student participation in co-curricular activities, as the expected count of less than 5 constituted less than 20%, which is 0.0%. The results indicated no statistically significant link between these two variables, with the p-value = 0.864.

Table 3. Association between co-curricular activity and learning style

Co-curricular Activity	**Learning Style**		**P value**
	Deep	Superficial	
More active	55	17	0.864[b]
Less active	10	5	

[b] – Chi Square Test, significant at p<0.05

The results of the current study indicated a statistically insignificant association between participation in curricular activities and preference for learning style. However, a contrasting finding had been reported among final-year full-time students in different setting (Chan, 2016). The observation would suggest that students who participated in co-curricular activities had a strong propensity to develop deep learning styles. Students employing a deep learning strategy effectively conserved time by concentrating on the fundamental principles of a lecture (Wijnen et al., 2017).Time management is essential since students who used the deep approach method of study were still able to attend and participate in extracurricular activities (Shaikh et al., 2021). Additionally, students who utilise the superficial approach learning technique waste valuable time by spending more time on self-study and review (Gozalo- Dalgado et al., 2020). This rationale indicates that students who learn best by employing the superficial technique will generally shy away from participating in

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extracurricular activities (Sterling and Kerr, 2015). However, a study involving 380 students from the Zahedan University of Medical Sciences revealed that 80% of them employed a superficial, memory-based, and outcome-focused strategy (Darling et al., 2005). However, the current results of this study did not discover any correlation between these two variables. These might result from a variety of environmental, socio-demographic, and behavioural factors that may have an impact on these outcomes. Additional investigation into these aspects may provide a solution to this problem.

The results of the current study showed that participation in co-curricular activities does not significantly improve pupils' academic performance. The majority of the medical students in the survey were found to be quite involved in extracurricular activities while yet managing to do academically to earn at least an average grade. However, Chung et al. reported that among students studying medicine and health sciences at Cyberjaya University College of Medical Sciences, there is a substantial correlation between health-enhancing physical activity (HEPA) level and academic accomplishment (Chung et al., 2018). Academically, HEPA-active students outperformed non-HEPA-active students. Contrarily, only HEPA is the focus of Chung et al.'s research; extracurricular activities are not. According to a study by Rathore et al., co-curricular activities and exam performance have a positive link. Rathore et al., on the other hand, concentrated on increasing the class attendance of students taking part in extracurricular activities because this indirectly improves academic achievement. Furthermore, Darling et al.'s study revealed that non-athletic students perform worse academically, have lower academic aspirations, and have unfavourable opinions of education (Darling et al., 2005). Our research found no significant association between participation in co-curricular activity and academic performance. This might be caused by additional elements, such as time management, and the social, mental, and character traits of the students, which could be investigated more in the future, and an explanation could be provided.

4.0 CONCLUSION

Different learning styles have an impact on academic achievement outcomes and engagement in extracurricular activities. In order to participate in more co-curricular activities, students who use a deep learning approach to learning seem to have a better academic performance. Additionally, the type of learning style that a student employs on a regular basis can be used to determine whether or not they are academically successful. According to this study, academic performance was poor among students who commonly

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used a superficial learning strategy. In contrast, the academic performance of the students who used deep learning approaches was better. It is therefore conceivable to teach underperforming students how to use deep learning to improve their academic performance and give them the ability to balance their academics and extracurricular activities. Future studies however, should consider retaining additional subcategories for learning styles and co-curricular activities to enable a more nuanced analysis. Detailed subgrouping facilitates a more informative examination of the alignment between specific learning styles and particular co-curricular activities.

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