

Assessment of learning styles of undergraduate medical students and its effect on examination outcomes - a cross-sectional study done in Azad Kashmir, Pakistan

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Abstract

Objective: To assess the learning style preferences of undergraduate medical students and the effect of the preferred learning style on examination outcomes.

Methods: The cross-sectional study was conducted from April to September 2018, at Poonch Medical College, Rawlakot, and Azad Jammu and Kashmir Medical College, Muzaffarabad, Pakistan, and comprised students from 2nd to 5th year. Data was collected using 16-item visual, aural, read/write and kinaesthetic questionnaire version 7.0. Data was analysed using SPSS 23.

Results: Of the 406 students, 203(50%) belonged to each of the two colleges. None of the students preferred unimodal or bimodal learning styles, while 191(94.1%) at Poonch Medical College and 189(93.1%) at Azad Jammu and Kashmir Medical College preferred quad-modal and the remaining preferred trimodal style. Among the combination of learning styles, aural in different combination was preferred by 201(99.01%) of Poonch Medical College students and 202(99.51%) at the other institution. There was no statistically significant relationship between the preferred learning style and examination outcomes ($p > 0.05$).

Conclusion: Most of the participants preferred multiple sensory modalities for learning.

Keywords: Learning style, VARK, Medical students, Pakistan, Azad Kashmir. (JPMA 70: 482; 2019).

<https://doi.org/10.5455/JPMA.18306>

Introduction

Learning results in attainment of knowledge, skills, and attitude.¹ Learning style has been defined as the characteristic cognitive, affective, social and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment.² Different people prefer different styles of learning depending on their cognitive processing.³ It has been known that if the method of information delivery to the learners matches their preferred learning style, they learn better.⁴ Grossly mismatched teaching and learning styles can make the students inattentive. In extreme situations, change of course and school dropouts have also been reported.^{5,6}

Being adults, it is expected from medical students that they have already developed a preferred learning style. This means educators need to assess the students'

preferred learning styles and modify the course material accordingly.⁷ Various methods have been developed to measure learning styles, including the validated Visual, Aural, Read/write and Kinesthetic (VARK) questionnaire.⁸ Visual (V) learners prefer using images, pictures, illustrations, colours and maps to process information. Aural (A) learners depend on information that is heard or spoken as a way of learning. Thus, they like to listen to lectures, attend tutorials, get involved in discussions and use tape-recorders. Read/Write (R) learners prefer the use of the printed word to convey and receive information. They like to read textbooks, handouts and notes. Kinaesthetic (K) learners prefer getting information through experiences and convention.⁹

A large proportion of medical students prefer multimodal learning style, but in most medical colleges, unimodal teaching style by delivering lectures is still the predominant mode.¹⁰ The educators need to know the learning styles of medical students for effective planning and delivery of teaching-learning activity.¹¹

The current study was planned to investigate the

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relationship between exam outcomes and the learning style preferences of medical students.

Subjects and Methods

The cross-sectional study was conducted from April to September 2018, at Poonch Medical College, Rawlakot, and Azad Jammu and Kashmir Medical College, Muzaffarabad, Pakistan. The sample size was calculated using the formula $n = z^2 p(1-p)/d^2$ while assuming a prevalence rate of 50%, and z value of 1.96. The questionnaire was distributed to all the medical students from 2nd to 5th year. First-year students were excluded as they were yet to take their annual exam. For the included students, the annual result was obtained by calculating the average scores in all the subjects. VARK questionnaire version 7.0 was used for data collection. It was electronically distributed to the students with an informed written consent form and a detailed description of the study purpose. Ethical approval was secured from the Ethical Review Committee of Poonch Medical College. Data was analysed using SPSS 23. All the study variables were categorical and were, therefore, presented as frequencies and percentages. Association between learning style and students' exam outcome was worked out with the Chi-square test. The analysis was performed at 95% confidence interval (CI), and $p < 0.05$ was considered significant.

Results

Of the 610 students approached, 406(66.56%) responded. Of them, 203(50%) belonged to each of the two colleges.

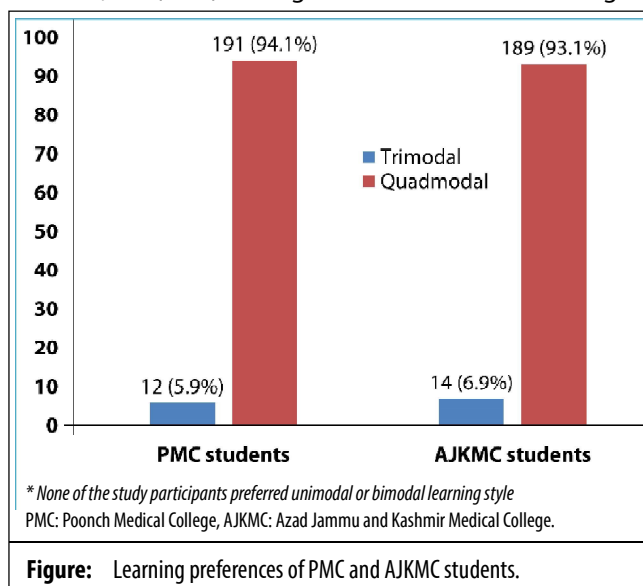


Figure: Learning preferences of PMC and AJKMC students.

Table-1: Baseline characteristics.

| Characteristics | PMC students n (%) | AJKMC students n (%) |
|------------------------------------|--------------------|----------------------|
| Age in years | | |
| 18-20 | 29 (14.3) | 69 (34.0) |
| > 20 - 25 | 95 (46.8) | 65 (32.0) |
| > 25 | 78 (38.4) | 69 (34.0) |
| Gender | | |
| Male | 59 (29.1) | 71 (35.0) |
| Female | 144 (70.9) | 132 (65.0) |
| MBBS year | | |
| 2nd year | 37 (18.8) | 100 (49.3) |
| 3rd year | 52 (25.6) | 15 (7.4) |
| 4th year | 43 (21.2) | 33 (16.3) |
| 5th year | 71 (35.0) | 55 (27.1) |
| Performance in annual exams | | |
| 50 - 60% | 14 (6.9) | 12 (5.9) |
| 60 - 70% | 138 (68.0) | 122 (60.1) |
| 70 - 80% | 49 (24.1) | 62 (30.5) |
| > 80 - 90% | 2 (1.0) | 7 (3.4) |

PMC: Poonch Medical College, AJKMC: Azad Jammu and Kashmir Medical College
 MBBS: Bachelor of Medicine, Bachelor of Surgery.

Table-2: Different combinations of learning styles preferred by all respondents.

| Learning mode | PMC students n (%) | AJKMC students n (%) |
|------------------------------------|--------------------|----------------------|
| Visual in combination | 199 (98.03) | 196 (96.55) |
| Aural in combination | 201 (99.01) | 202 (99.51) |
| Read/ write in combination | 198 (97.54) | 199 (98.03) |
| Kinesthetic in combination | 202 (99.51) | 201 (99.01) |
| Visual + aural + read/ write | 192 (94.58) | 191 (94.09) |
| Visual + read/ write + kinesthetic | 193 (95.07) | 190 (93.60) |
| Visual + aural + kinesthetic | 196 (96.55) | 193 (95.07) |
| Aural + read/ write + kinesthetic | 195 (96.06) | 196 (96.55) |

PMC: Poonch Medical College, AJKMC: Azad Jammu and Kashmir Medical College.

Overall, 276(67.95%) students were female, and 260(64.05%) had scored 60-70% mark in their annual exams (Table 1). None of the subjects preferred unimodal or bimodal learning styles. At PMC, 191(94.1) students and 189(93.1%) at AJKMC preferred quad-modal style (Figure). Different combinations of learning styles were preferred by PMC and AJKMC students (Table 2). There was no statistically significant relationship between the preferred learning style and examination outcomes ($p > 0.05$) (Table 3).

Discussion

The current study found quad-modal as the most preferred style followed by trimodal. It is in contrast with a study comprising Malaysian medical students the majority of whom preferred bimodal style.¹² A survey of Iranian dental students revealed unimodal learning preference of 48.5%.¹³ Similarly, a study was done on the first year

Table-3: Relationship between exam outcomes and preferred learning style.

| Medical college | Learning style | Exam outcomes | n (%) | p-value | | |
|-----------------|----------------|---------------|------------|---------|------------|-------|
| PMC | Trimodal | 50-60% | 3 (25.0) | 0.124 | | |
| | | 60.1%-70% | 8 (66.7) | | | |
| | | 70.1%-80% | 1 (8.3) | | | |
| | Quad-modal | 50-60% | 11 (5.8) | | | |
| | | 60.1%-70% | 130 (68.1) | | | |
| | | 70.1%-80% | 48 (25.1) | | | |
| | AJKMC | Trimodal | 80.1%-90% | | 2 (1.0) | 0.386 |
| | | | 50-60% | | 10 (71.4) | |
| | | | 70.1%-80% | | 4 (28.6) | |
| Quad-modal | | 50-60% | 12 (6.3) | | | |
| | | 60.1%-70% | 112 (59.3) | | | |
| | | 70.1%-80% | 58 (30.7) | | | |
| PMC + AJKMC | Trimodal | 80.1%-90% | 7 (3.7) | 0.394 | | |
| | | 50-60% | 3 (11.5) | | | |
| | | 60.1%-70% | 18 (69.2) | | | |
| | Quad-modal | 70.1%-80% | 5 (19.2) | | | |
| | | 50-60% | 23 (6.1) | | | |
| | | 60.1%-70% | 242 (63.7) | | | |
| | | | 70.1%-80% | | 106 (27.9) | |
| | | | 80.1%-90% | | 9 (2.4) | |
| | | | | | | |

PMC: Poonch Medical College, AJKMC: Azad Jammu and Kashmir Medical College.

Pakistani medical students showed that 39% respondents preferred unimodal learning style and, among them, the most preferred mode was K, followed by V, A and R.¹⁴ These findings are contrary to our findings as we did not identify any student with unimodal learning preference.

A study in 6 medical colleges in Pakistan¹⁵ suggested most of the students preferred multimodal learning style as opposed to unimodal learning style which somewhat matches the findings of the current study. The same study also revealed no statistically significant relationship between academic achievement and learning style which completely matches with our findings.¹⁵ Another study of 600 Saudi Arabian medical students further cements the idea of no statistically significant relationship between learning style preference and academic results.¹⁶

There is a multitude of confounders which might influence the exam outcomes, like motivation, perseverance, mental or physical health etc. Furthermore, different learning styles may be suitable for various subjects in medical science. In order to clearly understand the temporal relationship between learning style and its impact on exam outcomes, large-scale, multi-centre randomised control trials are needed.

The current study observed for all the possible four

trimodal combinations e.g. VAR, VRK, VAK, and ARK, and the preference rate was somewhat similar at around 95%. We could not see the six possible bimodal combinations as none of the study participants preferred bimodal learning method. An Indian study revealed different learning preferences for different modal combinations. The most preferred trimodal combination, according to that study, was VAR which was preferred by 21% of students.¹⁷

The current study has its limitations. Only two medical colleges were included which may not be a representative sample of medical colleges across Pakistan. Being a cross-sectional study, the proper cause-and-effect relationship could not be established.

Conclusion

All students preferred multimodal learning style. Considering the complexity of medical literature, multimodal learning style may be suitable for students. However, the exam outcome was not found to be significantly associated with the learning style.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

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