

# Analysis of Current Medical Student Population Data for Improvement and Development of Novel Educational Modalities

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VCOM Research Day, 2023

References and E-copy of Poster



## Abstract

We are analyzing medical student population data for the improvement and development of novel educational modalities. Previous studies have demonstrated importance in understanding the backgrounds of students due to clear differences demonstrated by students with science-based backgrounds compared to those with art-based backgrounds (Akbulut, D., 2010). In respect to these backgrounds, among undergraduate medical students, kinesthetic learning was the preferred learning style with significant relationships between personality traits and learning types (Abouzeid et al., 2021). Additional research demonstrated 51% of students preferred a bimodal approach to studying (Bokhari, et al., 2019) with further research showing an improvement in student motivation with the implementation of this approach (Prithishkumar, et al., 2014). Modern students also tend to place value in more transparent and supportive environments (Sadowski, et al., 2017). Novel technologies, such as virtual reality, for educational purposes, requires the consideration of the learner's personality traits (Kim, et al., 2021). This demonstrates the necessity to understand current medical students' backgrounds with the goal of developing targeted novel educational modalities. This review's purpose is to analyze meaningful literature to identify potential areas of growth in learning avenues of medical students through novel educational modalities.

## Methods

Current available literature regarding medical students' study habits, backgrounds, and preferences were reviewed. Inclusion criteria for articles were English language, peer-reviewed, and published between 2010 and January 2023. Literature utilized in this review were selected using the following databases:

- PubMed
- Research Gate
- Google Scholar

Keywords used were "medical student", "learning style", and "medical education."

## Outcomes

- In this investigation of learning styles of students, medical students completed a questionnaire designed by Honey and Mumford to categorize their learning style in comparison to activists, reflectors, theorists and pragmatists. Most medical students matched reflector (46.8%) and pragmatist (27.3%) learning styles. Reflectors are defined as those that "learn best when learning activity provides the opportunity to think and reflect like reading, clinical decision making, clinical rotations, audio/video films." Pragmatists are defined as those that "learn when issues of learning are practical, and objective oriented like practicals, workshops, demonstrations and field trips" (Bhalli, et al., 2015).
- In this same study, it was found that medical students preferred interactive lectures (28.7%) and problem-based learning (25.98%). Only 1 student, out of 77 surveyed, preferred one-way lectures. No significant link was uncovered between learning style and preferred teaching method. Additionally, no link between preferred teaching method and academic success was found.
- The majority of medical students identified kinesthetic learning as their preferred learning style based on the VARK model of learning styles, and those with kinesthetic learning as their primary style demonstrated higher academic success (Abouzeid et al., 2021).
- Medical students were found to shift from unimodal learning to multimodal learning as they progressed through medical school, which has been postulated to attribute to multimodal learning being preferred in a clinical setting as education shifts from didactic to discussion based (Bokhari, et al., 2019). The educational background of students, whether science or art, influenced output of content. Science educated students were more likely to create designs that were three dimensional and representative, while art educated students were more likely to design abstractly (Akbulut, D., 2010).
- Nursing students that used virtual reality in their education were shown to have greater learning satisfaction, though satisfaction was higher in males than females. Students with personality traits of openness, extraversion, and conscientiousness were found to respond positively to use of virtual reality education (Kim, et al., 2021).

## Discussion

Review of current literature demonstrates a common theme of learning styles correlating with academic success. Using the VARK model (Fig 1.), medical students preferred kinesthetic-style learning and showed preference for interactive lectures and problem-based learning. This preference highlights the importance of the ongoing shift in research and resources aiming to improve medical education. Using the Honey and Mumford model (Fig 2.), it is seen that reflector and pragmatist learning styles are most common, suggesting potential efforts should aim to increase teaching modalities that appeal to these styles.

Articles discussing medical students utilizing bimodal or multimodal methods of learning suggests that providing resources to allow flexibility for students to utilize the learning methods that best fit them may prove to be more beneficial with regards to academic success. These opportunities being provided to medical students present a potential financial barrier in the form of larger budgets required to support a more robust education. The inherent differences in satisfaction with educators using virtual reality between male and female students and the various assessed personality types further implies the importance of evaluating the background of students. Understanding one's personal experiences and personality traits allows educators to promote individualized learning modalities. The research that reveals students prefer transparent and supportive academic environments continues to highlight the potential for improvement measured by academic success in medical education.

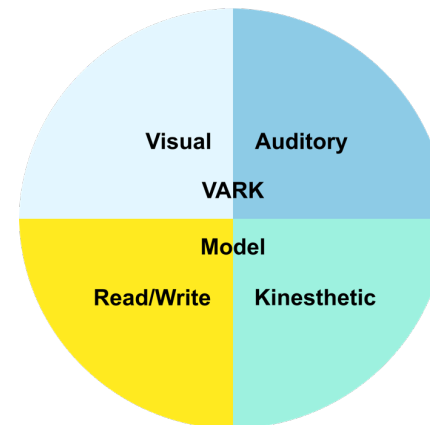


FIGURE 1. Illustrates the four basic modalities that form the VARK Model. Data from: Fleming, N., & Mills, C. (1992). Not Another Inventory, Rather a Catalyst for Reflection. *To Improve The Academy*. <https://doi.org/10.1002/2534-8922.1992.1531213>.

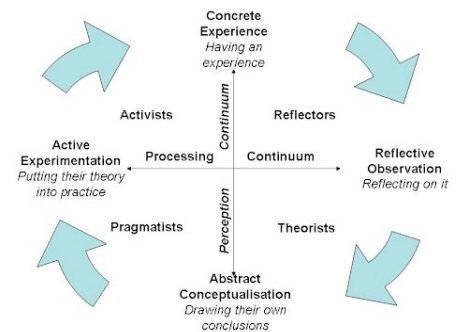


FIGURE 2. Peter Honey and Alan Mumford Learning Styles. (2021, June 1). Extension Practice. <https://extensionpractice.com.au/extension-practice/peter-honey-and-alan-mumford-learning-styles/>

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## Conclusions

Further exploration into the background of students and their preferred study methods will help medical schools identify and adopt teaching methods that optimize learning for the goal of academic success. Additionally, by understanding the background of medical students, we can further analyze their personality traits, which is required for proper use of novel educational modalities. Overall, by furthering our understanding of the history of our medical students, we can produce more competent physicians by using data to develop personalized educational tracks that allow students to pick their delivery method to maximize their education. In the future, we plan to conduct an additional study to assess the background of current medical students via questionnaire, including their prior clinical experiences, personality traits, shadowing experiences, history of video game usage, and preferred third-party resources, such as Anki, Quizlet, practice questions, textbooks, etc.