A Novel Approach to Preparing Students for the Medical College Admission Test: Passage-Centered Learning (PCL)

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Abstract

With the United States facing a severe deficit of physicians, it is imperative that as many students as possible be placed into the "physician pipeline". Current teaching methods are not entirely adequate for preparing college students for the rigors of the Medical College Admissions Test (MCAT), the gateway to medical school. To resolve this issue, we propose a new teaching method called Passage-centered Learning (PCL). This method enhances the ability of students to perform well on the passage-heavy MCAT by promoting critical thinking and application of concepts through the extensive use of passages during the learning process. This method could also be used to prepare students for several other entrance examinations required by various professional schools.

Keywords: MCAT preparation; pre-medical students; pipeline; medical school admissions; teaching methodology; active learning

Introduction

By the year 2030, it is estimated that there will be a shortfall of as many as 104,900 physicians in the United States(Dall et al., 2017). Therefore, the need to fill the pipeline of future physicians is greater than ever. To this end, adequately preparing students for the medical college admissions test (MCAT), a key part of a medical school application, is imperative. The MCAT was first offered in 1928 under the name "Scholastic Aptitude Test for Medical Students". Over the years, the test has evolved in both name, receiving its current designation in 1948, and content, emphasizing different types of knowledge and skills to reflect what was and is thought to be essential for aspiring medical students. The latest embodiment of the test came about in 2015 uniquely incorporating a behavioral and social sciences section(McGaghie, 2002; Pigg and Kroopnick, 2015). Satisfactory performance on the MCAT provides assurance that medical school applicants have a solid foundation that will allow them to be
effective learners in the dynamic field of medicine. This also applies to students interested in attending Physician Assistant (PA) schools since completion of the MCAT is also required by PA schools for admission. In addition, satisfactory performance on the MCAT should ensure minimal attrition among classes of medical students. The overall average MCAT score for the 2017-2018 application cycle was 504.7 (67\textsuperscript{th}-70\textsuperscript{th} percentile). However, the average score of medical school matriculants for the same cycle-year was 510.4 (84\textsuperscript{th}-86\textsuperscript{th} percentile), indicating the necessity for high performance on this test(K). Current approaches used in pre-medical programs across the country for preparing pre-medical students for the MCAT are largely ineffective. Therefore, a substantive change to curricula that will enable students to significantly increase performance on the MCAT is crucial. Here, we propose a novel teaching method called Passage-Centered Learning (PCL) that should help more students to attain more competitive MCAT scores.

**Passage-centered learning**

Passage-centered learning (PCL) is an innovative, instructional strategy that requires students to become familiar with course content on their own followed by application of the acquired knowledge to solving questions derived from passages within the classroom setting. This method incorporates aspects of other active learning strategies such as flipped classroom in which the onus for becoming familiar with relevant classroom content is shifted to the student followed by application during classroom sessions. The application aspect is where the primary difference lies. It is the use of passages resembling those that are seen on 90\% of MCAT questions that confers novelty to PCL. The passages are based on sources such as primary literature, case studies as well as textbook content.

PCL was developed for pre-medical education, but can also be used in any classroom that is focused on helping students to perform well on standardized tests that utilize passages. The process allows learners to develop test-taking and critical analysis skills, as well as, reading comprehension. It also enhances students’ ability to recall relevant material (i.e. what they learned on their own) and apply theory.

As previously mentioned, 90\% of the MCAT questions are based on passages. The four sections of the MCAT include: chemical and physical foundations of biological systems (CPBS), critical analysis and reasoning skills (CARS), biological and biochemical foundations of living systems (BBFL) and psychological, social and biological foundations of behavior (PSBB). To be successful on the CPBS section, students must take two semesters of general chemistry, two semesters of organic chemistry and two semesters of physics. The focus of the BBFL section dictates that students take approximately two semesters of basic biology, at least one semester of anatomy and physiology and one semester of biochemistry. Implementation of PCL in the teaching of these courses would enable students to attain greater success on these two MCAT sections. Moreover, since the MCAT is taken by students of widely diverse educational backgrounds, which includes both hard sciences and liberal arts majors, use of PCL can serve to level the playing field for all students.

As the physicians of the future are increasingly being expected to serve diverse populations with a wide spectrum of behaviors, the PSBB section was added to the MCAT. As such, this section tests understanding of a variety of psychology and sociology concepts that are typically taught in first semester courses. The skills required to perform well on this section include abilities to demonstrate scientific reasoning and understand statistics. Application of PCL in the relevant classroom settings will enhance students’ ability to more fully and rapidly comprehend the passage-based questions, which comprise approximately 90\% of the PSBB questions.

The CARS section tests analysis and reasoning skills further emphasizing the expectation that medical students have the ability to efficiently understand and process the vast amounts of information to which they will be exposed. This entire section is comprised of thought-provoking passages with often-sophisticated vocabulary covering topics such as philosophy, ethics and various humanities. As with the other sections of the MCAT, frequent and regular
exposure to passages similar to those used in the CARS will help students to refine the skills necessary to perform well on this section, which can be accomplished through PCL. Additionally, PCL can serve to greatly help students whose primary language is not English by boosting their reading comprehension.

The traditional approach to teaching requisite material for the MCAT is not optimal leading to the great difficulty that many students experience as they try to learn the material well enough to perform in a superior fashion on the test. The reason for this is that students traditionally are required to memorize vast amounts of material overriding the development of the much more useful skill of being able to understand and apply the material conceptually. In PCL, students must still have relevant prior knowledge before coming to the classroom. However, the enormous amount of memorization is unnecessary because the passages used during the classroom session contain much of the relevant information in the context of real-world scenarios. In other words, students’ prior knowledge of basic concepts is utilized to solve problems based on current research topics from scientific literature.

How each individual institution chooses to lay out a curriculum that incorporates the various elements of the American Association of Medical Colleges (AAMC) content outline and objectives is, of course, entirely at their discretion. However, once the appropriate curricular structure is in place, we believe that use of the PCL methodology will support MCAT preparation and, subsequently, enhance test scores of pre-medical students.

Incorporation of this method into institutional curricula would be especially helpful to underserved and financially challenged students. With comprehensive MCAT preparatory courses costing as much as five thousand dollars, becoming a competitive medical school applicant if often prohibitive for this group of students. Use of PCL in undergraduate pre-medical programs circumvents the need for taking these costly courses and places all students, regardless of income, on the same playing field. Moreover, schools in rural areas would be able to readily apply this style of teaching thus reaching students from these areas. Given the fact that students from rural regions who matriculate into medical school are more likely to practice medicine in rural areas, use of PCL in these schools would, in turn, promote greater access to medicine in these areas.

Importantly, use of PCL is not limited to only MCAT preparation. For example, the American College Test (ACT) and the Scholastic Assessment Test (SAT), which are geared toward assessing readiness of high school students for college, both heavily use passage-based questions. Implementation of PCL in high schools would reach even more students who could then qualify for entry into competitive colleges placing them on the path to medical school or other professional schools. Interestingly, a new trend for medical schools is the recruitment of students directly out of high school into combined BA/MD or BA/DO programs. The primary admissions criterion for these programs is the SAT or ACT so, clearly, use of PCL in high school curricula could be hugely beneficial.

Since passage-based questions are also found on standardized tests for other professional schools and graduate schools, use of PCL could be integrated into a number of other pre-professional programs. For example, the Pharmacy College Admission Test (PCAT), Dental Admission Test (DAT), and Law School Admission Test (LSAT) all have substantial passage-based question components. Additionally, most graduate schools in the United States require the Graduate Record Examination (GRE), another test that has a large proportion of passage-based questions, for admission. International students who want to attend US graduate schools must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), both of which have a significant portion of passage-based questions, so PCL could even be used in schools outside the US to great effect.

**Conclusions**

Currently, many undergraduate institutions around the US are integrating MCAT preparatory courses into their pre-
professional health programs. We believe that these programs will be able to elevate the performances of their students if they implement PCL into their curricula. It can be said that use of the teaching methodology we are proposing represents "teaching to the test," which many believe is counter-productive with respect to actual learning by students. We freely concede that this is true, but only in part. Indeed, we enthusiastically accept our role as proponents of teaching to the test because the admissions system adopted by most institutions of higher learning includes use of standardized exams that are replete with passage-based questions. Nevertheless, we do not believe that learning is sacrificed when PCL is used because it enhances reading comprehension, critical thinking proficiency and ability to synthesize facts. Importantly, it also promotes increased test-taking aptitude, which is a genuine skill that can be honed with ample practice. Furthermore, this skill will be required even after completing professional school to be successful on licensing examinations. Although it represents a major paradigm shift in the realm of teaching pedagogies, PCL also represents a means to make medical education, as well as other pre-professional educations, more accessible and is, therefore, a worthwhile pursuit.

Take Home Messages

1. PCL is an innovative instructional strategy that enhances the pre-medical students self-directed learning by applying knowledge they learned through the content review into solving questions or problems derived from the passages.
2. PCL help pre-medical students perform well on their MCAT exam and improves their test-taking abilities.
3. PCL is appropriate for the post-baccalaureate or pre-medical preparatory course curricula to prepare students for the entrance examinations.
4. PCL will also be applicable to other competitive examinations such as ACT, SAT, PCAT, DAT, LSAT, GRE, TOEFL and IELTS.
5. PCL technique help pre-medical advisors and faculty to guide pre-medical students who are preparing for MCAT.

Notes On Contributors

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None

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Appendices

None

Declarations

The author has declared that there are no conflicts of interest.

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Ethics Statement

It is not a Research Article and New Innovation Manuscripts. No humans or animals involved in this study. It is a personal view or opinion piece.

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