



Developing Medical Students as Teaching Assistants: An Anatomy-Based Student-As-Teacher Program with Emphasis on Core Teaching Competencies, its Effectiveness and Improvement

Shilpa Karkera^{1*}, Nagadharshan Devendra², Shashikant Adlekha³ and Bhavesh Lakhani⁴

¹Associate professor, Chair, Internal Assessment Review Committee, Department of Neuroscience and Anatomy, St Vincent and Grenadines

²Associate Dean Basic Sciences and Associate professor, Department of Biochemistry, Trinity Medical Sciences University, Saint Vincent and Grenadines

³Associate Professor, Department of Pathology, Trinity Medical Sciences University, Saint Vincent and Grenadines

⁴MD 4th Term student, Trinity School of Medicine, Trinity Medical Sciences University, St Vincent and Grenadines

*Corresponding Author: Shilpa Karkera, Associate professor, Chair, Internal Assessment Review Committee, Department of Neuroscience and Anatomy, St Vincent and Grenadines.

Received: April 15, 2024

Published: May 16, 2024

© All rights are reserved by Shilpa Karkera, et al.

Abstract

Introduction: Procuring medical students as peer tutors (PT) in an Anatomy Med course is regarded as beneficial to both students and peer tutors. A PT program has been implemented at TMSU and was shown to enhance the development of core competencies of medical students. This study observes the effectiveness of PTs and categorizes specific ways in which to improve their teaching.

Methods: A survey was sent to 120 Pre Med Transition term (PM) students taking BIOS 205: Introduction to Anatomy at Trinity Bio-medical sciences. Questions included positively and negatively framed items related to Anatomy dissection. Responses were graded on a 5-point Likert scale. A total of 90 responses were recorded.

Results: The PreMed students (PM) indicated that PTs contributed positively to their learning (90% of respondents), and 10% believed that this experience motivated them to follow a similar role in the future. On the other hand, 11% of PM respondents noted that PTs occasionally provided incorrect information, and 2% of respondents noted that PTs were often inaccessible when approached.

Discussion: Inclusion of medical students as PTs in the dissection laboratory and review sessions is an effective method for enhancing anatomy education. Revealing potential issues with medical student PTs requires the use of targeted questions, rather than limiting evaluations to general items. Our records suggest that PTs should prepare for teaching, acknowledge gaps in knowledge, and emphasis on maintaining a professional approach in the anatomy dissection laboratory.

Keywords: Peer Tutoring; Anatomy; Medical Education; Premed Transitional Term; Interprofessional Education

Introduction

The modern medical education is directed toward imparting to persons seeking to become physicians the knowledge and skills required for the prevention and treatment of disease. It also develops the methods and objectives appropriate to the study of the still unknown factors that produce illness or favor health. Programs in early medical education that enrich interdisciplinary collaboration, teamwork which will introduce students to their future team members in contemporary background of healthcare.

The teaching of anatomical sciences within the medicine is undergoing marked changes. The time assigned for anatomical courses has reduced significantly in last few decades and, due to drastic increase in the class size in many medical schools which has left the reduction in contact between students and teachers. This has impacted the quality of learning most of the medical students are now learning superficial; rather than deep, learning. Due to these

issues, teachers of Anatomical sciences have often had to develop new teaching techniques to better understand the concepts [1].

Perception of knowledge by an individual student is different based on the individual primary mental abilities. Therefore, some individuals may show better learning by particular methods. Hence a blend of different methodologies to teach a subject is helpful for the majority of the students. In teaching of human gross anatomy too, a combination of different methods has been in use. However, in era of decrease in course duration and easier availability of newer technologies, there is a need to review the priorities and preferences of the methods or to find out different ways to use the existing methods to increase their effectiveness [2].

The medical student Teaching Assistant (TAs) program was established in 2014 at Sidney Kimmel Medical college and has been shown to contribute to core competency development in Medi-

cal students. (1) Similar type of studies done by comparing data of TAs with Physician assistant in Anatomy course. (2) Here, our goal to continue analysis of this program with advance insight on influence of teaching assistants have on rest of the peers. Efforts to represent formerly undiscovered and unaddressed areas for development with specific questionnaire items may allow for a more battered approach to educating the involvements of both parties [3].

Methods

Description of the PT program

The Department of Anatomy and Neuroscience at Trinity Medical Sciences University established a medical student as peer tutoring program in 2020. Eight to ten rising term1 and 2 medical students are given the opportunity to support department faculty in the dissection lab and lecture reviews during a twelve-week human gross anatomy course (BIOS: 205 Introduction to Anatomy) for transitional Premed Anatomy students at the beginning of their educational period.

Prior to the beginning of the dissection course, the course director supervises a half-day training session for the enrolled medical students. The training session focuses on the importance of preparation for teaching, professional interactions with PM students, and teamwork among the PTs. The transitional term PM Anatomy course consists of 45 hours of lecture supplemented by 20 hours of cadaveric dissection. PM students are separated into dissection groups ranging from 8-10 students per cadaver and are instructed to reference Grant’s Dissector textbook. Faculty tutors are present in the lab to assist with dissection and answer questions. PTs is trained to perform a similar role. Responsibilities of the PTs include providing of guidance during dissection, identification of structures, and explanation of questions. PTs additionally compiles tutoring students preceding to their exams. PTs arranges tutoring with multiple choice problem based practical examinations mimicking testing conditions prior to each of block examinations.

Opportunity for PTs

The gross anatomy course (the Human Anatomy) at Trinity Medical School is designed as an interactive, student-centered, team-based learning activity addressing all six ACGME competencies outlined in the Accreditation Council for Graduate Medical Education Outcome Project [4] with extensive, small group laboratory component [5]. It has been modernized from a traditional format lecture/laboratory course, which in the past, in addition to laboratory dissection, utilized gross anatomy, embryology, and radiology lectures. In current design, lectures have been replaced by short-briefing sessions (in gross anatomy) and students-led presentations (in embryology) that enables students to spend more time in the gross anatomy laboratory, where the highest quality of learning takes place. In addition, the use of educational and informational technologies such audience response system (ARS) [6],

web-based portals (Wiki), [7], interactive programs displaying CT scans of dissected cadavers in combination with student-generated content and peer- and self-evaluations [8,9], allow students to monitor their own progress, receive feedback on their performance as well as have combined hands-on cadaver dissection with medical imaging technology experience. While such a method of delivery places the responsibility on the learner to prepare for laboratory experience and team-based activities, it also places a higher demand on group facilitation by faculty [10,11]. ACGME aligned peer tutors (PT) and Teaching assistants (TA) objectives. Overall, TAs in the gross anatomy course demonstrate competencies aligned with the ACGME framework, contributing to the delivery of high-quality medical education and the development of future healthcare professionals.

ACGME competency	PT objectives
Demonstration of professional and ethical behavior	PTs are evaluated by students and faculty. PTs are expected to uphold professional values when interacting with students and faculty. PTs need to understand the responsibilities and honor their positions as part of the faculty team. PTs are involved in assessing student projects/presentations, creating test questions and assisting students in learning process
Effective interpersonal and communication skills	PTs present briefing sessions, provide feedback to students and faculty. Learn how to assess difficult situations, identify students who need additional tutoring. Provide written and oral communications to students – provide instructions for lab work (daily dissector).
Understanding of application of basic science knowledge to patient care	Direct students on clinical assignments and bedside presentations. Facilitate clinical embryology discussions. Provide commentary during briefing sessions relating to their experience in the clinics.
Display of effective teamwork and leadership	Work within the teaching team with faculty and other TAs. Participate in shared research projects Rotate leadership amongst TAs responsibility for specific course segments. Preparing prosections and leading students through dissection. Direct Radiology laboratory exercises. Mentoring students and providing support during a challenging course Relating to students during the block from their own experience and also reinforcing the importance of basic science application to patient care.

Table 1: ACGME aligned PT and TA objectives.

Survey administered to PM students

A total of 120 PM students from the Trinity school of Biomedical sciences, affiliated to Trinity medical sciences university attended cadaveric dissection during human gross anatomy in 2020-2022. A survey “Course critique 2020-2022” was provided to all students upon completion of the course. The questions in the survey forms were both positive and negative framed items specific to anatomy dissection.

Responses were collected confidentially, graded on a five-point Likert Scale (“Strongly Disagree,” “Disagree,” “Neutral,” “Agree,” “Strongly Agree”), and converted to a numerical scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). “N/A” was an accepted response. For item 20 out of 32, students were instructed to select “Disagree” to control for inattentive participant responses. Means and standard deviations were calculated using Microsoft Office 365 Excel. Graphical representations are shown.

Results

Peer tutors positively impacted the educational experience of premedical students. Their contributions can significantly enhance the learning environment by providing additional support, guidance, and valuable insights. If you have specific details or examples of how teaching assistants have made a difference, it would be interesting to highlight those in any communication or report to underscore their positive influence.

It’s impressive to see such positive feedback from PM students regarding the contribution of peer tutors (PTs) to their learning experience. The high agreement percentages 60% and average numerical scores 5.7 (Figure 1 PTs response) indicate a strong endorsement of the PTs’ effectiveness in maintaining professionalism during dissection and providing valuable support in the lab. The mention of specific resources like study guides and practice laboratory practical examinations further emphasizes the tangible impact of PTs on students’ education.

This positive feedback not only reflects the current success of PTs but also suggests the potential for continued benefits in the future, as indicated by the 42% of students who believe that students in future years would benefit from continued use of PTs. It might be valuable to explore the specific practices or approaches employed by TAs that contribute to such positive outcomes, as this information could inform ongoing strategies for educational support and enhancement.

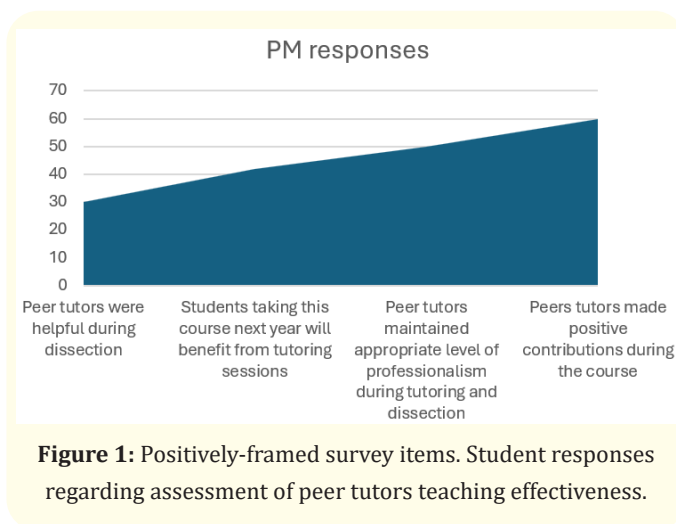


Figure 1: Positively-framed survey items. Student responses regarding assessment of peer tutors teaching effectiveness.

Peer tutors must be aware of gaps in their academic knowledge (Figure 2)

Using negatively-framed statements in assessments is a common practice to gauge students’ perspectives on specific topics or experiences. Negative framing involves presenting statements in a way that requires respondents to disagree or express a negative sentiment.

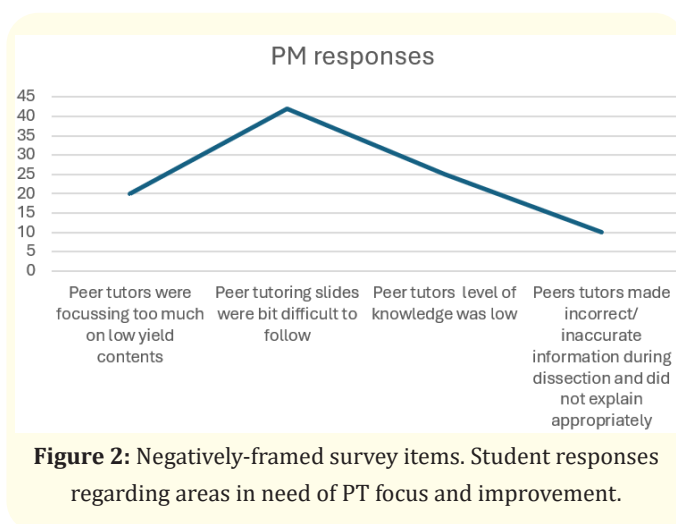


Figure 2: Negatively-framed survey items. Student responses regarding areas in need of PT focus and improvement.

The teaching assistant program supports interprofessional communication

Three survey items assessed student agreement with the positive impact of the program on interprofessional communication and evidence of social or extracurricular conversation (Figure 3). The data show that 60% of respondents agreed or strongly agreed that their interactions with PTs made a positive impact on their outlook on interprofessional and interdisciplinary communication (average numerical score = 4.4). 17% feels they feel to study by themselves.

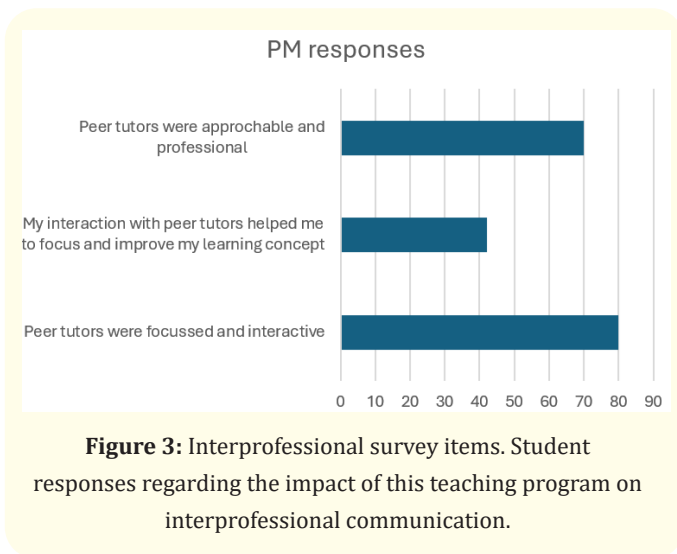


Figure 3: Interprofessional survey items. Student responses regarding the impact of this teaching program on interprofessional communication.

Discussion

The data from our study suggest that medical student Peer Tutors (PTs) play a valuable role in the dissection lab, with PTs being highly regarded by their peers for their contributions. However, despite the overall positive feedback, there are areas identified for potential improvement. The aim of our study was to identify actionable areas and provide structured recommendations to enhance the PTs' performance in future iterations of the program.

Although the mostly positive regard in which PM students held the PTs and their performance, survey items targeted areas that could potentially want for improvement. The aim of this study was to identify actionable areas and provide structured recommendations to the PTs in future iterations of this program.

It is also important for PTs to assess the needs of learners before interrupting a group dynamic to assist with dissection. Moreover, PTs should not spend disproportionate amounts of time with one group or in one area of the lab. Given that only one student agreed that PTs were over-involved with dissection and another that lack of availability was an issue, these two areas may not be as egregious as that of providing inaccurate information. The comments did elicit, however, a similar number of responses when comparing those related to availability and those related to provision of inaccurate information without follow up. It remains necessary for PTs to not limit their assistance to one or two tables and to be proactive in offering assistance to all students in the lab.

One area of improvement is for PTs to assess the needs of learners before offering assistance, ensuring that their intervention does not disrupt group dynamics unnecessarily. Additionally, PTs should distribute their time evenly among all groups and areas of the lab, avoiding spending disproportionate amounts of time with

certain groups or in specific areas. While issues related to over-involvement and availability were identified, providing inaccurate information without follow-up emerged as a more significant concern, highlighting the need for improved accuracy and follow-through in PT interactions.

Indeed, the bar has been raised as medical educators tap in to the potential for medical students to initiate teaching skills in early medical education [12]. Peluso and Hafler (2011) [13] point out that despite the lack of requirement by the Association of American Medical Colleges for medical students to be exposed to some level of teaching responsibility, the ACGME strongly advocates that residents be involved in teaching roles during their clinical training. For medical students, the TA experience has become more than an informal, improvised exercise. It has become an important training ground for the early acquisition of teaching skills within a familiar setting that provides a sheltered mentoring milieu. Recognition of these early teaching skills is evidenced in student-provided TA feedback [14-16].

We hypothesized that negatively-framed survey items may more effectively elicit issues students may have with PT performance. Positively-framed statements such as those assessing PT effectiveness above may not be a comprehensive measure of the effectiveness of this program. When answering a general question assessing the overall performance of PTs, students may not recall specific occasions on which PTs did not perform up to expectations or hindered their learning.

Our study was limited by the 90 responses received from the primary survey. We believe that it would be helpful to allow for commentary and constructive feedback after each individual survey item to pinpoint specific behaviors that can be improved upon in future years. Evaluation of PTs after completion of the course and their opinions on whether or not they agreed with any of the negatively-framed items would also form a more comprehensive understanding of the implications of using medical students as PTs.

To improve future assessments of PT performance, we suggest allowing for commentary and constructive feedback after each survey item to pinpoint specific behaviors for improvement. Additionally, evaluating PTs after the completion of the course and soliciting their opinions on negatively-framed items would provide a more comprehensive understanding of the effectiveness of utilizing medical students as PTs.

While our study was limited by the number of responses received, we believe that incorporating these suggestions into future

evaluations will enhance the effectiveness of the PT program and further optimize the learning experience for all students involved.

Conclusions

In this article, we propose a teaching practice that enhances accountability for Peer Tutors (PTs), Teaching Assistants (TAs), and course faculty by integrating ACGME competencies into the TA experience. This approach aims to empower students interested in becoming future educators by providing opportunities within basic science courses, where teaching education options are often limited. By incorporating elements of effective teaching practice into the learning environment, we reinforce the importance of critical skills necessary for professional development.

Furthermore, students actively participate in the evaluation of PTs' performance, enabling informed discussions between PTs and faculty regarding educational outcomes. Addressing areas of improvement, such as error admission and collaborative dissection, benefits both parties involved. Therefore, when designing similar programs, it is essential to consider these aspects and provide adequate guidance to PTs before they commence their roles. Leveraging medical students as teaching assistants can positively impact physician assistant education, fostering a collaborative and enriching learning environment.

Bibliography

1. Sytsma TT, et al. "Long-term effect of a short interprofessional education interaction between medical and physical therapy students". *Anatomical Sciences Education* 8 (2015): 317-323.
2. McBride JM and Drake RL. "Student-directed fresh tissue anatomy course for physician assistants". *Anatomical Sciences Education* 4 (2011): 264-268.
3. Burgess A, et al. "Medical students as peer tutors: a systematic review". *BMC Medical Education* 14 (2014): 115.
4. ACGME. "Accreditation Council for Graduate Medical Education. ACGME outcome project. Common program requirements: General competencies (2007).
5. Gregory JK, et al. "Restructuring a basic science course for core competencies: An example from anatomy teaching". *Medical Teacher* 31 (2009): 855-861.
6. Alexander CJ, et al. "Assessing the integration of audience response system technology in teaching of anatomical sciences". *Anatomical Sciences Education* 2 (2009): 160-166.
7. Durosaro O, et al. "Use of knowledge-sharing web-based portal in gross and microscopic anatomy". *Annals of the Academy of Medicine of Singapore* 37 (2008): 998-1001.
8. Bryan RE, et al. "Assessing professionalism in early medical education: Experience with peer evaluation and self-evaluation in the gross anatomy course". *Annals of the Academy of Medicine of Singapore* 34 (2005): 486-491.
9. Chen LP, et al. "Learning to lead: Self- and peer evaluation of team leaders in the human structure didactic block". *Anatomical Sciences Education* 2 (2009): 210-217.
10. Michaelsen LK, et al. "Team-based learning for health professions education: A guide to using small groups for improving learning". 1st Edition. Sterling, VA: Stylus Publishing LLC (2007).
11. Vasan NS, et al. "Team-based learning in anatomy: An efficient, effective, and economical strategy". *Anatomical Sciences Education* 4 (2011): 333-339.
12. Dandavino M, et al. "Why medical students should learn how to teach". *Medical Teacher* 29 (2007): 558-565.
13. Peluso MJ and Hafler JP. "Medical students as medical educators: Opportunities for skill development in the absence of formal training programs". *Yale Journal of Biology and Medicine* 84 (2011): 203-209.
14. Brown MT, et al. "Promoting the Development of Core Competencies during Early Medical Education: Implementation of a Teaching Assistant Program in Anatomy Course". *Austin Journal of Anatomy* 4 (2017): 1073.
15. Dent JA and Harden RM. "A practical guide for medical teachers. 3rd edition. Edinburgh, UK: Elsevier Churchill Livingstone (2009).
16. Kevin D He, et al. "A Program of Medical Students as Teaching Assistants in an Anatomy Course: Effectiveness and Improvement". *Austin Journal of Anatomy* 5.2 (2018): 1081.