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Original Research Article

Role of Co-curricular Activities in Enhancing Conceptual Learning of Anatomy – An Undergraduate Perspective

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ABSTRACT

Introduction: Human anatomy deals with spatial orientation and organization of major systems of the body. Routine didactic lectures and dissection lab practical's need to be supplemented with other learning modalities to enhance deeper and holistic approach towards the fabric of nature. Many educationists have provided surplus information regarding the use of one or few of the co-curricular activities in promoting learning in various fields of education. Literature is scarce on use of multiple co-curricular activities in the discipline of anatomy. The present study aims to ascertain the participation rate and explore the perspectives of phase-1 MBBS students on the role of cocurricular activities in conceptual learning of anatomy.

Methods: Study design: cross sectional study**.** Study participants and study area: 150 phase-1 MBBS students 'of 2021 batch, study conducted in the department of anatomy at Dr. Pinnamaneni SIMS & RF.

Sampling: convenience/purposive

Data collection: online survey via google forms was collected from students who have participated in one or all the co-curricular activities. The co-curricular activities included video-making, seminars, model making, WhatsApp assessments, peer tutoring and tutored and student volunteering. The forms consisted of self-rating (5-point Likert scale) and close end questions.

Data analysis: Responses in the form of agreements and disagreements of the students were analyzed in percentages for simplification of data.

Results: A total of 128 responses were received. Out of 128 students 75.8% participated in video-making,81.3 % in seminar presentations, 98.4% in model making,81.3% in WhatsApp assessments,76.6% tutored their peers,88.3% got tutored from their peers in turn.64 (50%) students participated as volunteers in anatomy state conference. Students feedback revealed a positive impact of all the above co-curricular activities in promoting conceptual learning in anatomy.

Conclusions: Blending of supplementary methods in learning can promote qualitative comprehension of anatomy in undergraduate students. Co-curricular activities enhance critical thinking and deeper understanding of subjects through healthy recreation in a stress-free environment.

KEYWORDS: co-curricular activities, critical thinking, deeper learning, video-making, WhatsApp assessments.

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INTRODUCTION

Human Anatomy is a discipline which deals with intricacies and details of the organization of structures in the human body. As a basic science discipline, anatomy needs to be mastered by medical students with concepts interwoven with clinical relevance. Didactic lectures and dissection lab education have been significantly reduced in the latest Competency Based Medical Education (CBME) as proposed by the National Medical commission (NMC). Various learning methods are utilized by medical students to imbibe anatomy, one of them being rote learning which only permits surface approach, leading to non-retention of concepts in future clinical application. The role of co-curricular activities in promoting deep learning has been established in many studies in various other professional fields. Co-curricular activities (CCA)are defined as tasks and assignments that augment the customary curriculum during medical college days [1]. They are also referred to as extra -class student activities [1]. Some examples of CCA's for medical students include science models, practical experiences, scientific posters, quizzes, student led and run initiatives, specialty clubs like Surgically Oriented Anatomy Prosectors (SOAP) which were created at the Schulich School of Medicine and Dentistry, The University of Western Ontario, London, and Canada [2].

Co-curricular activities benefit students by providing opportunities to apply their knowledge and skills, develop new abilities and interests and strengthen their social and organizational skills [3].

Review of studies on the role of CCA's as effective learning tools was scarce and most studies either compared or derived an association of CCA's with academic performance and as a pursuit for professional placements. Many educationists believe that these activities increase social interaction, enhances leadership quality, give a chance of healthy recreation, make students self-disciplined and confident [4]. The purpose of present study is to ascertain the involvement of phase-1 MBBS students in CCA's conducted in the department of anatomy and to explore the role of CCA's as an effective mode of enhancing conceptual learning of anatomy through medical student perspective.

METHODS

A cross-sectional study was conducted on a convenient sample of phase-1 MBBS students' of 2021 batch at Dr. Pinnamaneni SIMS & RF. All the 150 students of phase-1 participated in all or some of the co-curricular activities conducted in the department of Anatomy throughout the academic year during the extracurricular activity hours as proposed by the National Medical commission. The co- curricular activities included video-making, model-making, seminars, WhatsApp assessments (these were conducted outside curricular hours), volunteering in conferences or workshops and peer tutoring or peer tutored (concept donor &recipient model).

Data in the form of responses was collected online via google forms which consisted of mixed items of self -rating scale (5-point Likert scale) and close end questions. The questionnaire was designed after thorough review of scarce literature available and was subjected to peer review. It was then piloted on a convenient sample of students (n=14) to ensure validity. Clear objectives of the study were elaborated to all the participants and the participation was voluntary and non-compulsory.

For simplicity in reporting, all the disagreement (disagree & strongly disagree) responses were graded as disagree and all the agreement (agree & strongly agree) statements graded as agree. The data obtained was analyzed in percentages for better comprehension of results and views of the participants.

RESULTS

Out of 150 students a total of 128 responses were collected.

Video-making: 75.8%(n=97) students participated in video making with 61.7% (n=59) taking the role of team building and team support. Presentations in the videos were done by 20.3%(n=19) students,10.9% (n=10) supported recording of videos and 7%(n=7)

Table 1: showing the responses of students distributed in percentages and numbers.

Total responses =128	Participation % (n = total no of students)	Promote conceptual learning %	Continue as a learning tool %
Video making	75.8 (97)	93	90.6
Seminars	81.3(104)	84.4	75.8
Model making	98.4(126)	91.4	93.8
WhatsApp assessments	81.3(104)	90.6	90.6
Peer tutoring	76.6 (98)	92.8	-
Peer tutored	88.3(113)	70.3	-

students were technically fit to help in editing the videos. The video recordings were shared in WhatsApp working group of students for future utility. The concepts in anatomy were better understood by videos, has been agreed by 93% (119 out of 128) of students. Videos were re-used by 81.3% (104 out of 128) of students for revising the concepts.90.6%(n=88) agreed video-making to be continued as a learning tool in Anatomy for future batches.

Seminars: Seminars on student selected topics with clinical relevance were presented by 81.3%(n=104) of the students. Out of the 104 students 84.4% agreed seminar presentation as a motive for deep approach of learning in anatomy and 75.8% (97 out of 128) agreed for holistic and organizational learning through peer presentation of seminars. Continuing student seminars as a learning tool was agreed by 75.8%(n=79) of students in toto.

Model-making (***Modeler Anatomica***): Model making competition was well received by the students,98.4% (n=126) of students participated in teams of 5 members each and the theme was to prepare models with only biodegradable materials. Student contributions out of 126 members in model making included roles of presentation, preparation, and teamwork, out of which 61.7% prepared models,24.2% presented the model and 10.2 % supported their team. Most students, 91.4%(n=115) agreed with achieving a conceptual understanding of the discipline while preparing the model and 90.7% agreed for enhanced learning of meaning and spatial orientation in anatomy. Models were re-used for revision by 70.1% of the students and 93.8%(n=118) agreed model making to be continued as a learning tool for further batches.

Student volunteering: 2022 has been an active academic year with multiple conferences and workshops been conducted in our institution successfully including the 19th Regional Society of Anatomists Meet-AP & TS. The number of students who volunteered for the anatomy conference was 64 (50%) and only 10 members participated in other conferences. Out of the 64 students 40.6% were involved in venue and stage management,20.4% in scientific sessions and 32.8% actively volunteered in technical support and hospitality wing. Out of the 64 students 88% agreed for understanding the proceedings of the conference,89% have got the opportunity to interact with senior anatomists. In response to accomplishment of leadership qualities and management,80.4% students responded positively towards enhancing their motivation in teamwork and leadership. Most students agreed (84.3%) with the improvement of their communication skills which added credit to their professional upbringing.

WhatsApp assessments: Assessments like "fastest answer" and "fastest identification" on WhatsApp generated interest in students in learning anatomy.89.2%(n=114) participated in online assessments using WhatsApp working group.90.6% out of 114students agreed for online assessment as an interesting method which promoted the essence of "assessment as learning" and to be continued for future batches.

Peer tutoring (concept donor) and peer tutored (concept recipients): Analysis of the responses reported that 76.6% of students explained concepts and context to their friends. Tutoring their peers promoted better understanding and retaining of the subject, was agreed by 93.8% of the students.88.3% of

the students have been taught(recipient) by their peers and 70.3% agreed that being tutored helped them comprehend subject matter better and there was degree of freedom in exchanging knowledge.

DISCUSSION

The present study describes the views and perspectives of phase-1 MBBS students towards CCA's in enhancing conceptual learning of Anatomy. All the students have participated in all or some of the activities conducted in the department of anatomy and gave their feedback. Student surveys and feedback have been conducted by many educationists worldwide emphasizing the effectiveness of one or few of the CCA's in their study articles. Present research signifies the role of various CCA's including student volunteering conducted in our institution.

Ayesha Anwar and Waqar Khan have done a comparative analysis on two groups of students with and without CCA's participation and have examined the outcome on the educational success at Rashid Latif Medical College in Lahore. CCA's included in the study were science diagram drawing and sketch books, practical experiences, and scientific posters. The results of pre and posttests scores revealed that the experimental group students proved better outcomes than the control groups [1] Mazen Almasry et al conducted an online cross-sectional survey on preclinical medical students at College of Medicine, Saudi Arabia and reported a satisfactory participation rate of 60.3% (143/327) in CCA's and identified motivating factors and barriers hindering participation in the CCA's. The CCA's were broadly dichotomized as research and non-research related which included a diversity of activities like teaching, community and social service, research, and sports activities [5]. The present study reported participation rate of 85.3%with diversity of activities promoting deep approaches to learning. Few studies as conducted by Chi-Hung et al determined if CCA's improved student learning effectiveness and if there was positive effect on students' academic performance. The result showed little impact on students learning efficiency with CCA's in their study [6].

Ahmad, Rahman et al conducted a study to ascertain student involvement in CCA's and academic performance. Most of the CCA's included sports, photography groups, debates, and cultural activities. It was discovered that pupils who actively participated in CCA's outperformed those who did not [7]. The authors in the present study were keen to analyze responses of students on CCA's which were innovative and newly used. Authors of the study would barely find literature related to impact of video-making and WhatsApp assessment on promoting conceptual and deep learning through assessment in medical disciplines, henceforth justifying the novelty of these unique learning tools.

Most studies signified the role of model-making as a teaching learning tool in anatomy and loads of information can be retrieved through databases on model-making. Nagaraj et al collected feedback through structured questionnaires from 1st year MBBS students on model-making. The models were prepared with old cloth and tissue papers and the study concluded that the activity generated three dimensional understanding of anatomy with greater retention of subject in 95% of students and 90% accepting to prepare such models in future [8]. Vipin Garsa et al in their study reported that 98% of 1st MBBS students (100) opined that models with different color coding made them better understand nerve plexuses like brachial and lumbar before going for dissection. 100% found it more informative and 70% found model making more informative than YouTube videos [9].

Majority of students gave a positive response in use of model making in anatomy in a study feedback conducted by Uma SV, where in 94% of students felt model-making was useful for learning, 93% admitted that it should be used as teaching method for other topics and 91%agreed that model making helped in long term memory of subject [10]. Study responses in present study were close to above studies in quantitative metrics on model making as a standalone activity. Students in the present study were given the opportunity to select

their own models and topics and the material used was biodegradable.

Multiple studies have been conducted on the effectiveness of student seminars as a solo activity in all phases of MBBS students, very few articles were identified on seminars in anatomy. Most student seminars in present CBME include horizontally and vertically integrated topics with alignment and integration being the mainstay of the process. Jitender R Patil et al collected feedback from one hundred and ten 1st year MBBS students regarding effectiveness of student seminars in learning process and reported that 76% of students positively responded to utility of seminars [11]. In another study conducted by Ashwini Namdeorao Patil et al revealed many positive aspects of seminars as a learning tool in the subject of physiology [12]. In present study 84.4% of students gave positive response on impact of seminars in conceptual learning of anatomy.

Ollen Cate et al surveyed 2006 medical education literature on peer teaching and identified reasons for applying peer teaching in curriculum which included alleviating faculty teaching burden, providing role models for junior students, enhancing intrinsic motivation and preparing physicians for their future role as educators [13]. Bowyen et al conducted scoping reviews on PubMed search articles on peer teaching or tutoring and found results related to potential benefits which include opportunity for tutors to consolidate their own learning. The learners benefit from small group learning focused on a relevant level of knowledge. Efficacy of teaching and monitoring of tutoring were shortcomings identified in the review [14]. The students in the present study opined that teaching their near peers enhanced their retention of subject more compared to being taught or tutored by their colleagues.

Most students in the present study participated in volunteering the conference proceedings conducted at our institution in August 2022. Student volunteer programs include community services like medical camps, outreach programs, awareness programs which are usually opted by students in later semesters. These programs enhance student communication skills and potentiate their leadership abilities and team building. As stated by Avinash Supe, CCA's are a variety of activities that are conducted alongside the standard study curriculum to provide experience in active social interaction. These activities develop important qualities such as leadership, ethics, self-discipline, and self - confidence and provide healthy recreation opportunities [15]. Adults hold different conceptions of learning as proposed by Saljo, which was further analyzed by Marton, Beaty, and Dall 'Alba [16] as six qualitatively different conceptions which are presented in the Table-2 below.

Table 2: Concepts of Learning by Saljo [16].

A. Increasing one's knowledge	Learning as primarily reproducing
B. Memorizing and reproducing	
C. Applying	
D. Understanding	Learning as primarily seeing meaning
E. Seeing something in a different way	
F. Changing as a person	

The categories D, E and F in which seeing meaning with a deep approach in subject matter can be achieved through co -curricular and extra-curricular activities.

CONCLUSION

Medical students adopt various methods of learning and comprehending anatomy through stress free environments. Co-curricular activities provide this congenial learning environment, where students can avoid surface learning which is driven by fear of assessment and grading. Present study justifies the role of CCA's through student perspectives for effective and holistic learning of basic intricacies in anatomy.

Conflicts of Interests: **None**

REFERENCES

[1]. Ayesha Anwar, Waqar Khan M. Role of co-curricular activities in effective learning, at a local medical college in Lahore. PJMHS. Oct-Dec 2013;7(4):901-903.

[2]. Shahnoor M Ullah, Andrew Bodrogi, Octa Cristea, Marjorie Johnson, Vivian C McAlister. Learning surgically oriented anatomy in a student -run extracurricular club: An education through recreation initiative. Anat Sci Educ. 2012;5:165-170.

[3]. Shaikh Rezwan Rahman, Md Asfiul Islam, Pritidhrita Paul Akash, Masuma Parvin, Nazmun Nessa Moon, Fernaz Narin Nur. Effects of co-curricular activities on student's academic performance by machine learning. Current Research in Behavioral Sciences. 2021;2:100057, doi.org/10.1016/j.crbeha.2021.100057.

[4]. Guest A, Schneider B. Adolescents extracurricular participation in context: The mediating effects of schools, communities, and identity.2003;76: 89-105.

[5]. Mazen Almasry, Zeina Kayali et al. Perceptions of preclinical medical students towards extracurricular activities. International Journal of Medical Education.2017;8: 285-289.DOI: 10.5116/ijme.5973.297a.

[6]. Chi-Hung, C W R N, P O E. Chan.Can co-curricular activities enhance the learning effectiveness of students? An application to the sub-degree students in Hong Kong. 2011;23(3),329-341.

[7]. Ahmad M, Rahman M F, Ali M, Rahman F, Azad, Al M A. Effect of extracurricular activity on students' academic performance. J. Armed Forces Med. College, Bangladesh.2019;11(2):41-46.

[8]. Nagaraj Mallashetty, Veeresh Itagi, Angadi A V. Model making exercise- A new tool for teaching and learning anatomy and perception of students towards it. Journal of Educational Research & Medical teacher.2015;3(1):34-36.

[9]. Vipin Garsa, Neeru Ghalawat, Ravikanth Narayan, Sanjay Gupta, Suresh Kanta Rathee. Learning anatomy with model making along with dissection. Int J Anat Res.2017;5(2.3):3993-96.

[10]. Uma S V. Model making, an interesting method of learning anatomy: student's perceptions. Int J Anat Res.2022;10(1):8291-96.

[11]. Jitender R Patil, Dharmik S Patil, Rajesh Desai, Jasmin Parmar, Ravi Thakur, Nikita D Patil. Evaluation of student seminar in medical education: student's perspective. Int J Cur Res Rev.2015;7(7):6-9.

[12]. Ashwini Namdeorao Patil, Bageshree Nilkanth Pande, Nirmala Gopal Borade. Learning to learn and teach: Student seminars as a teaching- learning method in undergraduate medical physiology through student's perspective. National Journal of Physiology, Pharmacy & Pharmacology. 2018;8(10):1356-61.

[13]. Ollen Ten Cate, Steven Durning. Peer teaching in medical education: twelve reasons to move from theory to practice. Med Teach.2007;29(6):591-9. DOI: 10:1080/01421590701606799.

[14]. Bowyer E R, Shaw S C. Informal near peer teaching in medical education. A scoping review. Educ Health.2021;34:29-33.

[15]. Avinash Supe. Co-curricular activities in medical education. The National Medical Journal of India.2012;25(3):128-129.

[16]. Marton F, Dall Alba G, Beaty E. Conceptions of learning. International Journal of Educational Research.1993;19:277-300.

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