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A Comparative Study on Medical Student's and Faculties Perspectives on the Incorporation of Virtual Reality in AETCOM Training in Medical Curriculum in India

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Abstract: *In order to enhance the cognitive, ethical, and attitudinal perceptions of the profession, the National Medical Council (NMC) has introduced the AETCOM (Attitude, Ethics, and Communication) module. Teaching methodologies include Case-Based Learning (CBL), Small Group Teaching/Discussion (SGT/SGD), Self-Directed Learning (SDL), and Symposiums. The implementation of the module across the country, however, faces many challenges, the most significant of which are the orientation of undergraduate students towards AETCom and delivery challenges. By administering a self-administered, anonymous questionnaire, the study will assess the knowledge, attitudes, and practices of medical faculty members and students regarding the use of Virtual Reality (VR) technologies in AETcom teaching and learning. The validated questionnaire will be disseminated via electronic media (Google forms) to the Medical Education Units (MEUs) of the various medical colleges in India after approval from their Institutional Ethics Committees. A self-designed, standardized questionnaire will be used to analyze the results. There is a lack of knowledge among faculties about the utility of VR technologies in medical education, especially the AETCom modules. The Indian medical curriculum will then be on par with the western countries' and, as a result, a better Indian medical graduate will be produced.*

Keywords: National Medical Council (NMC), AETCOM (Attitude, Ethics and Communication), Case-Based Learning (CBL), Small Group Teaching, Small Group Discussion (SGT/SGD), Self-Directed Learning (SDL), Virtual Reality (VR), Medical Education Units (MEUs).

I. INTRODUCTION

The National Medical Council, (NMC)'s new competency-based curriculum for medical graduates, is a major landmark for medical education in India; it represents a significant change and is in accordance with the global trends [1]. One of the remarkable changes was the introduction of the AETCOM (Attitude, Ethics and Communication) module, which is an integral component to improvise the cognitive, ethical and attitudinal percepts of the profession. The goal of teaching AETCOM as a discipline is to strengthen medical students with a skill set to approach ethical dilemmas in daily clinical settings. This skill set is useful because, if taught well, it can inspire "self-criticism and examination of one's values" and thus may indirectly affect a student's character[2]. However, there seem to be many challenges that need to be addressed for the successful implementation of AETCOM across the country, most important of which are the orientation of the undergraduate students towards AETCOM and challenges in the delivery of the module.

The present teaching methodologies in AETCOM includes Case-Based Learning (CBL), Small Group Teaching/ Discussion (SGT/SGD), Self-Directed Learning (SDL), symposiums and lectures. But how far these tools have been able to impart the required skills in this domain to students is questionable. Furthermore, the students are not used to 'self-directed learning and Reflections as a learning tool', which is one of the major approaches towards delivering this module.

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Hence, we propose to incorporate Virtual Reality (VR) based technologies into the delivery of the AETCOM module, which will enable the students to perceive the case/situation discussed by the faculty in a better way[3]. VR situations tailored according to the demand of each competency will present the student to experience that situation in a hospital set up in a three-dimensional realm through appropriate video and audio effects, both physically and emotionally[4].

Several studies have demonstrated the potential of using virtual reality, augmented reality, mixed reality, and extended reality (XR) technology in the teaching of clinical as well non-clinical sciences like in learning of cadaveric dissection and surgical training[5,6]. These have gained particular importance during online learning and teaching during the Covid-19 Pandemic, especially in surgical branches[7]. The VR experience tries to predict the sensory consequences of an individual's movements, providing to him/her the same scene he/she will see in the real world. There is the possibility of altering the experience of the body, facilitating the cognitive learning of AETCOM values by designing targeted virtual environments able to simulate both the external and the internal world/body[8].Hence VR will provide a safe learning environment where the students can experience the real-life doctor-patient scenarios to learn the AETCOM skills[9]. According to a recent study by Ghosh et al, AETCOM skills cannot be written on a paper and attitude can change in reality when facing a real-world clinical scenario in contrast to what is written in answer script during creative writing. Hence the same technology can be used for the assessment of AETCOM, via a practical approach in a real-world simulated scenario[10].

Though VR is not a panacea, it will be a powerful educational tool for defined learning objectives, which will help us achieve quality interprofessional education and transform how we deliver attitude and ethics to the clinicians of the future[11,12].

To plan and implement such teaching tools into AETCOM, we should explore the medical student's requirement and their satisfaction with the current teaching methods and as well as the faculties perceptions about to what extent they have been able to deliver the competencies in AETCOM [13]. There is a dearth of knowledge among faculties about the utility of VR technologies in medical education, especially the modules like AETCOM and we intend to educate the students as well as faculties regarding the arena of opportunities in this field, which if properly utilized and implemented could bring about a revolution in the training of AETCOM across India, setting the ground for further research on this topic to make learning interesting with novel technologies.

II. OBJECTIVES

1. Analyze the student's satisfaction with the present teaching methodologies in AETCOM
2. Analyze the faculties satisfaction regarding the delivery of contents of the AETCOM module
3. Assess the knowledge and attitude of students and faculty regarding the incorporation of VR technology into AETCOM training.

III. METHODOLOGY

The study will be conducted as a cross-sectional study to evaluate the knowledge, attitude and practice of medical faculties as well as the students regarding the application of virtual reality technologies in AETCOM teaching and learning via a self-administered, anonymous questionnaire.

3.1 Study sites and Participants

The study will be based in a tertiary care medical college in collaboration with Medical Education Units (MEUs) of other colleges in India after approval from respective Institutional Ethics committees. The faculties designated by the respective colleges for training AETCOM and all medical students undergoing training under the new CBME curriculum for the Bachelor of Medicine, Bachelor of Surgery (MBBS) degree will be eligible to participate in this study after signing an electronic informed consent.

3.2 Sample Size Calculation

Using the sample size calculation formula for cross-sectional surveys involving comparison of means of two groups[14].

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$$d = \frac{\mu_2 - \mu_1}{\sigma}$$

$$n \geq \left(\frac{1+r}{r}\right)\frac{\left(Z_{1-\alpha/2} + Z_{1-\beta}\right)^2}{d^2} +$$

Alpha (α): Type 1 error rate

Beta (β): Type 2 error rate

d: Expected effect size

r: Sample size ratio Group 2 / Group 1.

Alpha=0.05, beta=0.2, effect size =0.5 and ratio No. of students/no. of faculties= 4, the minimum sample required in group 1 (Faculties) is 40 and the minimum sample required in group 2 (medical students) is 160. Therefore, minimum total sample size required = 200.

IV. DATA COLLECTION AND STATISTICAL ANALYSIS

The data will be collected using the validated questionnaire which will be disseminated via electronic media (google forms) to the MEUs of different medical colleges. The validation of the questionnaire was done with external expertise (Cronbachs alpha-0.85). There will be 6 sections in the questionnaire. Section A will deal with the informed consent of the participants and section B, their demographic data. Section C will be exclusively for medical students about their attitude to present AETCOM training and section D exclusively for medical faculties regarding their satisfaction in the delivery of the contents of the AETCOM module. Section E will deal with knowledge about virtual reality technology among both faculties as well as students. The knowledge score will be calculated based on 5 questions and one point will be assigned to each 'yes' answer or the correct answer. The maximum possible knowledge score will be 5. Section F will deal with questions related to attitude and future practice of VR in AETCOM training, based on 'agree', 'neutral' and 'disagree' options. The 'Agree' option will get 2 points, 'neutral' will get one point and 'disagree' will get zero points. The maximum possible score in the attitude section is 10 points. The responses in sections C and D will be compared for each corresponding question from faculties and students to find out the unmet need to adopt new technologies in AETCOM training. For the analysis, we will use descriptive statistics and the responses from the faculties and students will be differentially analyzed using Welch's t-test (for unequal sample size in both groups) and significance will be considered at a p-value of less than 0.05. This will enable us to find the statistically significant difference between the student and faculty responses.

The questionnaire will take about 5 minutes and will be in the English language

V. IMPLICATIONS

If we can find an unmet need among students for the need of advanced training in AETCOM skills, a VR based module can be developed with sufficient Information Technology (IT) support which can be subjected to validation and pilot testing, which if found useful can be implemented across India in collaboration with the NMC and MEUs of the medical colleges. This can make our medical curriculum on par with the western countries and in turn, will carve a better Indian Medical Graduate (IMG).

VI. QUESTIONNAIRE

SECTION A

Electronic Informed consent

INFORMED CONSENT FORM

You are invited to participate in the research project entitled "A Comparative Study on Medical student's and Faculties Perspectives on the Incorporation of Virtual Reality in AETCOM Training in Medical Curriculum in India".

Your participation in this project is voluntary.

The session will last approximately 5 minutes.

If I feel uncomfortable in any way during the session, I have the right to withdraw from the session.

The information provided will be strictly confidential and will be utilized for the research purposes only.

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By clicking on the 'Agree' button I confirm that I have read and understood all the above information and agree to participate in this research.

Agree

SECTION B
Demographic details
1. Age
i. 18 -25 years
ii. 26 to 50 years
iii. More than 50 years

2. Gender
i. Male
Agree
ii. Female
iii. Other

3. Occupation
i. Medical faculty
ii. Medical student

4. Designation
i. Professor
ii. Associate professor
iii. Assistant professor
iv. Senior resident/Tutor
v. Phase I Medical student
vi. Phase II Medical student
vii. Phase III Medical student

5. Type of organization
i. Government
ii. Private/deemed institute

6. State (Choose from the drop-down list)

SECTION C
(Only for Medical Students)
7. On a scale of 1 to 3, how much would you rate the usefulness of the weekly AETCOM classes
1-Not useful
2- Useful but beyond our scope
3- Highly useful & Practical

8. Do you agree that you have understood and practiced the required competency as mandated under AETCOM so far?
i. Agree
ii. Neutral
iii. Disagree

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9. Are you content with the current teaching methods for AETCOM?

i. Agree
ii. Neutral
iii. Disagree

10. Have you felt difficulty in understanding/imagining certain instances/situations that were discussed during AETCOM classes?

i. Agree
ii. Neutral
iii. Disagree

11. Do you think we need to adopt new technologies that might help you in understanding these situations?

i. Agree
ii. Neutral
iii. Disagree

SECTION D

(Only for Medical Faculties)

12. On a scale of 1 to 3, how do you rate your delivery of the AETCOM Module

1- Average
2- Good
3- Excellent

13. Do you think your students have mastered the required competency as required under AETCOM?

i. Agree
ii. Neutral
iii. Disagree

14. Are you satisfied with the current teaching methods adopted in the delivery of AETCOM skills?

i. Agree
ii. Neutral
iii. Disagree

15. Have you ever felt limitations in explaining the situations encountered in the hospital to students during AETCOM training?

i. Agree
ii. Neutral
iii. Disagree

16. Do you think we need to adopt new technologies that might help in understanding these situations?

i. Agree
ii. Neutral
iii. Disagree

SECTION E

Knowledge about Virtual Reality Technology

17. What do you understand by Virtual Reality? (Choose any one applicable)

i. Recreating past things through our computers
ii. An interactive 3D computer-created world that you can explore, where you feel you are there, both mentally and physically

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iii. 2D simulation of a situation

18. Are you aware of the existence of Virtual reality-based technologies and their applications in medical education?
i. Yes
ii. No

19. Can you name a few VR software's that are currently available?
i. Yes, If yes name____
ii. No

20. Do you think AETCOM skills can be trained using VR?
i. Yes
ii. No

21. Do you think score-assessment of AETCOM skills can be done using VR?
i. Yes
ii. No

SECTION F
Attitude & Practice of using Virtual reality in AETCOM

22. Do you think it would be apt to incorporate VR as a means of AETCOM training?
i. Agree
ii. Neutral
iii. Disagree

23. Do you think incorporating VR into AETCOM will be beneficial for enhancing the skills of medical students?
i. Agree
ii. Neutral
iii. Disagree

24. Do you think using VR will be a safe and effective alternative for assessing AETCOM skills?
i. Agree
ii. Neutral
iii. Disagree

25. Do you think your institution will be able to bring forth the required technological platform and facilities for incorporating VR based training into the AETCOM curriculum?
i. Agree
ii. Neutral
iii. Disagree

26. How likely will you switch to VR if provided with the required facilities?
i. Highly likely
ii. Less likely
iii. Not likely

27. Do you have any other comments with regards to teaching methodology/tools in the AETCOM module?

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