



Original Research Article

REINVENTING ETHICS EDUCATION IN UNDERGRADUATE MEDICAL TRAINING: INSIGHTS FROM AN APPLIED ROLEPLAY MEDIA INTEGRATED (ARMI) PEDAGOGICAL MODEL FOR AETCOM IN MAHARASHTRA

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ABSTRACT

Background: The National Medical Commission (NMC) introduced the Attitude, Ethics and Communication (AETCOM) module under the competency-based undergraduate medical curriculum. However, evidence regarding effective teaching strategies beyond traditional lectures remains limited. We developed an Applied Role-play and Media-Integrated (ARMI) approach and evaluated its effectiveness in improving knowledge, comprehension, and applicability of AETCOM competencies compared with conventional teaching.

Materials and Methods: A quasi-experimental study was conducted among Phase III MBBS students (n=110), equally allocated to intervention and control groups. The intervention group received the ARMI approach, incorporating case-based discussions, role-play, and curated movie clips, while the control group received lecture-based teaching. A structured questionnaire assessed cognitive, affective, and psychomotor domains of AETCOM Module 3.5 (fiduciary duty) before and after the sessions. Effectiveness was evaluated using Hake's normalised gain (g). Wilcoxon signed-rank and Mann-Whitney U tests were used for within-group and between-group comparisons, respectively.

Results: The intervention group demonstrated moderate learning gains across all domains, whereas the control group showed minimal improvement. The highest normalised gain was observed in the cognitive domain (44%), followed by affective and psychomotor domains (33% each). Significant within-group improvements were observed in the intervention group across cognitive (p=0.002), affective (p=0.025), and psychomotor (p<0.001) domains. A significant between-group difference was observed only for psychomotor scores (p=0.001). Students reported positive perceptions and preferred interactive, media-integrated ethics sessions.

Conclusion: The ARMI approach effectively improved learning outcomes across AETCOM domains and offers a feasible, engaging strategy for ethics education within competency-based medical curricula.

Keywords: Competency-Based Medical Education (CBME), Attitude, Ethics and Communication (AETCOM), Applied Roleplay and Media Integrated model (ARMI), Pedagogy, Learning gains.

INTRODUCTION

Medical education has evolved over time.^[1] Conventional medical education does not provide enough training to medical undergraduates in resolving the ethical dilemmas they would encounter as healthcare professionals.^[2-4] The serious concern about the medical syllabus is that it is loaded with a lot of knowledge components, in medical education terms, the cognitive domain, with little of the psychomotor domain (clinical skills) and almost no emphasis on the affective domain (attitudes) which includes the most essential elements of care such as empathy, professionalism, communication skills, and ethics, were not covered in any way in the syllabus.^[1,5,6] Every academician and governing authority in all possible academic forums advocate the need for bringing rampant curriculum reforms in medical education by tailoring it to the current-day needs and demands.^[1] In 2017, the Medical Council of India(MCI), now the National Medical Commission(NMC), revised graduate medical education regulations and competency-based Undergraduate (UG) curricula and decided to implement Attitude, Ethics and Communication Module (AETCOM) in all medical colleges across the country. This approach alone is no longer sufficient for the development of a medical professional, as the domains of attitude and communications, with emphasis on ethics, therefore need to be taught directly and explicitly throughout the undergraduate curriculum.^[7] There is a need for classrooms to change in such a way that the teacher should act as a facilitator and allow students to learn by themselves through active involvement based on the principle of cooperative learning.^[1]

There are only a few international research studies, and there is no consensus on how medical ethics should be taught in medical curricula.^[4] Different methods of teaching communication skills include role-play, cinemeducation and case discussions.^[8] Role play, as a teaching and learning method, can be an effective way to enhance cognition, psychomotor skills, and affective domains in learners.^[9,10] Cinemeducation provides the opportunity for all the medical students to learn all the ethical and psychosocial subjects which are related to medicine by observing and reflecting on the films.^[11] So, the use of cinema in teaching the AETCOM module plays a vital role, providing a coherent picture of how communication and attitude can be integrated. That is why the AETCOM module can be fully utilised by students, using the cinema and other informative tools, which provide a new direction for the future of medicine.^[12] Due to time constraints, it is not possible to include Cinemeducation in its entirety in our curriculum. Combining methods such as role play and case discussions with film clips relevant to specific concepts will improve learning efficiency and time management. Based on this we formulated, Applied Role-play and Media

Integrated(ARMI) approach for teaching attitude, ethics and communication and conducted a study to assess and compare the effectiveness of traditional teaching methods and the Applied, Role-play and Media integrated (ARMI) teaching approach in enhancing knowledge, comprehension and applicability of AETCOM (Attitude, Ethics, and Communication) competencies among medical students.

MATERIALS AND METHODS

A quasi-experimental study was conducted in the Department of Community Medicine at a tertiary-care medical college among phase III MBBS undergraduate students. Ethical approval was obtained from the Institutional Ethics Committee (IEC/Pharm/RP/353/2025). Written informed consent was obtained from all study participants before inclusion. In the consent form, we explained the aim of the study and the right to withdraw from the interview process at any time without any reprisals. Data confidentiality was strictly maintained at all stages.

Sampling technique:

A total of 110 students participated. They were randomly assigned to one of two groups using a computerised random number table. [Refer to Figure 1]

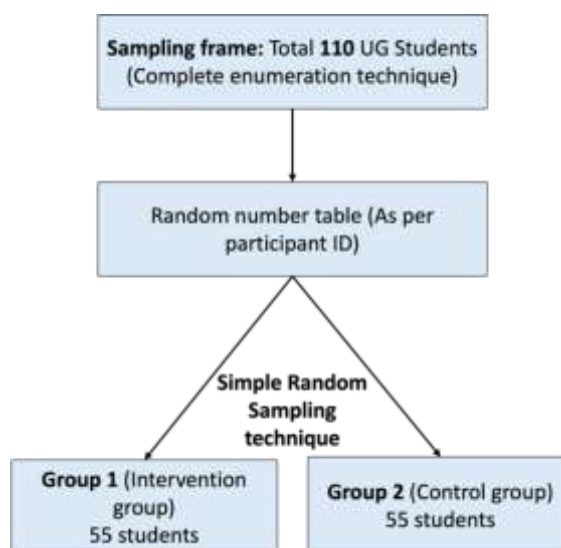


Figure 1: Sampling method

Intervention

The ARMI approach, using applied case-based discussions, role-play, and movie clips, was used in the intervention group (Group 1), whereas a conventional lecture-based teaching approach (Group 2) was used in the control group, with a teaching duration of two hours per group as described in the lesson plan. (Refer to figure 2)

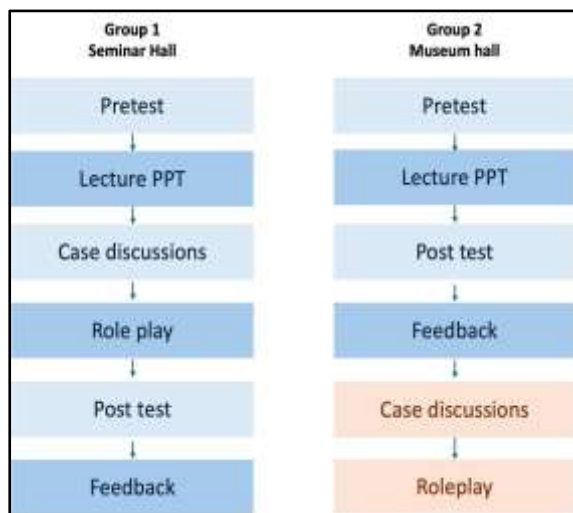


Figure 2: Lesson plan

The case-based discussions and role-plays used in the study were sourced from the Indian Kanoon website, a database of Indian legal case studies.^[13] Case studies were selected from the website that related to patient autonomy, medical negligence, and patient confidentiality. The case studies were selected for the study to simulate real-life scenarios and court cases drawn from public records under Section 52(1)(q)(iv) of the Copyright Act of India, 2012, which states that the publication of court judgements does not constitute an infringement of copyright.^[13] (Appendix-1)

Movie clips in English and Hindi were shown for each roleplay and case-based discussion, which were context-appropriate. Each clip shown was about fifty to sixty seconds long and covered topics such as patient autonomy, confidentiality, and medical negligence. The movie clips were shown first, followed by real-life Indian case studies and roleplays. (Appendix-1)

A structured questionnaire was used to assess the Knowledge, Comprehension, and Applicability of AETCOM module 3.5's fiduciary duty in both study groups before and after teaching. A total of 12 questions were designed, with 4 each addressing the competencies in the Cognitive, Affective, and Psychomotor domains. The questionnaire was validated by the subject experts. Both groups were asked to complete the pre-test questionnaire before the session began. The conventional lecture-based learning was conducted for both groups, after which only the control group was asked to complete the post-test questionnaire. The intervention group participated in case-based discussions and roleplays, preceded by movie clips, and then completed the post-test questionnaire. (Refer to Figure 2 for the lesson plan) Google Forms were shared to facilitate and expedite data collection at the end of the sessions.

Data Analysis

The effectiveness was assessed using an analysis of learning outcomes. Learning outcomes are defined as clear statements of what a learner is expected to

know, understand, and be able to do after completing a learning experience.^[15] These outcomes are commonly described across three domains: cognitive (knowledge), psychomotor (skills), and affective (attitudes), aiding in performance-based assessment.^[16] Assessment of learning outcomes is important not only for determining whether the educational objectives have been achieved but also for ensuring accountability, supporting learner progression, and guiding continuous improvement in medical education.^[17]

Descriptive statistics were used to summarise participant characteristics and domain-wise scores. Continuous variables were expressed as mean $\pm$ standard deviation (SD) and 95% confidence intervals (CI). Since the domain scores were ordinal and not normally distributed, nonparametric tests were used for inferential analysis. The Wilcoxon signed-rank test was applied to assess within-group changes between pre-test and post-test scores, while the Mann-Whitney U test was used to compare scores between the intervention and control groups. A p-value <0.05 was considered statistically significant.

To evaluate the intervention's effectiveness, three commonly used measures of learning gain were used. The scores were calculated using the following methods: Absolute learning gain was calculated as: Absolute learning gain = $[(\% \text{ post-test}) - (\% \text{ pre-test})]$. Relative learning gain was calculated as: Relative learning gain = $[(\% \text{ post-test}) - (\% \text{ pre-test})] / (\% \text{ pre-test}) \times 100$, and normalised gain (g), calculated as: Normalised gain (g) = $[(\% \text{ post-test}) - (\% \text{ pre-test})] / [100 - (\% \text{ pre-test})]$. This method is known as Hake's normalised gain (g), which measures the actual gain relative to the maximum possible improvement (18). Based on the Hake gain, the intervention's effectiveness was classified as low (0–0.29), moderate (0.30–0.69), or high (0.70–1.00). An educational intervention was considered effective if the Hake gain exceeded 30%.^[18]

Feedback

Collected using a Likert-scale questionnaire, which was shared at the end of the lesson, with responses on a 5-point scale from strongly disagree to strongly agree. The questionnaire demonstrated a Cronbach's alpha of 0.911, thus confirming its reliability. The feedback focused on teaching methods, student engagement, and the incorporation of interactive elements into future sessions.

RESULTS

The present study was conducted to assess and compare the effectiveness of the ARMI teaching method with traditional methods in AETCOM modules among MBBS students. The students who consented to participate were divided into two groups, and Group 1 (Intervention Group) received the ARMI teaching methods in addition to the

traditional method. The assessment was conducted at the end of the sessions for both groups and primarily focused on questions that elicited responses across the cognitive, affective, and psychomotor domains, assessing skills in handling ethical issues.

General characteristics of the participants

A total of 110 students were recruited and equally allocated to two groups. Group 1 comprised 38 males and 17 females with a mean age of 21.39 years (SD ± 1.07 years). Group 2 included 22 males and 33 females with a mean age of 21.44 years (SD ± 0.89 years) and a median age of 21 years. None of the participants had prior training in ethics or AETCOM.

Table 1: Learning gain analysis

Group	Domain	Mean pre-test score	Mean Post-test score	Pre-test (%)	Post-test (%)	Absolute Gain	Relative Gain (%)	Normalized Gain (g)	Interpretation
1	Cognitive	3.1	3.5	77.5	87.5	10	12.9	0.44	Medium gain
	Affective	3.1	3.4	77.5	85	7.5	9.7	0.33	Medium gain
	Psychomotor	2.5	3	62.5	75	12.5	20	0.33	Medium gain
	Total	8.6	10	71.7	83.3	11.7	16.2	0.41	Medium overall gain
2	Cognitive	3.4	3.5	85	87.5	2.5	2.9	0.17	Low gain
	Affective	3.5	3.4	87.5	85	-2.5	-2.9	-0.2	Negative gains
	Psychomotor	2.8	2.8	70	70	0	0	0	No gain
	Total	9.7	9.8	80.8	81.7	0.83	1.1	0.05	Low overall gain

**Individual domain scores are out of 4, and the total score for each group is out of 12*

Students' performance in the cognitive domain of AETCOM on the role of fiduciary duty in the doctor-patient relationship

The improvement in mean pre-test scores in the cognitive domain following the intervention is shown in Table 2. The mean pre-test score for Group 1 increased from 3.07 ± 0.92 to 3.55 ± 0.57 in the post-test, whereas in Group 2, the mean score increased marginally from 3.36 ± 0.78 to 3.55 ± 0.60 . The normalised gain (Hake's gain, g) for Group 1 was 0.44, indicating moderate effectiveness of the intervention, while Group 2 demonstrated a low normalised gain of 0.17 (Table 1). The mean

difference in cognitive scores was higher in the intervention group (0.47 ± 1.05 ; 95% CI: 0.19–0.76) than in the control group (0.18 ± 0.94 ; 95% CI: –0.07 to 0.44). Within-group analysis using the Wilcoxon signed-rank test showed a statistically significant improvement in cognitive scores among students in the intervention group ($p = 0.002$), whereas no significant change was observed in the control group ($p = 0.173$). Between-group comparison using the Mann–Whitney U test showed no significant difference at baseline ($p = 0.094$) or post-intervention ($p = 0.920$). [Table 3]

Table 2: Domain-wise differences in scores

Mean difference in cognitive scores ± SD			
Group	Mean difference ± SD	95% CI	P
Intervention group	0.47 ± 1.05	0.19–0.76	0.112
Control group	0.18 ± 0.94	-0.07–0.44	
Mean difference in affective scores ± SD			
Group	Mean difference ± SD	95% CI	P
Intervention group	0.38 ± 1.16	0.07–0.70	0.092
Control group	-0.09 ± 0.91	-0.34–0.15	
Mean difference in psychomotor scores ± SD			
Group	Mean difference ± SD	95% CI	P
Intervention group	0.53 ± 0.88	0.29–0.76	0.001*
Control group	0.02 ± 1.13	-0.29–0.32	

Table 3: Between-groups and within-groups comparison

Domains	Intervention group (Mean $\pm$ SD)	Control group (Mean $\pm$ SD)	Mann-Whitney U-test p (between)
Cognitive			
Before	3.07 ± 0.92	3.36 ± 0.78	0.094
After	3.55 ± 0.57	3.55 ± 0.60	0.920
Wilcoxon's test	$p = 0.002$	$p = 0.173$	
Affective			
Time	Intervention group (Mean $\pm$ SD)	Control group (Mean $\pm$ SD)	p (between)
Before	3.04 ± 1.00	3.49 ± 0.57	0.015
After	3.42 ± 0.63	3.40 ± 0.74	0.891
Wilcoxon's test	$p = 0.025$	$p = 0.517$	
Psychomotor			

Before	2.49 ± 0.84	2.80 ± 0.65	0.018
After	3.02 ± 0.62	2.82 ± 0.82	0.219
Wilcoxon's test	p < 0.001*	p = 0.871	

Students' performance in the affective domain of AETCOM on the role of fiduciary duty in the doctor-patient relationship

The mean score for Group 1 increased from 3.04 ± 1.00 in the pre-test to 3.42 ± 0.63 in the post-test, whereas in Group 2, the mean score decreased slightly from 3.49 ± 0.57 to 3.40 ± 0.74 (Table 2). The normalised gain (Hake's gain, g) for Group 1 was 0.33, indicating moderate effectiveness of the intervention, while Group 2 showed a negative gain (-0.20), indicating a decline in performance (Table 1). The mean difference in affective scores was 0.38 ± 1.16 (95% CI: 0.07–0.70) in the intervention group and -0.09 ± 0.91 (95% CI: -0.34 to 0.15) in the control group. Wilcoxon signed-rank testing demonstrated a statistically significant improvement in affective domain scores in the intervention group ($p = 0.025$), whereas no significant change was observed in the control group ($p = 0.517$). Baseline affective scores differed significantly between groups (Mann–Whitney U test, $p = 0.015$); however, post-test scores were comparable between groups ($p = 0.891$). The difference in mean change scores between groups was not statistically significant ($p = 0.092$). [Table 3]

Students' performance in the Psychomotor domain of AETCOM on the role of fiduciary duty in the doctor-patient relationship

The mean score for Group 1 increased from 2.49 ± 0.84 in the pre-test to 3.02 ± 0.62 in the post-test, whereas in Group 2 the mean score remained largely unchanged (2.80 ± 0.65 to 2.82 ± 0.82) (Table 2). The normalised gain (Hake's gain, g) for Group 1 was 0.33, indicating moderate effectiveness of the intervention, while Group 2 showed no measurable gain ($g = 0.00$) (Table 1). The mean difference in psychomotor scores was 0.53 ± 0.88 (95% CI: 0.29–0.76) in the intervention group compared with 0.02 ± 1.13 (95% CI: -0.29 to 0.32) in the control group. Within-group comparison using the Wilcoxon signed-rank test showed a highly significant improvement in psychomotor scores in the intervention group ($p < 0.001$), whereas no significant change was observed in the control group ($p = 0.871$). Although the intervention and control groups differed significantly at baseline ($p = 0.018$), post-test scores were not significantly different ($p = 0.219$). However, comparison of mean change scores demonstrated a statistically significant advantage of the intervention over the control group ($p = 0.001$), indicating superior improvement in psychomotor learning outcomes. [Table 3]

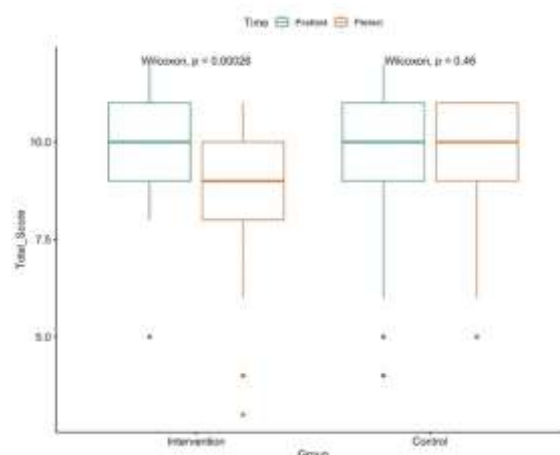


Figure 3: Pre-test post-test score comparison between groups

Feedback

Overall, students from both groups reported positive perceptions of the sessions, with responses in the intervention arm relatively better. Most participants agreed or strongly agreed that the session improved their understanding of fiduciary duty in medical practice (Group 1: 96.4%; Group 2: 94.6%). However, a higher proportion of strong agreement was observed in the intervention group (58.9%) compared to the control group (36.4%). Similarly, both groups perceived the teaching methods to be effective in helping them reflect on their ethical responsibilities (Group 1: 98.2%; Group 2: 94.5%). Strong agreement was again higher in the intervention group (58.9% vs. 43.6%). Regarding engagement, most students reported remaining attentive throughout the session, with higher levels of strong agreement in the intervention group (51.8%) than in the control group (30.9%). A majority of students in both groups preferred that future ethics sessions include more interactive elements, such as case discussions, role-play, and videos. This preference was stronger in the intervention group (strongly agree: 58.9%) compared to the control group (25.45%).

DISCUSSION

The National Medical Commission (NMC) envisions the Indian Medical Graduate as a clinician, leader, communicator, and lifelong learner.^[19] To ensure training is aligned with this vision, the NMC has proposed new teaching and learning approaches, including a structured longitudinal programme on attitude, ethics and communication.^[7] NMCs' attempt to implement AETCOM training longitudinally aims to develop clinicians with a strong understanding of ethics in practice, built on a robust foundation established in undergraduate education.^[7] However, the foremost

challenge in implementation is the teaching method, specifically the need to reform traditional methods that primarily focus on the cognitive domain of learning.^[20] Since competency-based curricula and AETCOM have been introduced into the undergraduate medical curriculum fairly recently, there is a need to explore and evaluate the effectiveness of various pedagogical approaches.^[20,21] This study used the AETCOM module to teach more engagingly, enabling students to understand, retain and reproduce it for future clinical practice.

From an educator's perspective, evaluating curricular effectiveness requires objective measures that capture meaningful gains in knowledge and skills across learning domains, particularly in competency-based higher education.^[22] The concept of learning gain provides a useful framework in this regard, as it aligns with metrics such as statistical significance, which are sensitive to pretest scores, the normal distribution of data, and sample size, and focuses on the extent of change achieved through the educational intervention.^[22,24] Furthermore, evidence suggests that a learning-gains approach can inform policy and practice by promoting a holistic, integrated curriculum, aligned assessment design, and a research-informed pedagogical perspective.^[23] In the present study, this approach was explored along with inferential analysis to quantify gains in ethics education.

Overall, the intervention group showed moderate learning gains in post-test scores across all three learning domains, whereas the control group showed minimal or no improvement. Moreover, in the affective domain, the control group showed a loss of potential gain. The highest normalised gain was achieved in the cognitive domain (44%), whereas in the affective and psychomotor domains, the gains were similar (33% each). A study by Banait, Shashank et al. reported similar findings, with the cognitive domain showing higher gains than the affective or psychomotor domains.^[4] This indicated that while the ARMI technique is useful for improving knowledge, it is less effective for improving outcomes in skills and attitude domains. Another explanation is that the mode of assessment for these domains is not simulation-oriented as per available evidence, which would have yielded more tangible results. A study by Khaliq et al. also reported similar findings, in which movie clips increased knowledge and understanding of concepts. The use of visual representations of the scenarios enhances students' understanding.^[14] Similarly, Varma et al. have shown that roleplay is a game-changer in teaching communication modules. While our findings are consistent with those of others, augmenting knowledge of AETCOM is amenable to interactive interventions and, with training, can be improved. However, there is limited evidence on an integrated multi-modal intervention approach which combines the methods used in the present study.

Limitations

This study has certain limitations. First, it was conducted using a quasi-experimental design due to resource constraints. A more robust experimental design with stricter randomisation could provide stronger evidence and better outcome assessment. Second, although the questionnaire-based assessment was useful for evaluating the cognitive and, to some extent, the affective domains, it was limited in assessing skill gain in the psychomotor domain. The inclusion of simulation-based "shows how" methods could have provided a more objective, competency-based evaluation of skills. However, this could not be implemented due to feasibility and logistical constraints. Future studies with larger and multicentric samples are needed. Finally, long-term follow-up was not conducted. Evaluation of retention, the need for refresher training, and the applicability of learning during internship and postgraduate practice would provide more meaningful insights into the sustainability of this approach. As this is a novel approach, further evidence is required to establish its effectiveness and replicability in similar settings.

We also encountered certain challenges during the implementation of this intervention. First, there was a lack of consensus on a single standardised approach for teaching and integrating such concepts, largely due to the diverse and often polarising influence of media and differing perceptions among faculty. Second, there was limited existing evidence in the literature to support the intervention or to draw robust conclusions, as this remains an emerging area in medical education. Another challenge was the limited availability of expert input, particularly from the ethical and interdisciplinary domains, which could have further strengthened the intervention. Additionally, there was a lack of prior sensitisation and structured training among healthcare professionals, which affected implementation and scalability.

Addressing these challenges requires a systematic, interdisciplinary, and evidence-based approach. Future studies, using the designs proposed above, may help generate stronger evidence and support the development of structured and replicable models in similar educational settings.

CONCLUSION

Based on the findings of this study, we conclude that the ARMI (Applied Roleplay Media Integrated) approach, as a novel teaching strategy, was effective in improving learning gains mainly in the cognitive domain, with moderate gains also observed in the affective and psychomotor domains among undergraduate medical students. These findings suggest that, despite the AETCOM module often being challenging to implement, ethics education can be effectively integrated into the medical curriculum through structured training and

innovative approaches. However, considering the study limitations, existing gaps in the literature, and implementation challenges, further studies are required to generate stronger evidence and support wider adoption of this approach.

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