Section: Obstetrics and Gynaecology

Original Research Article

ACQUAINTANCE AND ACCEPTANCE OF INNOVATIVE INTERACTIVE LEARNING METHODOLOGY IN UNDERGRADUATE MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Medical education aims to produce a medical graduate who is capable of taking care of health care needs of the society. Interactive teaching learning method is a form of teaching where students are actively involved in the learning process which makes learning more interesting, helps in better retention and promotes higher thinking. **Aim and Objective:** The aim and objective of study is: (i) to identify acquaintance of interactive teaching methods among undergraduate students, (ii) to assess acceptability of interactive learning methods over lecture.

Material and Methods: A descriptive cross-sectional study was conducted focussed on teaching four different topics in Obstetrics and Gynaecology by four interactive methods viz., demonstration (D), flipped classroom (FC), role play (RP) and case-based-learning (CBL). After completion of study pre-validated multiple choice questionnaire was given to 100 undergraduate students of which 25 students each were randomly selected from four different MBBS years.

Results: Students' responses were obtained after voluntary consent to participate in the study. Data was entered in Microsoft Excel sheet and SPSS version 22 and results were obtained. Our study showed that 98% students are aware of the interactive methods. Case based learning (61%) was accepted as the most preferred method followed by demonstration (26%) as most interesting, comprehensive and retentive method. 64% students were inclined to have 1-2 hours of daily interactive session.

Conclusion: Students' are aware of interactive learning and accept the inclusion of innovative interactive methods in their learning session.

Key Words: innovative interactive learning, classroom lecture, active learning, passive learning.

INTRODUCTION

Medical education has evolved in recent times. Lecture is most common method of teaching since ages but need to find innovative interactive teaching methods to remove or improve lecture must be in minds of old scholars also. In 1999, Yvonne Steinert & Linda S. Snell considered different teaching methods with two-way interaction between presenter and participant.[1] In 1986, Fredrick stated lecture method will stay but interactive strategies

will make student more involved, satisfied and informed and thus the teacher.[2]

Missing interaction between teacher and student makes classroom lecture monotonous after 20 minutes of attention span for an average student was shown in a 1978 study by Stuart J et al.[3] Innovative interactive teaching method encourages active-participation, influences student behaviour and promotes higher-thinking. Verma A et al showed that it motivates for self-directed learning that is a lifelong process in medical education.[4] Methods of delivering lecture have also evolved. Various aids to absorb visual and auditory information e.g., chalkboard, overhead projectors and Microsoft PowerPoint Presentation in present times are interesting ways of delivering lecture shown in a study by Mahanta P et al.[5]

Medical teaching in clinical subjects is still a challenge for teaching faculty. Classroom lectures are insufficient for providing practical applicability of acquired knowledge in very demanding and stressful circumstances where life and well-being of a patient lies in timely diagnosis and management of sometimes critical clinical conditions as in Obstetrics and Gynaecology. As shown by Sharma KA et al hybrid interactive methods like blended e-learning with simulation-based training on Obstetrics and Gynaecology skills replicating clinical scenarios improves its practical applicability. The purpose of medical education is to produce a competent health-care professional who can provide effective clinical care.[6]

Well-trained medical undergraduate must have learning and understanding to deal with clinical emergencies for practical use at the time of need. Teacher works with the student to understand their weakness and strength and thus aid learning process to work on those aspects preferentially.

Educational health care institutes are globally experiencing continuous evolution and modernization. They are innovatively improving to make learning more effective. The Undergraduate Medical Education Board of National Medical Commission (NMC), New Delhi, India reinforced Curriculum Based Medical Education (CBME) for all medical colleges focusing on competency, trustable professional activity, tailored learning experiences, sequenced progression and programmatic assessment accounting for responsible, flexible and learner-centred approach.[7] NMC under Faculty Development Program (FDP) made Basic Course in Biomedical Research (BCBR) examination and Basic Course in Medical Education (BCME) training workshops to be compulsory for faculty. It is a mandate for medical college faculty upgradation under Medical Education Technology (MET) enhancing systematic teaching-learning experience to train students become competent doctors.[8]

MATERIAL AND METHODS

The study was conducted in Obstetrics and Gynaecology department of Rama Medical College Hospital and Research Center, Hapur, Uttar Pradesh state of India from January 2024 to June 2024. It was a descriptive cross sectional study conducted on a purposive sample of 100 MBBS students randomly selected from four batches comprising of 25 students from each batch. The students were taught four topics by four different interactive teaching methods as described in Table 1.

Students of four batches coming for early clinical exposure and clinical postings were taught four topics by four different interactive methods in an interval of 1-2 hours keeping 15 minutes for students' feedback and questions as follows:

1. Mechanism of labour was explained by demonstration on dummy and pelvis with no previous preparation.
2. Episiotomy was taught by flipped classroom method with power point presentation provided one week back consisting of pictures and bullet points for self-directed learning.
3. Antenatal follow up in OPD of patients was taught by role play with predesigned script provided one week back consisting of information on history taking, examination and antenatal advice in OPD.
4. Post-partum haemorrhage was elaborated by case based study showing placards with case scenarios assisted with audio-visual and pictures with no previous preparation.

Students were provided with prevalidated questionnaire (Appendix 1) at the end of study to assess the response to the inclusion of newer interactive teaching methods focussed on three categories

1. Acquaintance and acceptability of interactive teaching methods.
2. Learning style preference acceptability based on type of interactive method (case based learning, demonstration, role play, flipped classroom).
3. Formative assessment of acceptability of interactive teaching method based on Likert scale.

Pilot study for questionnaire setup

Prevalidation of questionnaire was done by conducting a pilot study on 20 MBBS students yielding Crohnbach's Alpha coefficient of 0.77 which showed satisfactory internal consistency and was acceptable.

Result Analysis

Statistical analyses to determine any significant differences between response and perception regarding awareness and accepting inclusion of interactive teaching methods in medical curriculum was performed by entering data into Microsoft Excel and interpreting results with SPSS version 22.

Categorical data was depicted as percentages, proportions or frequencies.

Ethical Approval

The study was conducted after briefing the students and taking their informed consent. Confidentiality was maintained and participants' identity was not revealed so ethical clearance was not mandatory. However, review board approval from Institutional Ethical Committee was obtained with reference number EC/RMCH&RC/2024/12.

Table 1: Description of the methodology of study conducted

Sl No.	Topic	Interactive teaching method	Props and preparation	Duration	Material provided
1.	Mechanism of labour	Demonstration	Dummy and pelvis	1-2 hour	At the spot
2.	Episiotomy	Flipped classroom	Power point presentation	1-2 hour	One week back
3.	ANC follow up in OPD	Role play	Predesigned script and participant student	1-2 hour	One week back
4.	Post-partum haemorrhage	Case based learning	Pictures, audio-visuals and placards with case scenarios	1-2 hour	At the spot

RESULTS

The age of students was in the range of 18 to 23 years. Out of 100 students, 61 were female and 39 were male. The knowledge and awareness of newer interactive teaching methods was seen in 98% students.

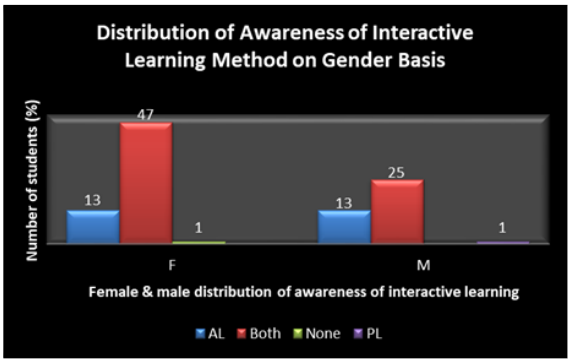

Figure 1: Distribution of awareness of interactive learning methods on the basis of gender. (AL-Active Learning; PL-Passive Learning; F-Female; M-Male)

The distribution of interactive learning method awareness on the basis of gender is shown in Figure 1. The chi square test (χ^2) calculated for the awareness of innovative interactive teaching methods on the basis of gender showed a value of 2.364 (χ^2) and a p-value of 0.5. Since $p > 0.05$ we failed to reject null hypothesis, hence there was no association found between gender and interactive learning method awareness or preference.

Active or interactive learning was known to 26% of students, passive or traditional learning to 1%, both methods to 72% and none to 1%. Although majority (99%) of the students were accepting the requirement of interactive methods into current curriculum, it was considered very important by 26%, important by 59%, slightly important by 14% and not important by 1%. All students (100%) felt that interactive methods will improve academic scores, 59% felt to a great extent, 40% somewhat and 1% very little. Although majority (50%) felt that classroom lecture is essential but should be aided with interactive lectures, 2% felt that it should be abolished and rest felt classroom lectures are very essential (13%) or essential (35%). The difference in male and female awareness and acceptability of interactive methods is depicted in Figure 2.

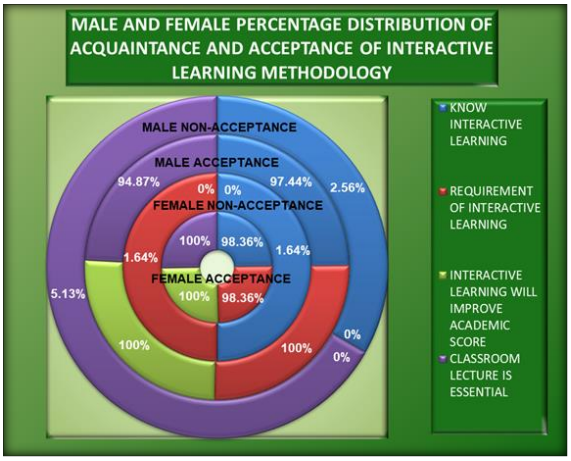

Figure 2: Distribution percentage of male and female pattern of acquaintance and acceptance of interactive teaching learning.

Majority of students (64%) response was that 1-2 hours of interactive learning sessions should be included in routine curriculum, 30% wanted <1 hour, 3% wanted >2 hours and 3% felt it is not required as shown in Figure 3.

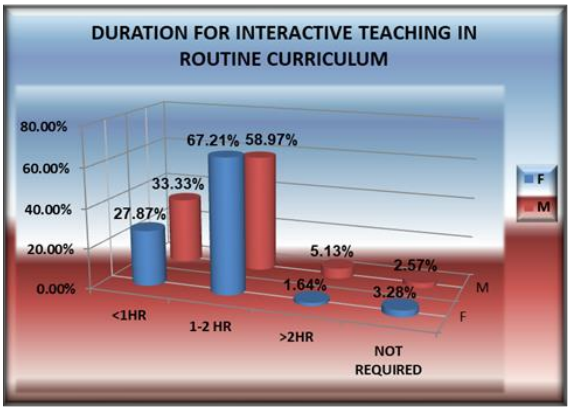

Figure 3: Students' response regarding duration of interactive learning sessions in routine curriculum. (F-Female; M-Male)

When asked about the preferred modality of teaching, majority of the students (53%) wanted more student-centered, 33% wanted more teacher-centered, 8% wanted student-centered only and 6% wanted teacher-centered only as shown in Figure 4.

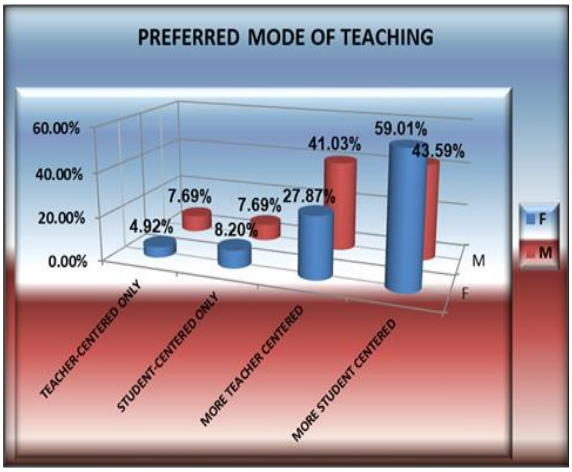

Figure 4: Response to the mode of learning implemented for teaching to students. (F-Female; M-Male)

For categorical representation proportions are shown in figures above. The differences in standard deviation and mean are presented in Table 2.

Learning style preference acceptability to four types of teaching methods is shown in Figure 5. The students' response showed that case based learning (C) followed by demonstration (D) was the most preferred method (C61%,D26%) in terms of comprehensibility (C54%,D36%), interesting (C50%,D27%), retain and recall (C45%,D34%), conveying objective of the topic (C50%,D37%) and promoting higher thinking (C66%,D18%); also considered best for academic growth with the incorporation of multimedia such as power point presentation, audio-visual and digital aids (C53%,D34%) and as most decentralized form of teaching method i.e., directed from student to teacher (C39%,D25%).

Lesser students chose role play (R) followed by flipped classroom (F) for preferable (R10%,F3%), comprehensive (R6%,F4%), interesting (R22%,F1%), retain and recall (R17%,F4%), convey objective of topic (R10%,F3%), promote higher thinking (R11%,F5%) and decentralized form of study (R23%,F13%). Flipped classroom was considered better than role play for academic growth with incorporation of digital and multimedia (F8%,R5%).

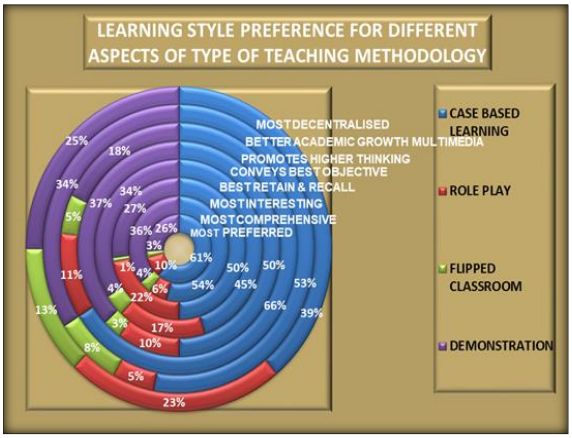

Figure 5: Students' learning style preference for different aspects of four types of interactive teaching methodology

The coefficient of determination (R^2) for the regression analysis of four types of teaching methods as depicted in Figure 6 shows flipped classroom has better chance of acceptability as compared with other methods. Also, the correlation coefficient (ρ) shows that role play and flipped classroom combined together have better acceptability than other methods as depicted in Table 3.

The learning style preference for four different types of study showed a Chi square (χ^2) of 65.004 with a corrected value of 32.67 and p-value of 2.17056E-06 (0.00000217) that is significant at 5% level of significance to show that students show acceptance for interactive teaching methods. [Table 3]

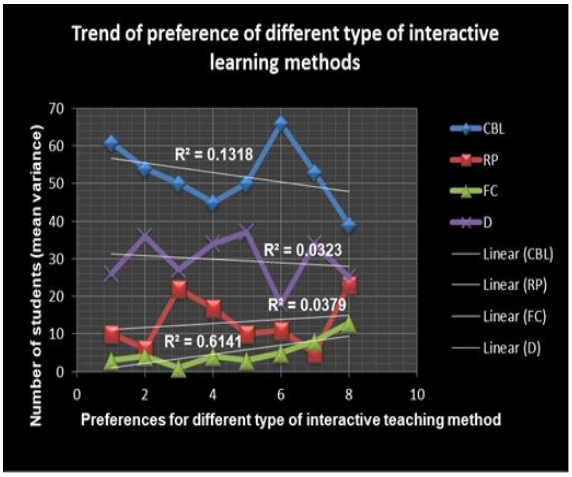

Figure 6: Scatter diagram showing preference for different types of teaching method

A formative assessment questionnaire was also provided to assess the response of students towards acceptance of interactive learning sessions on Likert scale with the responses varying as strongly agree (score 4), agree (score 3), disagree (score 2) and strongly disagree (score 1). The response of students is presented in Table 4 as proportions.

Figure 7 shows that a majority 98% of the students felt that interactive methods remove communication

gap and increase teacher approachability. Students' response for classroom lecture being overused as it is a convenient teaching method was agreed by 81%. The response for MCQ following any teaching method helps to improve learning was agreed by 90%. Medical education should aim for more practical approach than theoretical as students have to clinically practice i.e. medical education should deviate from theory to more practical was agreed by 98% students. Also, in modern clinical scenario inclusion of Artificial Intelligence (AI) such as Chat GPT and robotic surgery has been a rising trend in health care delivery system. Majority i.e., 93% students felt that a new practical-based interactive learning focusing on skill enhancement of clinical knowledge with integration of electronic, digital and AI-based advanced approach looks promising for future of medical students. Nearly 96% students felt that its very satisfying to have such periodic questionnaire based survey considering students' opinion in modifying learning methodology.

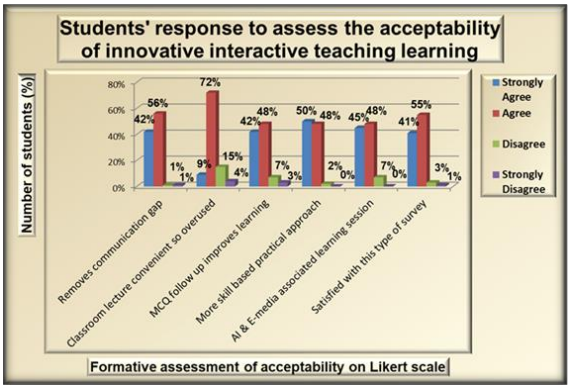

Figure 7: Bar diagram representing assessment of acceptability of innovative teaching learning methodology on Likert scale

The calculated Chi square value (χ^2) for assessment of acceptability was 67.924 with corrected value of 24.995 and p-value of 1.04393E-08 (0.0000000104) at 5% level of significance showing excellent acceptance of interactive teaching methods in formative assessment.

Table 2: Evaluation of students' response to acceptance of integrating interactive learning sessions

Acceptability of integration of interactive learning (Most preferred response)	Standard deviation (Mean)
1. Know interactive methods (Yes)	0.542 (3.69)
2. Requirement of interactive methods (Yes)	0.765 (3.43)
3. Duration in routine curriculum (1-2 hour)	0.698 (3.55)
4. Integration improve academic score (Yes)	0.513 (3.58)
5. Preferred teaching model (More student-centered)	1.046 (3.08)
6. Value of classroom lecture (Essential but aided with interactive sessions)	0.958 (3.11)

Table 3: Analysis of correlation between four different types of study

Type of method	R^2		Type of method	Correlation coefficient (ρ)
1. Case Based Learning (CBL)	0.1318		1. CBL-D	-0.39905
2. Demonstration (D)	0.0323		2. CBL-RP	-0.60174
3. Role Play (RP)	0.0379		3. CBL-FC	-0.45646
4. Flipped Classroom (FC)	0.6141		4. D-RP	-0.37413
Chi square test (χ^2)	65.004		5. D-FC	-0.18067
p-value	2.17E-06		6. RP-FC	0.193177

Table 4: Formative assessment of students' acceptability of integration of interactive teaching methods in medical curriculum

Assessment of acceptability of interactive teaching methods	Standard deviation (Mean)	Mode
1. Help in removing communication gap and increase approach to teacher	0.564 (3.39)	3
2. Classroom lecture is convenient so overused	0.617 (2.86)	3
3. MCQ assessment following any teaching method improves learning	0.725 (3.29)	3
4. Medical education deviate from theory to skill-based practical learning	0.538 (3.48)	4
5. Practical-based teaching include AI-based advanced education as robotic surgery and ChatGPT have become a part of clinical practice	0.613 (3.38)	3
6. Periodic survey for student opinion-based modifications/reformations for incorporating digital and AI based interactive learning are satisfying	0.592 (3.36)	3

DISCUSSION

Medical education aims to produce independent health care professional capable of taking care of health needs of society. For ages lectures are centre of education in pre-clinical years. Our study showed that medical students are well aware of newer interactive methods that help them to build clinical acumen as it requires more skill and competency based practical knowledge. Fernández-Rodríguez CA et al stated that classroom lectures are not negatively assessed by students but they are overused for teaching.[9] Our study showed undergraduate medical students are inclined to have 1-2 hours of interactive learning sessions with classroom lectures. They also show inclination for more student-centred approach for better academic scores.

Methods are designed on basis of how students and teacher learn. Interactive teaching makes more communication between teacher and student. Our study focussed on four types of method viz, case

based learning, demonstration, role play and flipped classroom. We found that although case based learning is the most favourable individual method but flipped classroom fit more towards imparting higher thinking and self-directed learning. Also, it was inferred that hybrid method after combining flipped classroom with role play gives better impact on teaching skill-based learning. Similar study was done by Cheema et al by using case based learning followed by MCQ based evaluation. It had consistent results with our study.[10] Another studies using MCQ, flipped classroom and confusion technique by Panda et al and using brainstorming, MCQ and confusion technique by Buch et al also had results similar to our study.[11,12] For improving communication skill of student in clinical practice role play is a reliable method. It also benefits introvert and low scoring students to learn by performing as shown by Lavanya et al.[13] Role play also has certain limitations as were described by Bella Stevanny et al. There is high variability in role play due to limited literature. Role play requires preparations before, during and after teaching session that demands additional time.[14] Flipped classroom enhances self-directed learning but it has limited benefits. Ramnanan CJ et al observed that in flipped classroom there was insufficient student preparation and active learning process was suboptimal structured due to lack of direction.[15] Study design might adversely affect desired outcome even when it is most favoured. The purpose and premise of professional development program requires learning style preferences to be sorted by both teachers and students as suggested in a study by Kennedy MM et al.[16]

CONCLUSION

Based on our study present day students are acquainted with the concept of innovative interactive learning and they showed increased acceptance towards introduction of interactive methods in undergraduate medical education. Each student has different style of learning. In our study case based learning followed by demonstration was the most accepted tool for clinical teaching. Role play and flipped classroom although effective required prior preparation. However, hybrid methods may also improve attention, higher thinking, competency and leadership required from Indian Medical Graduate. Medical education should be flexible enough to accommodate and incorporate multidisciplinary teaching models effectively and appropriately from beginning of preclinical years to increase attendance and attention span. Students also acknowledged that survey conducted for periodic formative assessment is a beneficial aspect of feedback learning.

Limitations: Interactive teaching methods although more effective than lecture but students and teachers require additional time to prepare for each session. Methods need prior student sensitization, more number of faculties and their active involvement. The study was done in a single institute on a small purposive sample in a short duration due to paucity of infrastructure and manpower. The future interventional studies conducted in different institutes are recommended with larger population.

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Author Contributions: All authors have made a significant contribution in the completion of the work, that comprises of conception, study design, execution, acquisition of data, analysis and interpretation in all areas; they also participated in drafting, revising or critically reviewing the article and gave final approval of the version to be published; they have agreed on the journal to which the article has been submitted; and agreed to be accountable for all aspects of the work.

Conflict of interest: There are no conflicts of interest.

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APPENDICES

Appendix 1: Prevalidated questionnaire provided at the end of study to the students.

Set of 20-Questionnaire in three categories
I. Acquaintance and acceptance specific questionnaire:
Q1. Which teaching methods do you know? (a) Active learning/Interactive teaching method, (b) Passive learning/Conventional teaching method, (c) Both, (d) None; Q2. Do you feel that there is a requirement for newer interactive teaching method? (a) Very important, (b) Important, (c) Slightly important, (d) Not important; Q3. How much duration of newer interactive teaching methods should be included in your daily schedule along with traditional teaching method? (a) <1 hour, (b) 1-2 hour, (c) >2 hour, (d) Not Required; Q4. Do you think these newer methods will improve your academic score? (a) To a great extent, (b) Somewhat, (c) Very little, (d) Not at all; Q5. Which teaching method do you prefer most?

(a) Teacher-centered only, (b) Student-centered only, (c) More teacher-centered, (d) More student-centered;

Q6. How do you value role of traditional teaching method i.e., classroom lecture in modern medical education system?

(a) Very essential, (b) Essential, (c) Essential but aided with other methods, (d) Can be abolished.

II. Questionnaire based on the type of learning method:

(a) Demonstration, (b) Flipped classroom, (c) Role playing, (d) Case-based learning.

Q7.Which of the following interactive teaching methods would you prefer most?

Q8. Which of the following teaching method is most comprehensive i.e. gives you best understanding of subject?

Q9. Which of the following teaching method is most interesting?

Q10.Which of the following teaching methods do you think contributes more towards retaining and recall of topic/subject?

Q11.Which teaching method you think conveys best objective of topic?

Q12.Which teaching method you think promoted higher thinking?

Q13. In present era of multimedia incorporation (power-point, audio-visuals, digital-classroom etc.) which interactive methods you think could offer better prospect of academic growth?

Q14. Which teaching method you think is best decentralized form of study approach (learning directed from student to teacher)?

III. Questionnaire for formative assessment on the basis of Likert scale:

(a) Strongly agree, (b) Agree, (c) Disagree, (d) Strongly disagree.

Q15. Do you think interactive teaching method helps in removing communication gap and make teacher more approachable?

Q16. Do you think traditional teaching method (classroom lecture) is convenient so overused?

Q17. Do you think every teaching method if immediately followed by MCQ assessment helps in improving learning?

Q18. Do you think medical education being a form of skill-based professional training should deviate approach from theory to more practical?

Q19. Do you think in changing scenario where Artificial Intelligence such as ChatGPT and robotic surgery in hospitals has become an integral part of health care system, practical based newer teaching methods should be included in curriculum?

Q20. Are you satisfied with this kind of periodic questionnaire based survey based on student opinion in modifying teaching methods that shape their future in view of incorporation of multimedia and AI in present day clinical practice?

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