

# Evaluation of Near Peer Assisted Approach for facilitating Early Clinical Exposure in Pre-clinical Year Medical Students: A Mixed Method Analysis

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## Abstract

**Introduction:** Peer assisted learning has a sound evidence base in healthcare education with documented benefits to students and peer teachers. The study was undertaken to evaluate effectiveness of near peer approach to facilitate early clinical exposure (ECE) in pre-clinical year medical students.

**Methodology:** Six ECE topics were identified in Biochemistry. First year medical students (n=120) were included as tutees and medical interns (n=12) as tutors. Small group sessions were conducted over 6 months. Mixed method evaluation was undertaken. Tutees and tutors responded to evaluation questionnaires which were quantitatively analysed. Tutees' reflections and tutors' transcribed interviews were subjected to thematic analysis. Formative assessment was taken after each session and final feedback at end of university exams.

**Results:** Participation rate was from 93.3 to 96.7% and response rate for evaluation was 89%. Students' score was 77.1 to 80.7%. Tutees rated the sessions' effectiveness as high on various dimensions of Student Evaluation of Educational Quality (SEEQ) Questionnaire with a mean score of  $4.95 \pm 0.45$  for the course and  $4.91 \pm 0.34$  for the instructors. Mean score for tutors' self-perceived usefulness was  $4.83 \pm 0.41$ . Themes were classified in three categories; perceptions about content, process and outcome.

**Conclusion:** Content of ECE tools and process of 'near peer assisted learning' was well perceived by tutors and tutees. Outcomes were well achieved through acceptable scores in assessments (tutees) and 'deeper learning by teaching' and 'improvement in teaching skills' (tutors). By generating evidence through a comprehensive evaluation process, we present argument for near peer assisted learning as an effective tool for facilitating ECE.

**Keywords:** Early Clinical Exposure (ECE), Near Peer Assisted Learning (NPAL), Peer Assisted Learning (PAL), Mixed method evaluation, Thematic analysis

## Introduction

Early clinical exposure (ECE), one of the unique features of the competency-based medical

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curriculum, facilitates comprehension of knowledge of basic sciences, emphasizing clinical applicability (Competency based undergraduate curriculum 2019, Sirsikar *et al.* 2021, Shivkar, 2020). For effective teaching of ECE, small group interactive setting with provision for discussion and feedback is desirable. However, there are several barriers to its effective implementation; shortage of faculty



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and heavy workload being the most commonly described (Ewnte and Yigzaw, 2023).

The term 'near peer assisted learning' (NPAL), introduced by Whitman in 1988, is often used interchangeably with the term 'peer assisted learning' (PAL), referring to student tutors at the same stage or at an advanced stage in training as their tutees respectively. A sufficiently inclusive working definition is 'people from similar groupings, who are not professional teachers, helping each other to learn and learning themselves by teaching' (Topping, 1996). The concept is not new to medical education and published accounts of medical students as teachers first began in the 1990s. Dual requirement to improve teaching quality while 'doing more with less' is an accepted reason for interest in peer tutoring (Topping, 1996). There is evidence that NPAL can enhance and supplement the role of professional teachers in laboratory and clinical education (Carr *et al.*, 2011, Ten Cate and Durning 2007, Tolsgaard *et al.*, 2007). However, growing global interest in NPAL in higher education calls for more qualitative research so as to explore the process in more depth and describe the intangible factors that influence the teaching learning experiences (Carr *et al.*, 2016).

Our previous work, published in the year 2018, was one of the few Indian studies that validated use of NPAL for undergraduate medical students in clinical settings (Sethi *et al.*, 2022). In a commitment to broaden its applicability and to provide comprehensive insights into the lived experiences and perspectives of tutors and tutees, the present study was planned to evaluate the effectiveness of near-peer approach for facilitating ECE in pre-clinical year medical students.

## Methodology

This quasi-experimental study was conducted at Department of Biochemistry, BPS Government Medical College for Women, Sonapat, Haryana over duration of 8 months (April- November 2022)

and final evaluation cycle was undertaken in March 2023 after the university exams.

### (A) Selection of Topics and Development of ECE tools

Nominal group technique was utilized amongst departmental faculties (n=3), postgraduates (n=5) and demonstrators (n=3) to identify ECE competencies listed in the NMC curriculum for Biochemistry. Six competencies were finalized and ECE tools were developed by authors in coordination with clinical faculty (table-1). The draft module was reviewed and approved by all authors, departmental faculty and institutional Curriculum Committee.

### (B) Participants

Near-peer tutors: Call for voluntary participation was given to academic year 2017-18 undergoing compulsory rotating medical internship (CRMI 2022).

Tutees: ECE is a part of the competency based curriculum for first year and all 120 students of academic year 2021-22 were included. Participation in the evaluation process was voluntary and if any student was unwilling to give feedback, it was considered as an exclusion criterion.

### (C) Designing the Framework

The following frameworks were referred to; Association for Medical Education in Europe guideline no. 30 (Ross and Cameron 2007), twelve tips for peer assisted learning (Wadoodi and Crosby, 2002) and ten dimensions for typology of peer tutoring (Topping, 2022).

### (D) Preparation for Conduction of Sessions

An orientation session was conducted for the tutors wherein framework of the program, instructions regarding conduct of the sessions and clinical tools for the respective ECE sessions was discussed. Tutors were also given eight hours training (four shifts of two hours each)

about the intricacies of teaching including small group discussion, adult learning, etc. Finally, mock tutorials with critical evaluation and feedback were undertaken.

#### (E) Conduction of NPAL Sessions

Hours for ECE are already allotted in the competency based timetable (3 hours per month)

and sessions were conducted in these time slots. The program was implemented in six cycles over six months (one topic per cycle) in small group settings of 10 tutees and one tutor each. This was as per literature wherein the ratio described for peer tutoring is 1:3-10 (Olausson *et al.*, 2016). During the session, tutors discussed clinical context of the competencies using the respective clinical aids (Table 1).

**Table 1: Summary of the six biochemical competencies/topics and the corresponding ECE tool**

| S. No. | Learning Objectives                                                                                          | ECE Tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Describe and discuss enzyme inhibitors as poisons and drugs and as therapeutic enzymes                       | <ul style="list-style-type: none"> <li>• OPD cards with case scenarios</li> <li>• Relevant laboratory investigation reports prepared in coordination with physicians (e.g. Gout, hypertension, Hypercholesterolemia, Coronary Artery disease, Organophosphorus poisoning, Alcoholism, Acute Lymphoblastic leukemia, methanol poisoning etc.)</li> <li>• Vacutainers to be used for various biochemical estimations (e.g. grey vacutainer for plasma glucose estimation)</li> <li>• Prescriptions of drugs for various clinical conditions and their commercially available forms (e.g. Allopurinol, Aspirin, Atorvastatin, Co-trimoxazole, Ramipril) along with explanation for biochemical basis of their mode of action.</li> <li>• Consent form explaining the anticipated effects of Disulfiram based on its mode of action</li> <li>•</li> </ul> |
| 2      | Explain the basis and rationale of biochemical tests done in diabetes mellitus                               | <ul style="list-style-type: none"> <li>• OPD cards with case scenarios for screening, diagnosis or monitoring of response to treatment in diabetes mellitus and its complications, as per the American Diabetes Association criteria,</li> <li>• Relevant laboratory investigations, prepared in coordination with physicians aimed to explain rationale and interpretation of biochemical tests, with special emphasis on HbA1c.</li> <li>• Test tubes with relevant bed-side tests (e.g. glycosuria, ketonuria, proteinuria etc.) along with respective case scenarios, for interpretation and diagnosis.</li> <li>• Vacutainers to be used for various biochemical estimations</li> </ul>                                                                                                                                                          |
| 3      | Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states | <ul style="list-style-type: none"> <li>• Test tubes with relevant bed-side tests (e.g. for glycosuria, ketonuria, proteinuria etc.) along with respective case scenarios, for interpretation and diagnosis.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4      | Explain the basis and rationale of biochemical tests done in Jaundice                                        | <ul style="list-style-type: none"> <li>• OPD cards with case scenarios</li> <li>• Relevant laboratory investigation reports prepared in coordination with physicians</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5      | Discuss the biochemical basis and rationale of tests done and treatment prescribed in Gout                   | <ul style="list-style-type: none"> <li>• OPD card with case scenario</li> <li>• Relevant laboratory investigation reports prepared in coordination with physicians</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|   |                                                                                |                                                                                                                                                                                                 |
|---|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                                                | <ul style="list-style-type: none"> <li>• Prescriptions of drugs for gout and their commercially available forms along with explanation for biochemical basis of their mode of action</li> </ul> |
| 6 | Explain the basis and rationale of biochemical tests done in thyroid disorders | <ul style="list-style-type: none"> <li>• OPD cards with case scenarios</li> <li>• Relevant laboratory investigation reports prepared in coordination with physicians</li> </ul>                 |

#### (F) End of Module Assessment

Assessment was taken at the end of each session using Multiple-Choice Questions, which were designed to ensure higher hierarchical levels of learning and validated by subject experts from other medical colleges.

#### (G) Program Evaluation

Mixed method evaluation was planned targeting Kirkpatrick levels 1 (perceptions) and 2 (learning).

**Tutees:** Tutees' data was collected in multiple dimensions using Student Evaluation of Educational Quality (SEEQ) Questionnaire (Coffey and Gibbs, 2001) shared through Google form. A minor modification was done; question no. 33-38 were not used after due agreement of the authors as these did not fit in objectives of the program. Students rated the 32 statements on a scale of 1-5 clustered into 9 dimensions (Table 3). They also wrote reflections about their perceptions about the program.

**Tutors:** Feedback questionnaire for tutors was developed by the authors and consisted of eight self-administered questions marked on a 5-point Likert scale. They were also interviewed through a semi-structured guide about their self-rated effectiveness as teachers and possible benefits of participation.

As the final part of the evaluation process, feedback was taken from the tutees after the

completion of university exams in March 2023, regarding utility of the program in their exam performance.

#### (H) Data analysis

For assessments, marks were categorized into <60% and ≥ 60% and frequency were calculated. Score of ≥ 60% was considered as an acceptable outcome.

Quantitative data from 32 questions of the SEEQ and 8 questions of tutor's questionnaire was expressed in terms of Mean±S.D. Percentage and proportions were calculated using SPSS (version 22) software. For each feedback form of tutors, Cronbach's alpha was calculated and value of >0.7 was considered acceptable.

Qualitative data for both tutors and tutees was anonymized. Thematic analysis was undertaken in three phases; familiarization with data, categorization of data in codes and themes and finally reporting the findings. The analysis process continued till data saturation was observed. Disagreement in categorization was resolved by consensus. Final draft was approved by all authors.

## Results

Table 2 summarizes number of students in each of the six sessions and marks obtained in the end-of-the-module assessment.

**Table 2: Summary of No. of Students in each sessions and the respective scores (total no. of students=120)**

| S. No. | Participating Students n (%) | Scoring ≥60% n (%) | Scoring < 60% n (%) | Mean score n (out of 30) (%) | SD   |
|--------|------------------------------|--------------------|---------------------|------------------------------|------|
| 1      | 114 (95.0)                   | 103 (90.4)         | 11 (9.6)            | 23.13 (77.1)                 | 4.58 |
| 2      | 115 (95.8)                   | 105 (91.3)         | 10 (8.7)            | 23.06 (76.9)                 | 5.94 |
| 3      | 115 (95.8)                   | 103 (89.5)         | 12 (10.5)           | 24.10 (80.3)                 | 4.24 |
| 4      | 116 (96.7)                   | 107 (92.2)         | 9 (7.8)             | 22.90 (76.3)                 | 4.97 |
| 5      | 114 (95.0)                   | 100 (87.7)         | 14 (12.3)           | 24.21 (80.7)                 | 3.87 |
| 6      | 112 (93.3)                   | 103 (92.0)         | 9 (8.0)             | 21.75 (72.5)                 | 5.38 |

| S. No.            | Dimensions/Statement                                                                    | 1 (%) | 2 (%) | 3 (%) | 4 (%) | 5 (%) | Mean | SD   |
|-------------------|-----------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|------|------|
| Learning          |                                                                                         |       |       |       |       |       | 4.74 | 0.48 |
| 1                 | I have found the course intellectually challenging and stimulating.                     | Nil   | Nil   | 2.6   | 20.0  | 77.4  | 4.75 | 0.49 |
| 2                 | I have learned something which I consider valuable.                                     | Nil   | Nil   | 4.3   | 20.9  | 74.8  | 4.70 | 0.55 |
| 3                 | My interest in the subject has increased as a consequence of this course.               | Nil   | Nil   | 0.9   | 27.8  | 71.3  | 4.70 | 0.48 |
| 4                 | I have learned and understood the subject materials of this course.                     | Nil   | Nil   | Nil   | 20.0  | 80.0  | 4.80 | 0.40 |
| Enthusiasm        |                                                                                         |       |       |       |       |       | 4.84 | 0.35 |
| 5                 | Instructor was enthusiastic about teaching the course.                                  | Nil   | Nil   | Nil   | 9.6   | 90.4  | 4.90 | 0.29 |
| 6                 | Instructor was dynamic and energetic in conducting the course.                          | Nil   | Nil   | Nil   | 9.6   | 90.4  | 4.90 | 0.29 |
| 7                 | Instructor enhanced presentations with the use of humor.                                | Nil   | Nil   | Nil   | 27.8  | 72.2  | 4.72 | 0.45 |
| 8                 | Instructor's style of presentation held my interest during class.                       | Nil   | Nil   | Nil   | 15.7  | 84.3  | 4.84 | 0.36 |
| Organization      |                                                                                         |       |       |       |       |       | 4.78 | 0.43 |
| 9                 | Instructor's explanations were clear.                                                   | Nil   | Nil   | 0.9   | 16.5  | 82.6  | 4.82 | 0.41 |
| 10                | Course materials were well prepared and carefully explained.                            | Nil   | Nil   | Nil   | 15.7  | 84.3  | 4.84 | 0.36 |
| 11                | Proposed objectives agreed with those actually taught so I knew where course was going. | Nil   | Nil   | 3.5   | 22.6  | 73.9  | 4.70 | 0.53 |
| 12                | Instructor gave lectures that facilitated taking notes.                                 | Nil   | Nil   | Nil   | 24.3  | 75.7  | 4.76 | 0.43 |
| Group Interaction |                                                                                         |       |       |       |       |       | 4.86 | 0.35 |

|                    |                                                                                      |     |     |      |      |      |      |      |
|--------------------|--------------------------------------------------------------------------------------|-----|-----|------|------|------|------|------|
| 13                 | Students were encouraged to participate in class discussions.                        | Nil | Nil | Nil  | 15.7 | 84.3 | 4.84 | 0.36 |
| 14                 | Students were invited to share their ideas and knowledge.                            | Nil | Nil | Nil  | 15.7 | 84.3 | 4.84 | 0.36 |
| 15                 | Students were encouraged to ask questions and were given meaningful answers          | Nil | Nil | Nil  | 13.0 | 87.0 | 4.87 | 0.34 |
| 16                 | Students were encouraged to express their own ideas and/or question the instructor   | Nil | Nil | 0.9  | 9.6  | 89.6 | 4.89 | 0.34 |
| Individual Rapport |                                                                                      |     |     |      |      |      | 4.92 | 0.26 |
| 17                 | Instructor was friendly towards individual students.                                 | Nil | Nil | Nil  | 8.7  | 91.3 | 4.91 | 0.28 |
| 18                 | Instructor made students feel welcome in seeking help/advice in or outside of class. | Nil | Nil | Nil  | 9.6  | 90.4 | 4.90 | 0.29 |
| 19                 | Instructor had a genuine interest in individual students.                            | Nil | Nil | Nil  | 6.1  | 93.9 | 4.94 | 0.24 |
| 20                 | Instructor was adequately accessible to students during office hours or after class. | Nil | Nil | Nil  | 6.1  | 93.9 | 4.94 | 0.24 |
| Breadth            |                                                                                      |     |     |      |      |      | 4.59 | 0.45 |
| 21                 | Instructor contrasted the implications of various theories.                          | Nil | Nil | 10.4 | 76.5 | 13.0 | 4.03 | 0.49 |
| 22                 | Instructor presented the background or origin of ideas/concepts developed in class.  | Nil | Nil | Nil  | 18.3 | 81.7 | 4.82 | 0.39 |
| 23                 | Instructor presented points of view other than his/her own when appropriate.         | Nil | Nil | Nil  | 24.3 | 75.7 | 4.76 | 0.43 |
| 24                 | Instructor adequately discussed current developments in the field.                   | Nil | Nil | 2.6  | 20.9 | 76.5 | 4.74 | 0.50 |
| Examination        |                                                                                      |     |     |      |      |      | 4.92 | 0.25 |
| 25                 | Feedback on examinations/ graded materials was valuable.                             | Nil | Nil | 0.9  | 14.8 | 84.3 | 4.83 | 0.40 |
| 26                 | Methods of evaluating student work were fair and appropriate.                        | Nil | Nil | Nil  | 2.6  | 97.4 | 4.97 | 0.16 |
| 27                 | Examinations/graded materials tested course content as emphasized by the instructor. | Nil | Nil | Nil  | 3.5  | 96.5 | 4.97 | 0.18 |
| Assignments        |                                                                                      |     |     |      |      |      |      |      |
| 28                 | Required readings/texts were valuable                                                | Nil | Nil | Nil  | 13.0 | 87.0 | 4.87 | 0.34 |
| 29                 | Readings, laboratories contributed to appreciation and understanding of subject      | Nil | Nil | 0.9  | 9.6  | 89.6 | 4.89 | 0.34 |
| Overall            |                                                                                      |     |     |      |      |      |      |      |
| 30                 | Relative value of the session is                                                     | Nil | Nil | Nil  | 6.1  | 93.9 | 4.94 | 0.24 |
| 31                 | Compared with other instructors, this instructor is                                  | Nil | Nil | Nil  | 18.3 | 81.7 | 4.82 | 0.39 |
| 32                 | As an overall rating, this instructor is                                             | Nil | Nil | Nil  | 3.5  | 96.5 | 4.97 | 0.18 |

**Table 3: Tutee feedback for NPAL sessions on the Student Evaluation of Educational Quality Questionnaire (SEEQ) (n=115)**

Question no. 1-29: strongly disagree [1], disagree [2], Neutral [3], agree [4], and strongly agree [5]

Question no. 30-32: Very poor [1], poor [2], average [3], good [4], and very good [5]

#### (A) Evaluation of Feedback of Tutees

Analysis of quantitative data

115 participants responded to the SEEQ questionnaire (response rate 95.8%) (Table 3).

Students rated the session as effective on all dimensions of SEEQ with the highest rated dimensions being enthusiasm of instructor ( $4.84 \pm 0.35$ ), group interaction ( $4.86 \pm 0.35$ ) and

individual rapport ( $4.92 \pm 0.26$ ). Students also rated overall value of the session very high ( $4.94 \pm 0.24$ ).

#### Analysis of qualitative data

Themes were categorized in three categories; 'content', 'teaching process' and 'outcome' (Table

4). Overall, students found the whole program interesting, stimulating and novel. ....it was interesting unlike the boring daily classes, ....better than routine practicals/lecture.

**Table 4: Themes, codes and extracts from qualitative analysis of tutees' reflections**

| S. No.                                                               | Codes                                                    | Extracts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Category: Content</b>                                             |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Theme: Enhancing content knowledge with clinical correlation.</b> |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1                                                                    | Correlating theory with clinical aspects                 | <p>.....Good way to understand the clinical aspects of topic</p> <p>.....Got an insight of solving various clinical problems</p> <p>.....It helps us to relate the theory with case scenario</p> <p>.....The experience told me about the importance of enzymes in our body and how they will act in the presence of drugs</p>                                                                                                                                                                                                                                                                  |
| 2                                                                    | Understanding clinical relevance of Biochemistry         | <p>.....Learnt new things about how Biochemistry works</p> <p>....This makes a switch from Biochemistry to a clinical subject.</p> <p>....Now I understand the basis of studying Biochemistry in MBBS</p> <p>.....The topic made us understand the subject and why should we study it</p>                                                                                                                                                                                                                                                                                                       |
| 3                                                                    | Appreciating clinically oriented learning tools          | <p>.....OPD cards of related diseases, tablets, blood collection vials were shown and made the topic even more connected</p> <p>.....Consent forms were shown, that are used before giving a serious medication</p> <p>.....Devices such as prescriptions and medicines were used to explain topic, which was good</p> <p>.....Going through OPD cards &amp; prescriptions made me feel like a doctor</p>                                                                                                                                                                                       |
| <b>Category: Process</b>                                             |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Theme-1: Recognition of value of NPAL</b>                         |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4                                                                    | Enhancing learning capacity by achieving concept clarity | <p>.....My retaining capacity has increased...</p> <p>....it had an effective influence on my learning of the topic.....</p> <p>.....our concepts were crystal clear after the interesting session....</p> <p>.....So we could understand easily and grasp the complex topics in minutes.</p> <p>.....Topics seemed easy &amp; understandable</p> <p>.....It will enables us to remember the topics for a very long time</p>                                                                                                                                                                    |
| 5                                                                    | finding the sessions interesting and enjoyable           | <p>....It was interesting unlike the boring daily classes</p> <p>.....This is fun &amp; interesting way of learning</p> <p>.....Experienced a lot of enjoyable moments, in which we study with our seniors</p> <p>.....Our super-duper seniors made us enjoy the study &amp; I didn't feel sleepy even for a second.</p> <p>.....It is an experience that I will cherish and share further</p> <p>.....Fun learning session that I could practically relate to.</p> <p>.....We tried to grasp each case with full attention as this was very interesting and not that boring class lecture.</p> |

|                                                           |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Category: Process</b>                                  |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Theme-2: Comfortable and safe learning environment</b> |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 6                                                         | Enhancing student-teacher interaction                    | <p>.....Class was divided into batches which helped increase the teacher-student interaction</p> <p>.....Easier to understand things by interaction with teacher instead of doing it individually</p> <p>.....I think we interact more with the seniors than with the teacher</p> <p>.....Interns discussed the topic in an interactive manner</p> <p>.....Made the efforts to make the topic interesting and more interactive</p> <p>.....As Interns were very interactive, we understood the topic very well</p>                                                                                                                                             |
| 7                                                         | Appreciating accessibility of tutors                     | <p>....The session was very helpful as it provided more accessible teachers</p> <p>....much more comfortable with the interns. They were so friendly and frank with us.....</p> <p>.....They were saying that we can ask any silly doubt also...</p> <p>....Felt free to ask questions/doubts related to the topic, as interns were teaching us</p> <p>.....The best part was that we got to be taught by our seniors which made me a bit more comfortable, while asking queries to re-explain the topic if needed.</p> <p>.....It gave a great experience to me that something we don't ask from Ma'am, we ask in that type of sessions from our seniors.</p> |
| <b>Category: Process</b>                                  |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Theme-3: Qualities of tutors as teachers</b>           |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 8                                                         | Finding the tutors confident & knowledgeable             | <p>.....Interns were full of knowledge &amp; confidence</p> <p>.....They taught us without hesitation</p> <p>.....Intern was very knowledgeable, sweet &amp; polite</p> <p>...they were having so much knowledge and were able to express very beautifully...</p>                                                                                                                                                                                                                                                                                                                                                                                              |
| 9                                                         | Appreciating social and cognitive congruence with tutors | <p>.....Tutors were also the students and they know what type of questions we have in our minds. They can empathize with us.</p> <p>.....Tutors were able to correlate the problems faced by students in understanding a topic.</p> <p>.....I would like more sessions from interns because I can relate more to them</p> <p>.....Session was like with interns and seniors not a so much gap, they understand us.</p> <p>.....the best part was that we got to be taught by our seniors which made me a bit more comfortable...while asking queries to re-explain the topic if needed</p>                                                                     |
| <b>Category: Outcome</b>                                  |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Theme: Appreciation of 'End of module' assessments</b> |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 10                                                        | Appreciating test format                                 | <p>.....Taking test using Google forms was good</p> <p>....the mcq test conducted on google forms was a very good method in order to sum up all the things that we had learnt today...</p> <p>.....We got to know how much we could recall the things taught to us by way of mcq test</p> <p>.....The test they gave us, helped us to evaluate how much we understood and learnt</p>                                                                                                                                                                                                                                                                           |

|                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11                  | Appreciating the test timing                        | <p>.....Will like to have many mcq- based tests after sessions to be able to know how much content I have understood</p> <p>.....Taking test immediately after teaching, using Google form, was excellent</p> <p>.....Fear of attempting the test at the end of the session kept me alert throughout</p> <p>.....Such sessions will make our habit to understand and learn each topic attentively &amp; effectively</p> <p>.....Giving a test just after studying summed up the concepts nicely</p> <p>.....The result of MCQs was released immediately after the session. I knew what I've not understood</p> <p>.....Questions that were produced after the session were really a brain booster for all of us.</p>                                                        |
| 12                  | Appreciating the test content (clinically relevant) | <p>.....Clinical based MCQ test had application based problems</p> <p>.....Clinical based questions were like tools of teaching us the importance of having clinical knowledge</p> <p>.....all the questions were based on clinical situation pattern that helped me in getting more idea about how to apply my knowledge practically to treat patients in future...</p> <p>.....and will try to view things on applied basis</p>                                                                                                                                                                                                                                                                                                                                           |
| General Observation |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 13                  | Appreciating novelty of the sessions                | <p>.....Got to learn in a different &amp; effective way</p> <p>.....Grasped the topic with full alertness as we were taught by near peers</p> <p>.....Good way of understanding a topic</p> <p>.....Before attending the session, I thought that session will be very boring. By the end of the session, my perception had changed.</p> <p>.....The topic read in class was getting shaped into clinical aspect and turned out to be very interesting.....</p> <p>.....Learning method was unique, interactive and amazing.....</p> <p>.....A great way to break the monotonous routine, where learning is more of a burden than fun</p> <p>.....It is better to opt for some different and fun methods than the conventional methods for a better learning experience.</p> |
| 14                  | Feeling like a doctor                               | <p>.....Had an effective influence on learning through group discussions</p> <p>...I felt like a l'il doctor in practice.</p> <p>.....I felt motivated to work hard and become a good doctor after going through the session</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 15                  | Wanting similar sessions in future                  | <p>.....Looking forward to many more such sessions</p> <p>.....Such sessions should be organized in future too so that students can learn more and gain best knowledge from clinical based questions</p> <p>.....Our teachers of all subjects should arrange more sessions like today's for few topics as we get in-depth knowledge of the topic.</p> <p>.....Will request Ma'am to hold such sessions every month</p> <p>.....I think these type of sessions should be done repeatedly at a regular interval as they are productive</p> <p>.....Such sessions should be held regularly</p>                                                                                                                                                                                 |

- Content: Themes in this category were related to the use of ECE tools. Tutees appreciated that correlation with clinical aspects was better understood by use of ECE tools.

*".....OPD cards of related diseases, tablets, blood collection vials were shown and made the topic even more connected, .....Devices such as prescriptions and medicines were used to explain topic, which was good."*

*"....Now I understand the basis of studying Biochemistry in MBBS".*

- Process: Students found the tutors to be knowledgeable, confident and empathetic. They could appreciate cognitive congruence with the near peer tutors.

*"....that something we don't ask from Ma'am, we can ask from our seniors.....best part was that we got to be taught by our seniors which made me more comfortable".*

- Outcome: Themes were related to format, timing and clinical relevance of the assessments. Students appreciated the timing of assessment.

*"..Taking test immediately after teaching, using Google form, was excellent,.....Giving a test just after studying summed up the concepts nicely."*

They also appreciated the fact that the question pattern analysed their understanding and not just rote learning.

*"..all the questions were based on clinical situation pattern that helped me in getting more idea about how to apply my knowledge practically to treat patients in future."*

They appreciated that these sessions helped them understand the relevance of biochemical tests in clinical practice.

*Feedback on the performance of students in the university exams*

Feedback collected at the end of exams helped us understand long term impact of these sessions in attempting ECE related questions in the university exams. A total of 78 students responded (response rate 65%); all of them mentioned that the sessions helped them in handling ECE related questions in the exams and 70 students (89.7%) mentioned that it contributed to their scores in the exams.

*"...I could recall the clinical applicability of the biochemical aspects that were taught by interns....Without these sessions, I could not have performed that well in the viva where examiner asked me applicability of these tests.....I had missed one session...when the examiner asked me question, I realized that I should have attended all the sessions."*

#### *(B) Evaluation of Feedback of Tutors*

Analysis of quantitative data: All near peer tutors responded to the questionnaire (response rate 100%) (Table 5).

The highest rated dimension was related to enjoyment of teaching ( $5.0 \pm 0.0$ ) and self-perceived usefulness as teachers ( $4.83 \pm 0.41$ ). All of them were willing to conduct more such sessions in future ( $4.60 \pm 0.55$ ).

**Table 5: Feedback of tutors for the sessions (n=12)**

| S. No. | Tutors                                                                                                                                   | 1<br>(%) | 2<br>(%) | 3<br>(%) | 4<br>(%) | 5<br>(%) | Score<br>(mean±SD) | SD   |
|--------|------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|--------------------|------|
| 1      | Did you find the NPAL method of teaching ECE satisfactory?                                                                               | Nil      | Nil      | 16.7     | 33.3     | 50.0     | 4.33               | 0.82 |
| 2      | Did you feel yourself useful as a tutor in NPAL method of teaching ECE to achieve the desired objectives of ECE?                         | Nil      | Nil      | Nil      | 16.7     | 83.3     | 4.83               | 0.41 |
| 3      | Did you feel sufficiently knowledgeable to be able to teach as tutors?                                                                   | Nil      | Nil      | Nil      | 66.7     | 33.3     | 4.33               | 0.52 |
| 4      | Did you enjoy teaching in your NPAL sessions?                                                                                            | Nil      | Nil      | Nil      | Nil      | 100.0    | 5.00               | 0.00 |
| 5      | Do you feel that conducting this NPAL session has facilitated in consolidation of your knowledge on topics of higher clinical relevance? | Nil      | Nil      | Nil      | 33.3     | 66.7     | 4.67               | 0.52 |
| 6      | Did you feel that tutees were comfortable in discussing their doubts about the session with you?                                         | Nil      | Nil      | Nil      | 33.3     | 66.7     | 4.67               | 0.52 |
| 7      | Do you feel that taking NPAL sessions has helped in improving your teaching skills?                                                      | Nil      | Nil      | Nil      | 33.3     | 66.7     | 4.67               | 0.52 |
| 8      | Would you like to conduct more such NPAL sessions to teach ECE?                                                                          | Nil      | Nil      | Nil      | 66.7     | 33.3     | 4.60               | 0.55 |

(1- Strongly disagree, 2- Disagree, 3- Not sure, 4- Agree, 5- Strongly agree)

**Table-6: Themes, codes and extracts from qualitative analysis of tutors' interviews**

| S. No.                                                              | Codes                                                                                 | Extracts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Category: Content</b>                                            |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Theme: Enhancing content knowledge with clinical correlation</b> |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1                                                                   | <i>Appreciating relevance of ECE tools for clinical correlation of basic subjects</i> | <p><i>.....discussion of cases helped in making their clinical approach more clear</i></p> <p><i>.....such sessions are of great value to the juniors as from first prof itself, they become sensitized to clinical aspects which add value to their studies</i></p> <p><i>.....clinical case studies along with real-time blood investigation reports were shown, which helped clear practical scenarios</i></p> <p><i>...it gave me a deeper sense of how teaching correlation between all subjects is essential for better understanding</i></p> <p><i>.....The session made me realise that the main aim of studying is to understand the clinical aspects by the heart &amp; not just passing the exams</i></p> <p><i>.... discussing the different case scenarios was the most relevant part of the entire session</i></p> |
| <b>Category: Process</b>                                            |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Theme-1: Holistic approach to teaching-learning</b>              |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2                                                                   | <i>Finding the sessions interesting and enjoyable</i>                                 | <p><i>.....it was great, memorable and amazing</i></p> <p><i>.....I was very excited to teach these lovely juniors</i></p> <p><i>.....It was a nice learning program for me</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 3                                                                   | <i>Appreciating the innovative method of teaching-learning</i>                        | <p><i>....I found the concept of near peer learning to be very good</i></p> <p><i>.... this project is sure to work well, because of the no-boundaries arena between near-peers</i></p> <p><i>....There were a lot of things to use including drugs, vacutainers, OPD cards to make the sessions more interesting and more connectable to clinics</i></p> <p><i>.....It makes things easy for both teacher and students</i></p> <p><i>.....It is a very holistic approach to address talents, fears and doubts.....</i></p>                                                                                                                                                                                                                                                                                                      |
| 4                                                                   | <i>Realizing social congruence with tutees</i>                                        | <p><i>....At first the students were a bit nervous, but very soon, they were interacting, laughing and learning.</i></p> <p><i>.....I could make them realise that it's not only them, who face these difficulties in learning, but everyone does.</i></p> <p><i>....students felt more free and more comfortable to ask their problems regarding the topic</i></p> <p><i>.....I found yet another way of interacting with juniors</i></p> <p><i>.....It provided a great opportunity to create a bond with my juniors</i></p> <p><i>....Students were initially not asking their doubts, but later started asking questions and according to me, in the end, they were satisfied</i></p>                                                                                                                                        |
| 5                                                                   | <i>Realizing cognitive congruence with tutees</i>                                     | <p><i>.....after the session, they were discussing various study related doubts which I think only their seniors can explain.</i></p> <p><i>.....we had frank discussions of topic related thoughts in the session</i></p> <p><i>....They were asking me the doubts, that I could never ask my teachers, thinking that she might scold me or ask back the questions from me.</i></p> <p><i>.....it reminded me of going to our seniors for understanding the topics</i></p>                                                                                                                                                                                                                                                                                                                                                      |

**Category: Process****Theme-2: Overcoming the fear and apprehension of teaching**

- 6 Addressing nervousness 03 and apprehension as tutors
- .....At first I was a bit nervous and uncomfortable as how the session would be*
- .....when I met the juniors, started the interaction, I was more than comfortable as I ever did.*
- .....I was not confident initially as I thought I had forgotten Biochemistry and was doubting whether I could teach them efficiently or not*
- .....Initially I was apprehensive and even feared the mock tutorial conducted for evaluation of our knowledge, but it was worth it as it made me feel confident to teach the juniors*

**Category: Outcome****Theme-1: Deeper learning by teaching**

- 7 Utility of the sessions to consolidate one's own knowledge
- .... Revisiting the lab procedures helped retain concepts*
- .....I had never tried to think about many clinically relevant things that I learnt here*
- .....while preparing the topic, I understood the concepts better than when I was a student in that class*
- .....I always had trouble remembering colours of vacutainer caps. Today my concepts were cleared and this will stay in my mind forever*
- .....I can strongly say that I was benefitted much more than my expectations in this session*
- .....the session helped to enhance my learning of the clinically relevant topics*
- .....the session helped me to understand the subject and to study my subject of Biochemistry as a NEET PG aspirant*
- .....discussing diagnostic methods for diabetes mellitus helped me by increasing my vision of thinking.*
- .....I was able to revise these clinically relevant topics on my own, taking time out from busy duty hours*

**Category: Process****Theme-2: Becoming a teacher/Mentor**

- 8 Discovering improvement and confidence in teaching
- .....Never knew that I could be so innovative with the PPT deck too*
- .....teaching them built a different kind of confidence in me*
- ....After the session, I was thinking of different ways of explaining the topics to them in other sessions*
- .....it helped me have a real time teaching experience about the methodology*
- ....sessions like these really help in improving our communication skills, making us more confident in teaching flawlessly*
- ....This session enhanced my learning skills as a student and my teaching skills as a teacher*
- ....It enhanced my skills as a teacher*
- ....The concepts, which even I myself was scared of, were taught by me to my juniors. Unbelievable!*
- ....It improved my own learning and encouraged me to come forward and teach my juniors*
- 9 Discovering satisfaction of teaching
- .....I felt alive because I could see them smiling, as they were understanding what I couldn't in my first year.*
- ....They were able to understand the topic and clear their doubts*
- .....I enjoyed sharing my knowledge with the students*

.....The contentment I felt on interacting with my near peers and the wholesome feeling of being on the other side of the desk for the first time was a lifetime experience  
 .....it was a delightful time to make my juniors understand the subject  
 .....I hope I was able to make the topic easier for students. ....I could see their happy faces when they were solving the MCQs provided to them after the teaching session.

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**Category: Outcome**
**Theme-3: Change in attitude/behaviour**


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|    |                                           |                                                                                                                                                                                                                                                                                             |
|----|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 | Wanting similar sessions in future        | <p>....I feel that regular conduction of such sessions should be put into the curriculum of both tutees and tutors</p> <p>....I wish that such sessions become a routine in MBBS</p> <p>....I want more sessions of this type to be conducted, so that I can improve my teaching skills</p> |
| 11 | Wishing to have had such sessions in past | <p>....I wish we were also presented the topics by our seniors so that we could have a clear diagnostic approach to subject</p> <p>..... I strongly feel that if such sessions were held in my MBBS days, it would have helped me a lot</p>                                                 |

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**Analysis of qualitative data**

Themes are being classified in three broad categories; the 'content', 'process' and 'outcome' (Table 6).

- Content: Tutors appreciated that the objectives of the sessions of correlating basic subjects with the clinical aspects were well achieved through ECE tools.

*"..discussion of cases helped in making their clinical approach more clear.....such sessions are of great value to the juniors as from first prof itself, they become sensitized to clinical aspects".*

- Process: Tutors could also appreciate cognitive and social congruence with the tutees.  
*"...after the session, they were discussing various study related doubts which I think only their seniors can explain.....I could make them realise that it's not only them, who face these difficulties in learning, but everyone does.....students felt free and more comfortable to ask their problems regarding the topic.*

*They also realized that they had overcome fears and apprehensions of teaching.*

*".....Initially I was apprehensive and even feared the mock tutorial conducted for evaluation of our knowledge, but it was worth it as it made me feel confident to teach the juniors".*

- Outcome: The tutors highlighted that they have developed a better consolidation of the topics themselves which would prepare them not just for their postgraduate entrance exam but in patient care as well.

*"while preparing the topic, I understood the concepts better than when I was a student in that class.....I always had trouble remembering colours of vacutainer caps.....the session helped me to understand the topic better".*

The tutors also felt that these sessions were helpful in developing their teaching abilities.

*"..sessions like these really help in improving our communication skills,*

*making us more confident in teaching flawlessly...this session enhanced my skills as a teacher”.*

An interesting theme in this category pointed towards a probable change in behaviour and attitude.

*“..I feel that regular conduction of such sessions should be put into the curriculum of both tutees and tutors.....I wish that such sessions become a routine in MBBS”.*

## Discussion

Undergraduate medical students, in preclinical years, are required to imbibe an enormous volume of cognitive knowledge in basic sciences. It is during the later years, when they undergo clinical rotations that they learn to align this knowledge with its clinical applicability. Students, in pre-clinical years, thus find it difficult to understand the relevance of basic sciences which encourages rote learning, rather than deeper understanding and higher order thinking (Kayser *et al.*, 2022, Lockspeiser *et al.*, 2008, Zhang and Maconochie 2022). ECE with an inherent ability to integrate pre-clinical concepts with their clinical applicability is a powerful tool to overcome these limitations. The NMC module of ECE highlights that clinical context refers to patients/cases being brought to the classroom, creating case scenario with relevant history, investigation reports and prescription of drugs and discussion of clinically relevant materials (Competency based undergraduate curriculum 2019).

ECE has always been of interest to researchers in health profession education. However, what has changed over the years, are the objectives of conducting these studies. Until a few years back, literature included isolated programs to introduce and evaluate ECE for its perceived effectiveness. However, as of now, mandate for ECE by the competency based curriculum and laying down of dedicated hours has developed interest in methods that can be effectively implemented in small group settings in routine curricular hours.

Our study utilized the time tested near peer approach for facilitating ECE in small group setting. A key part of our study is a robust objective evaluation mechanism to explore the process of NPAL in more depth which goes beyond ‘whether the program worked’. We planned to find answers to who (tutors and tutees), how (the process and outcome), when (at the end of session, at the end of program and at the end of university exams) and why (effective implementation of ECE in true small group setting) through perceptions, experiences and concerns of tutees and tutors. This in-depth evaluation approach suits the delicate dynamics of peer assisted learning, as advocated in literature (Balilah *et al.*, 2020, Bulte *et al.* 2007). We have also evaluated long term learning through their performance in university exams.

The cognitive congruence hypothesis argues that a teacher with a knowledge base similar (i.e. congruent) to that of the learner is more effective than an expert in the field with a dissimilar knowledge base (i.e. incongruent) (Carr *et al.*, 2016). Pairing junior and senior students has been reported to establish psychological and social support system, as they are seen as potentially less threatening by learners. There is also less apprehension of making mistakes in front of their peers, thus creating a safe, less hierarchical and more comfortable teaching environment (Burke *et al.*, 2007, Kayser *et al.*, 2022, Lockspeiser *et al.*, 2008, Zhang and Maconochie 2022). Having fulfilled these criteria for cognitive and social congruence, medical interns in our study fitted as ideal near peer tutors. With a wide spectrum of knowledge about clinical subjects and awareness of key problematic areas in pre-clinical years, interns could well attain the objective of correlating basic sciences with clinical applicability. Interestingly, the highest rated dimensions of SEEQ questionnaire were that of instructor’s enthusiasm, group interaction and individual rapport, thus substantiating all of these benefits. Similar perceptions were also reported in their reflections. Almost all of them appreciated the accessibility of tutors to ask questions and clear their doubts.

Outcome is the final and most important part of any educational program and in our study, we had pre-defined outcome parameters for both tutors and tutees. An outcome that holds a substantial significance is academic achievement of participants (Balilah et al., 2020). As expected, there was significant academic gain and 87.7 - 92.2% of students attained the designated minimum score of 60%. For tutors, one of the significant outcomes was achieving deeper learning of the clinically relevant topics. An analogy of 'Helping someone with a skill sharpens it in your own mind' has also been described in literature (Carr et al., 2016). Another outcome for the tutors was an improvement in teaching skills and confidence. They were nervous and uncomfortable initially but later credited the training imparted for gaining confidence as teachers. A review of Student-as-teacher curricula specifically mentions that most medical schools (89-100%) engage students as teachers but a formal skills training is less frequently provided (44-82%) (Cohen et al., 2022). One of the twelve tips emphasizes that tutors should be trained, aiming both at teaching skills and content specific material (Wadoodi and Crosby 2002). In our study, we have ensured all of these; training of content, training of teaching skills and also their assessment. It was heartening to observe that all the tutors were interested in taking up more such sessions, thus pointing towards change in behaviour, targeting Kirkpatrick level-3. Thus if we summarize tutors' evaluation in terms of Kirkpatrick model for program evaluation, level-1 (satisfaction), level-2 (learning and improvement in teaching skills) and level-3 (self-reported change in behaviour) were targeted. While level-4 was not targeted, we aim to achieve it in future by incorporating near peer teaching as part of internship curriculum in the institute.

We would like to highlight strengths and limitations of our study. While designing and implementing a PAL program, it is essential to adhere to a standardized framework, a specific implementation strategy and dedicated monitoring techniques so that future research can be accurately communicated and compared.

Difference in any of these aspects may result in inconsistency of the reported outcomes (Yu et al., 2011). We have ensured that our framework is as per standard guidelines available in literature. However, we do agree that despite following standardized frameworks, a single institutional study results may not be generalizable. Another important factor in NPAL is the calibre, preparation, and motivation of peer tutors, which are expected to differ from tutor to tutor. These are considered to be uncontrollable aspects in NPAL and thus one challenge to effective implementation of NPAL is likely to be managing disparities in each peer tutor's aptitude and drive. In our study, we tried to overcome it, by providing them a comprehensive training with provision for feedback. According to Kern's six step approach to curriculum development, evaluation is a critical part of any teaching program (Thomas et al., 2022). For this study, we ensured a robust mixed method evaluation process. We also tried to evaluate long term learning outcomes through performance of students in the university exams. Though this evaluation was subjective through self-perceptions, still it is imperative to mention that this has not been done earlier in any Indian study with regard to ECE. The interns also self-reported change in behaviour in their interviews, thus targeting higher levels of evaluation but any long term behaviour change or improvement in their teaching practices was not objectively documented.

## Conclusion

Through a comprehensive mixed method evaluation of the content, the process and the outcomes, this study provides key insights into the dynamics of near peer teaching learning and provides answers to not just 'whether it works' but also to 'how' and 'why' it works. Our study adds to the growing body of evidence that NPAL is beneficial to both tutees and tutors and can be a useful teaching tool for small group teaching. A cautious approach is needed to adhere to standardized frameworks so as to allow future replications and comparisons. Further, it is essential to address appropriate training of tutors. We also present an argument for medical interns

as near peer tutors for facilitating early clinical exposure in basic sciences. Having just completed their clinical rotations, they can be ideal near-peer tutors for achieving the objectives of ECE by helping the first year students integrate basic sciences with clinical applicability. Further research in this field may be targeted towards achieving still higher levels of evaluation including change in organizational practice and objective documentation of long term learning through scores in the university exams.

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