Journal of Engineering Education Transformations ,
Volume 36 , No. 1 , July 2022 , ISSN 2349-2473, eISSN 2394-1707

Peer-Observation: An Intensive Study and its Impact On the Teaching-Learning Process

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Abstract : Peer observation in teaching-learning significantly impacts students' learning and understanding experience. It improves the quality of the content delivery by the instructor and provides the learning opportunity to observer also. It is threefold learning from all perspectives. Thus, it is a collaborative idea sharing and achieving excellence by incorporating the best of others. Authors have experimented with the peer observation and feedback strategy to improve students' academic performance and overall teaching cum teaching experience. One semester activity has been conducted to conclude the significance of the study with the help of z and t statistics parameters with alpha value 0.05. Different peer observations are taken into consideration and incorporated to improvise the teaching-learning experience of facilitator and student. As a result, it has been found very helpful and impactful on the students' performance and the development of an instructor's teaching style. Peer observation helps explore the different approaches that help adapt to future challenges in anagogical instructional approaches.

Keywords : peer observation, self-reflection, higher education, academic practices, teaching-learning process.

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1. Introduction

With the advent of technology, higher education has become very challenging. Peer Observation [1-4] is a beneficial and vital process of academic development in these challenging situations. This work aims to enhance the teaching-learning process by observing the peer(s). It has many advantages[5-8] like improvement in the teaching process; it helps gain confidence (Bell 2005). Peer observation is an activity, where peer(s) observe each others, they learn and share best practices it is conducive [4] but generally faculty members avoid it. It is not only limited to academics to ensure outcome-based learning but also incorporates the industries and coroprates to imbibe the feelings of team building. Some organizations are also using it for appraisals and promotions because it can highlight the individual's strengths and weaknesses. Bell, M. and Cooper, P. (2014) suggested the formation of departmental peer observation groups [10] in the universities. Bell (2013) has also suggested and supported this peer group formation [15] in the departments. Z S SIDDIQUI et al. suggested twelve tips [13]

for peer observation of teaching enlisted are

1. Choose observer carefully.
2. Set aside time for peer observation
3. Clarify expectations
4. Familiarize yourself with the course
5. Select instrument wisely
6. Include students while formalizing
7. Be objective
8. Resist the urge to compare with your teaching style
9. Do not intervene
10 Follow general principles of feedback
11. Maintain confidentiality
12. Make it a learning experience.

These techniques are beneficial and effective in peer observation. Peer observation helps groom new persons in academics [25] by providing them motivation, confidence, and exposure. They can learn and find the best environment to create a great experience of learning and exposure. Primarily peer observation is an opportunity to improve the quality of teaching [19]. Peer observation helps in identifying the shared pool of best practices. These best practices will improve the efficiency of teaching-learning and students' interest in optimized learning. Erika Daniels et al. [34] support the development of a forum where enthusiastic practitioners can share their best ideas and practices that can support the growth of a teacher and provide motivation and an improved environment of learning to the students. Jacinta Brix et al. [35] investigated the peer review of teaching in schools (K-12) education and found it much effective to be used. Fred-Ole Sandt (2012) describes the peer observation-action research project that focuses and considers various issues like resistance to peer observation, contexts of power relations in this process, and peer observation for professional development, not for performance evaluation [36]-[38]. The survey says that 55% of teachers want to participate in this process because they desire to improve and build reflective practices continuously. The paper structure has been organized into six sections. Section II presents the material and methods, Section III talks about the observations, section IV discusses the study's results and discussion, section V describes the learning and best practices, and finally, section VI presents the conclusions and future work.

2. Material And Methods

A. Material

Teaching data of complete one semester has taken into consideration for screening subjects under control and experiment group. The screening semester ranges from Jan 2019-June 2019, segregated into various evaluation stages. Evaluation stages involve 1. Test 2. Quiz 3. Assignments 4. Mid Semester Exam 5. End Semester Exam. Test quiz and assignments are internal assessment that has 30%

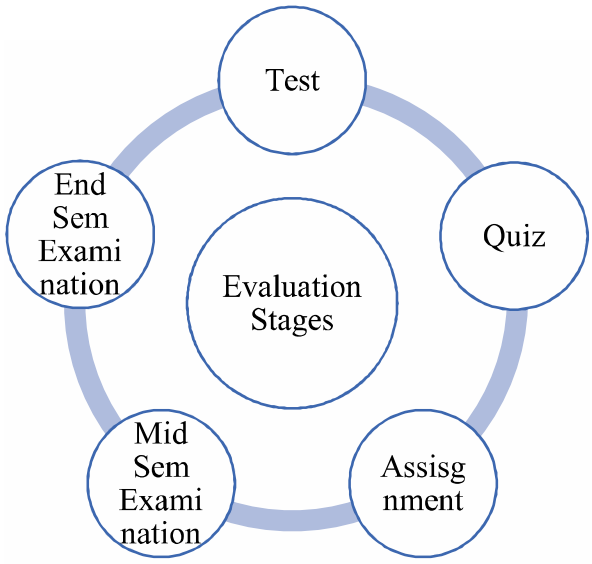

Fig. 1: Evaluation Stages

Table I Assigned Weightage for evaluation.

Evaluation Stages	weightage
Test+Quiz+Assignment(Internal Assessment)	30%
Mid Semester	20%
End Semester	50%

Weightage, mid-semester examination has 20% and end semester exam has 50% weightage in the evaluation as shown in table I. The Test, quiz, and assignments appear twice for evaluation; one set before the mid-semester and another after the mid-semester. The criteria set for screening was the

average marks of all the components considered under the evaluation stages. A population size of 103 is considered for the study purpose, out of which 50 students are in the experimental group, and the control group holds the data of 53 students. Moreover, the experimental group includes students whose average marks of all the aforementioned components under the evaluation stages are 60-75. Students scoring more than 75 marks were put in the control group. Size of the control group (53* 8) as eight evaluations has been carried out and experimental group (50 * 8). All students were medically fit to pursue their four-year Bachelor of Engineering degree. The main objective of conducting this study is to check the impact of the inclusion of peer observations in order to improvise the teaching style and how it would influence the learning experience of the experimental group. However, the traditional teaching method has been continued with the control group. In order to verify the impact of the proposed intervention, in the form of peer feedback, the next semester July 2019-Dec 2019, has taken for the subject, which requires higher-order thinking skills, and the experimental group has been exposed to interventions-based teaching methods, whereas the control group was treated with regular teaching practice.

B. Intervention Used

As shown in Figures 2 and 3, the pilot scheme incorporated has been used as part of the intervention, and the attainment level achieved is tested for both groups.

C. Hypothesis Tested

H0: Intervention has no impact on the attainment level of students.

H1: Intervention has a significant impact on the attainment level of students

D. Statistical Study of Parameters

A statistical test has been used to check the relevancy of the results. z statistics have been used to analyze the impact of the proposed intervention on academic performance, which gradually leads to an increase in attainment level. A t-test is used to analyze significance between non-control (experimental) and control groups. As well ANOVA test has been carried out for comparison purposes.

The entire study has been carried out to evaluate the effectiveness of peer observation and improve the performance of students and the instructor by incorporating the best practices. Peer observation and feedback modes effectively enhance the teaching-learning experience [25]. Peer observation is an opportunity to share and support the best academic practices that are very helpful in attaining quality education[40]. Based on the peer observation protocol, different peers have to attend the session of each other and provide reflections about teaching-learning. The objective of this activity was to assess the students learning effectiveness and identify the best collaborative practices with the following vital highlights.

1. The extent of achievement on learning outcomes with applied teaching pedagogy, modality, and resources.

2. The extent of learner's interaction and participation.

Figures 2 and 3 describe the peer observation process and a pilot scheme in detail [19]. This process involves various sub-steps in all three stages of peer observation.

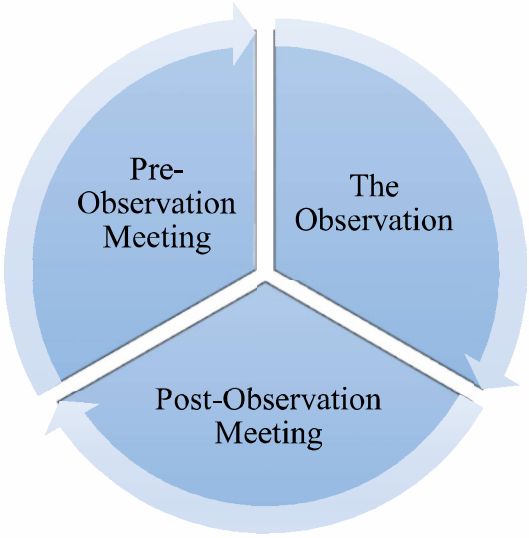

Fig.2: Peer Observation & Collaborative reflection [19]

The entire process has been executed twice in one semester. As per the designed pilot study, significant objectives have been achieved. During the observation, the adopted teaching methodology and its effectiveness were analyzed. The assessment parameters solely depend upon student learning

effectiveness (by student's interactions and classroom management). As a part of the improvement and outcome of this study, participants were expected to develop a capacity to anticipate and respond to change and practice collaborative learning techniques. As described by Martin, Graham A., and Jeremy M. Double [9], pre-observation meetings and pilot schemes (shown in Figures 2 and 3) were followed in pre-observation and post-observation forms.

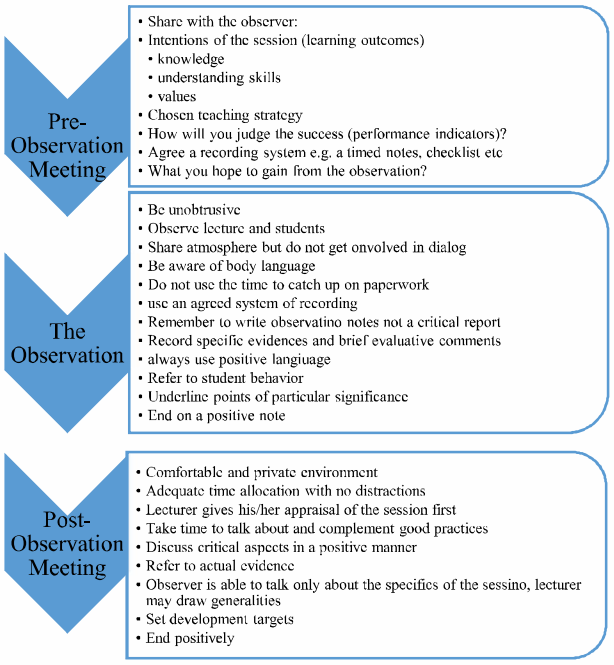

Fig. 3 : Pilot Scheme of Peer Observation [19]

3. Observations

Observation plays a vital role in every experimental process. The various levels of observation called- observation cycle are enlisted in Figure 4.

Fig. 4 : The Observation cycle

During pre-observation, peers were made acquainted with the rules and regulations to be followed. It is mandatory that no comparison has to be done for self and presenter teaching style during observation feedback, as everybody has one(s) teaching style. Sharing of prescribed forms has been done during this course of time [9]. During the post-observation meeting, the results of the entire activity were reported and finalized.

Table 2 : Statistical Values For Control and Experimental Group

	Control Group	Non-Control Group	Control Group	Non-Control Group
	z-statistics		t-statistics	
Blended mode for content delivery	1.76	2.34	1.55	3.12
Style of initiation of class and its impact on engagement during the entire course of the session	1.23	3.23	1.52	4.23
Collaborative exercise and its impact on critical thinking	1.45	3.12	1.34	3.45
Usage of technology freedom during the session	1.34	3.12	1.23	4.23
Raise attainment level of weak students	1.77	3.56	1.56	3.12
Frequent questioning session during session	1.45	4.23	1.23	4.56
Note of eye contact	1.34	3.45	1.45	2.12

Alpha Value=0.05 t value 1.6651 z value 1.8922

The benefits of this experimentation have been reported in various ways, and it has been proven effective in reflectively understanding the teaching style as suggested by Hammersley- Fletcher, Linda, and Paul Orsmond [6]. Key observations are based on statistical differences between two groups control group, and the experimental group has been analyzed based on performance as shown in TABLE II.

A. Pre-observation Meeting

The idea behind this meeting was to explain the pre-observation as a process to both the observer and the person to be observed [19]. The pre-observation meeting aimed to finalize the common agenda and attributes to observe. Peers' pre-observation forms were shared among the peer groups well before time. Table III presents the attributes considered for observing the sessions.

Table 3: Attributes of the experiment

S.No	Attribute
1	Aim/objective/outcomes to be achieved during this session
2	Description of the student's profile and their understanding level.
3	Teaching pedagogy to be adopted with appropriate reason for students' needs and equal opportunities
4	Session plan: contents to be covered with time duration
5	Scope for participation & interaction.
6	Techniques to be applied to measure the extent of the student's learning during this session
7	Resources used.

B. Post Observation Meeting

Post observation meeting is a feedback-sharing meeting, which aims to identify the positive traits of the observed person and areas of improvement.

After the peer observation, the observer shared the observation as highlighted in Table III below. This exercise in two cycles and mutual discussion among the peer groups; as a result, all the peers involved identified and picked some good practices. This post-observation meeting aimed to develop higher education teaching skills through peer observation and collaborative reflection, as suggested by Martin, Graham A., and Jeremy M. Double [19]. Post-observation meeting reflects the learnings in the observation by the observer. Pre observation attributes were the basis for this observation, and twelve tips of peer observation, as suggested in [13], provided the guidelines. The learnings and best practices which were the outcomes of this study are presented in section IV. These learnings and best practices are quite helpful for students and the instructor; they show enthusiasm in instructor and motivate the students. These techniques are a tool to achieve student attention & involvement. The adopted best practices and pedagogical methods were integrated into the classroom activities based on the observations. This activity is constructive and impactful on student performance, as the instructor can create students' interest by using these best practices identified. Table IV contains the observed attributes below.

Table 4 :Observed Attributes

S.No	Attribute
1	The content was delivered with full understanding. Students were interactive during the session. Communication was good. The content was delivered in such a way that all the students were able to focus. Relevant examples made clarity in the content.
2	Students raised several questions and were well answered by peer members. The peer member was very enthusiastic during the lecture. The biggest motivation was the applications of these algorithms.
3	Following tools were utilized in the delivery of the lecture. 1. Powerpoint presentation. 2. Whiteboard and Marker.
4	Yes, Students were attentive they were asking questions and involved in the process.
5	Classroom management was good. It involved all the students it can further be improved by asking questions to the students in a critical thinking way.
6	The content was delivered with full understanding. Students were interactive during the session. Communication was good. The content was delivered in such a way that all the students were able to focus. Relevant examples made clarity in the content.
7	Asking questions can improve the attention of students this can make the content delivery effective. Peer members effectively utilized the technique of questioning.
8	Yes to the maximum extent. Clear and timely feedback is very important. Peer member has effectively given feedback when students answered the questions.

4. Results And Discussion

With an intent to adopt best practices in teaching style, this study was conducted on the experimental group. The significance of the strategy adopted and its effectiveness has been observed by the level of rising of an attainment level as per the designed hypothesis, and as shown in Table II null hypothesis has been successfully rejected by the control group.

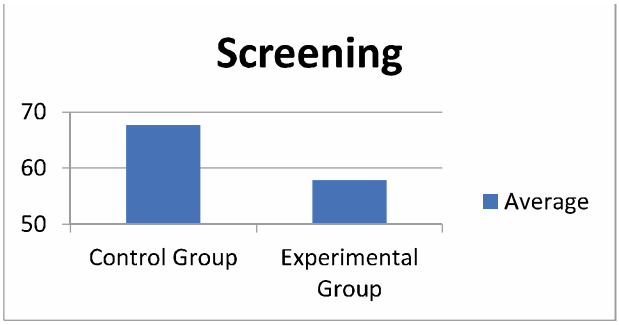

Fig. 5.Student's performance consolidated for screening pre-intervention

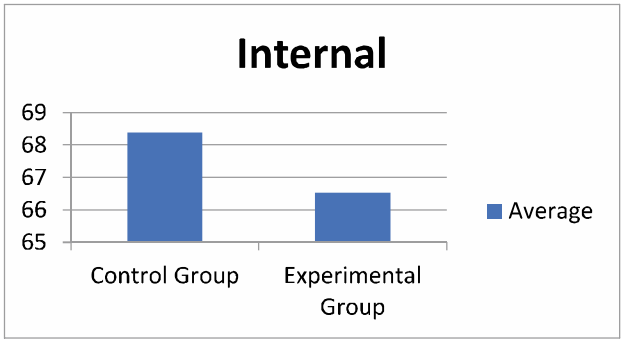

Fig. 6.: Student's internal performance post-intervention

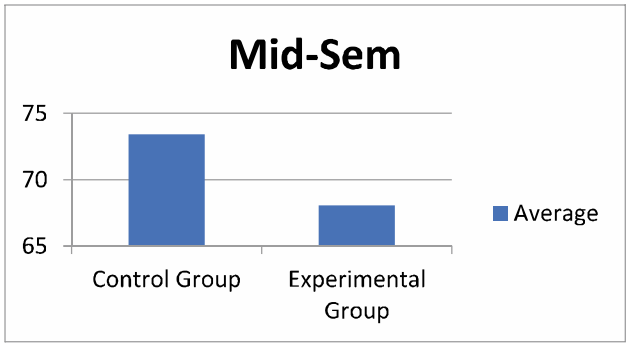

Fig.7. Student's Mid Sem performance post-intervention

In contrast, none of the observed parameters has fulfilled those criteria for the experimental group. Thus, it is proven a very effective intervention strategy to raise the teaching and learning level, and its impact is proven two-fold for the facilitator and the audience. Based on students' average marks, an initial screening was performed, and students were divided into two groups: the control group and the experimental group. Figure 5 shows the results for screening. Both group students' performance in all stages of evaluation criteria is compared and presented in Figure 6-8. It shows improvement in both segments. Figures 6 and 7 show the student's internal and mid sem performance post-intervention; this is higher for the control group due to this control group having level 3 CIA (cumulative internal assessment). Figure 8 shows the end semester performance of both groups; here, the experimental group has higher average marks, which resulted in improved performance and higher-level achievement. This was our intended objective. Therefore, due to this peer observation, the experimental group showed improved performance.

Figure 9 shows the consolidated performance of both groups. Figure 10-11 shows the attainment level achieved to assess the students learning outcome. Figure 12 and 13 shows the attainment levels of each course outcome (CO) in End semester examination. It has three attainment levels named Level* 1, 2, and 3, shown in Table V.

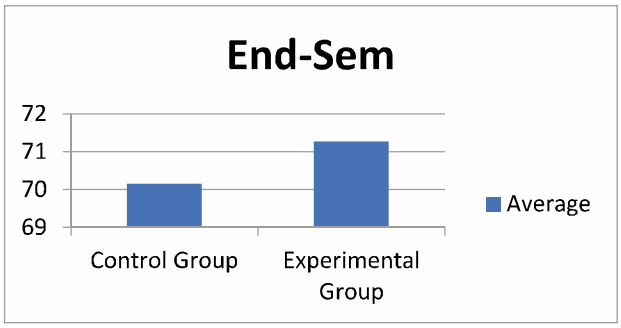

Fig. 8 : Student's End Sem performance post-intervention

Table 5: Attainment levels

Level 1	*40% of the class strength scores more than 50% of the total marks in the examination*
Level 2	*50% of the class strength scores more than 50% of the total marks in the examination*
Level 3	*60% of the class strength scores more than 50% of the total marks in the examination*

CIA is a cumulative internal assessment that contains test quizzes and assignments components. The experimental group achieved Level 3 in end-semester exams and level 2 in CIA, while the control group achieved level 2 in end-semester and level 3 in CIA; this proves the effectiveness of the proposed method.

The effectiveness of the proposed intervention has reflected in our study and is well presented in Figure 9. During the screening process, the index value is 9.73, which is the difference between the control and experimental group, and our set hypothesis has to reduce this index value. For reducing the index value difference, we focused on the experimental group by conducting multiple activities under the internal assessment criterion, and the result has shown the index value difference to 1.84, which is gradually improved. Though the proposed intervention has not shown promising results during mid-semester evaluation on the experimental group, it has risen from 1.84 to 5.35. However, the reason might be because of high course coverage compared to internal assessment. The experimental group still needs more special attention sessions to reduce the index value difference. Therefore, we have rigorously introduced interventions in a group activity to cover the maximum portion of the syllabus after mid-semester. The outcome positively impacts the experimental group's performance in the end semester examination by raising the index difference value -1.12. The range of difference index has deviated from 9.73→1.84→5.35 →-1.12 In literature [40-42], authors have presented the impact of peer observation and its inclusion to improve student performance. In [40], Paul A.K presented a study of implementation of peer-observation to enhance and improve the performance of instructor(s).

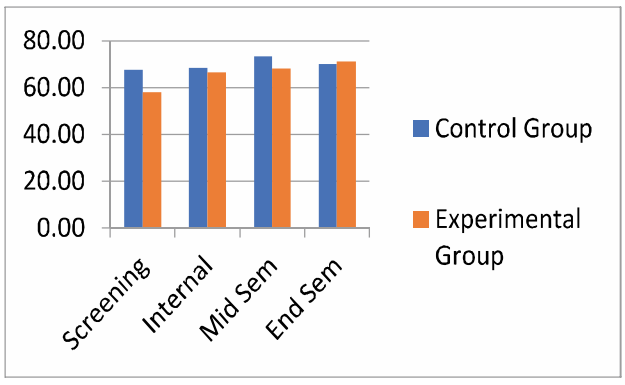

Fig. 9 : Consolidated impact of pre and post-intervention

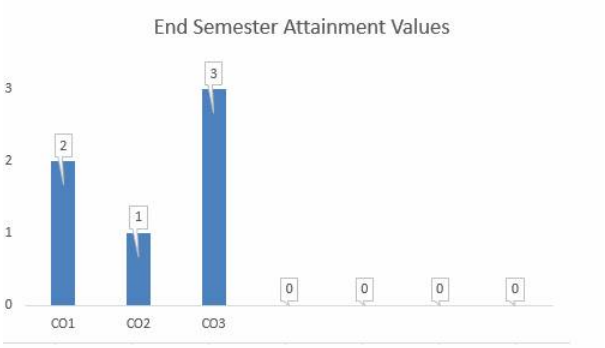

Fig. 10 : Student's attainment Experimental Group

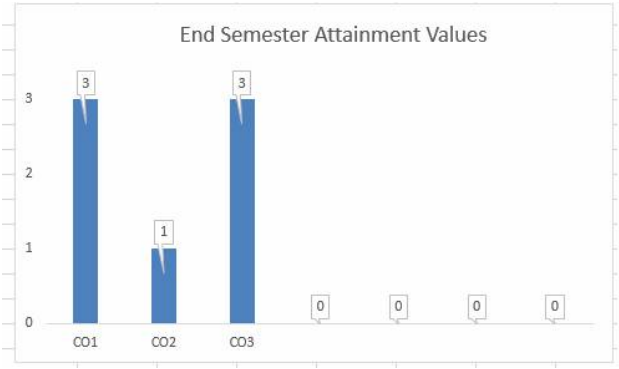

Fig. 11: Student's attainment Control Group.

Overall Attainment of Basic Electronics Engineering (ECEG-1002) (CO wise):	1.99
Overall Attainment of Basic Electronics Engineering (ECEG-1002) (End-Total Marks, Remaining as per CO wise):	1.99
50% of CIA Attainment+50% of End Semester Attainment of Basic Electronics Engineering (ECEG-1002):	1.85
50% of CIA (Total Marks) Attainment+50% of End Semester (Total Marks) Attainment of Basic Electronics Engineering (ECEG-1002):	2.5

Table: Achieved Attainment Levels Info

Criteria	CO1	CO2	CO3	CO4	CO5	CO6	CO7
Class Test/Quiz-1	Level-3 Achieved	Level-3 Achieved					
Class Test/Quiz-2		Level-3 Achieved	Level-2 Achieved				
Assignments/Tutorials	Level-3 Achieved	Level-3 Achieved	Level-3 Achieved				
Mid Semester	Level-2 Achieved	NOT Achieved	NOT Achieved				
CIA	Level-3 Achieved	Level-1 Achieved	Level-1 Achieved				
End Semester	Level-2 Achieved	Level-1 Achieved	Level-3 Achieved				
Avg. Attainments of CIA+END	Level-3 Achieved	Level-1 Achieved	Level-2 Achieved				
CIA (Total Marks)	Level-3 Achieved						
End Semester (Total Marks)	Level-2 Achieved						

Fig. 12 : CO Level achieved (Experimental Group)

Overall Attainment of Basic Electronics Engineering (ECEG-1002) (CO wise):	2.25
Overall Attainment of Basic Electronics Engineering (ECEG-1002) (End-Total Marks, Remaining as per CO wise):	2.6
50% of CIA Attainment+50% of End Semester Attainment of Basic Electronics Engineering (ECEG-1002):	1.8
50% of CIA (Total Marks) Attainment+50% of End Semester (Total Marks) Attainment of Basic Electronics Engineering (ECEG-1002):	2.5

Table: Achieved Attainment Levels Info

Criteria	CO1	CO2	CO3	CO4	CO5	CO6	CO7
Class Test/Quiz-1	Level-3 Achieved	Level-3 Achieved					
Class Test/Quiz-2		Level-3 Achieved	Level-3 Achieved				
Assignments/Tutorials	Level-3 Achieved	Level-3 Achieved	Level-3 Achieved				
Mid Semester	Level-3 Achieved	NOT Achieved	NOT Achieved				
CIA	Level-3 Achieved	Level-1 Achieved	NOT Achieved	NOT Achieved	NOT Achieved	NOT Achieved	NOT Achieved
End Semester	Level-3 Achieved	Level-1 Achieved	Level-3 Achieved				
Avg. Attainments of CIA+END	Level-3 Achieved	Level-1 Achieved	Level-2 Achieved				
CIA (Total Marks)	Level-2 Achieved						
End Semester (Total Marks)	Level-3 Achieved						

Fig.13 : CO Level achieved (Control Group)

5. Learnings And Best Practices

Peer observation exercise was a successful experiment performed in one module. It facilitated the teaching-learning process largely. It was proven as an effective technique for enhancing the students learning. While performing the observations, a few best practices and learnings were listed. Table VI presents the summary of these best practices and learnings.

Table 6 : Best Practices and Learnings

Lectures may be more effective by using teaching methodologies that give students attention.
Always try to connect with students through more and more interactions.
The use of Collaborative techniques helps students in more gaining.
Make the session outcome-based. Keep the session outcomes ready and assess them at the end of a session by asking questions for 2 minutes at the end of the session.
Be the facilitator of the session; guide them for their better understanding.
Practice using the reflective journal for our sessions that will help us identify our class's observations and behaviour in particular situations.
Feedback is essential; always try to give meaningful feedback quickly. It should also reflect the area of improvement.
21st-century education demands changes; we learned to identify those changes and be reflective in following those changes.
The instructional strategies at the course and unit levels effectively improve content delivery. Using Bloom's taxonomy helps us design the course objectives, course outcomes, and unit learning objectives [3].
Academic integrity is the very fundamental thing in the teaching-learning process. We should instruct students and motivate them to follow academic integrity.

6. Conclusion

Peer Observation is the collaborative idea sharing and achieving excellence by sharing the best practices. It is very much effective in the teaching-learning process. With the growth in technology, learner's aspects are also increasing. We conducted the peer-observation experiment among the peers, which improved the students' performance and given a chance to improve the instructor's teaching style. The significance of this study was vetted by z and t statistics parameters. As a result, it is incredibly

beneficial and effective on student performance and developing an instructor's teaching style.

Peer observation gives the collaborative techniques among a group of peers of different expert domains. These collaborative techniques help students gain more insights of the subject and make the sessions more interesting for them. In addition, if an instructor is reflective in his practices, he will be ready to cope with the changes coming with the advent of technology. Therefore, peer observation is for the three-fold benefit, i.e. for the learners and other peer groups.

Acknowledgment

This entire experimental study has been carried out as a part of a certification program PGCAP (Postgraduate certification in academic practices) executed at UPES University of Petroleum and Energy Studies, Dehradun, India. I would like to express my sincere gratitude to UPES, team PGCAP, and the Department of Electrical & Electronics Engineering, for their continuous motivation and support during the experimental study. My sincere thanks to my students who are an integral part of this study.

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