EFFECTIVE TEACHING AND LEARNING TECHNIQUES FOR INTERACTIVE CLASSROOM

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***Abstract*— This paper presents details of teaching and learning pedagogical techniques attempted for the undergraduate engineering program to improve the concentration span of students in a classroom. The details of activities such as valid statement, quiz competition, classroom paper, group work and product marketing to make the students remain active for the entire class duration and to improve presentation skills are presented. These activities shown tremendous improvement in student's performance in academics, also in asking questions, concept understanding and interaction with the course instructor. With these pedagogical activities we are able to achieve Program outcome elements and ABET Program outcomes such as d, i, g and h which are difficult to achieve through the conventional teaching methods.**

Keywords— Activities; pedagogy; interactive learning; valid statement; quiz competition; classroom papers; group work; product marketing.

I. INTRODUCTION

Many researchers in teaching innovation believe that on an average in a class student can concentrate up to 20 minutes, but usually the class timing can vary from 40 to 60 minutes. And also from many decades class rooms were teaching centric then the learning centric. Still today in many university and colleges class room lectures are major instructional method [1]. A well-worn quip attributed to Mark Twain summarizes a lecture as the transfer of information from the professor's lecture notes to the student's notes without passing through the minds of either. Similarly, WH Auden and Camus have each been credited with defining a lecturer as a person who talks in someone else's sleep. Despite such popular and discouraging sentiments about lectures, they remain the most common instructional modes in contemporary undergraduate education. The familiar practices of a professor delivering knowledge to room full of students passively absorbing that information has not fundamentally changed for centuries.

This paper presents valid statement activity- Each and every student have to state a one valid statement turn by turn based on the topic covered in the class. Quiz competition- divide the class into two groups (preferably boys and girls) and equal number of questions will be asked to both the groups. Classroom Paper- what points do you want to make sure you retain from topics discussed in the class. Group work - Encourages all students to think and talk in the class. These activities makes the students remain active for the entire class duration and help the students to improve their performance in academic, understanding about the course.

Organization of the paper is as follows section II deals with Pedagogical activities their objective, procedure, rules, benefits and suggestions, section III deals with Mapping of activities and feedback questionnaires, section IV Discussion and Conclusion.

II. PEDAGOGICAL ACTIVITIES

A. Valid Statement

- Activity objective: To make student remain active throughout the class duration.
- Procedure: Make an announcement in the beginning of the class that activity will be conducted at the end of lecture session.
- Rules:
  - Each and every student have to state a one valid statement turn by turn.
  - If a Wrong statement stated by the student or the student repeat the statement already stated by some other student then student need to write corrected statement 3 times on the board.
- Suggestion and advice: This activity can be conducted in last 10 min of the lecture session. If instructor felt that the number of possible valid statements are made by the students then the activity can be stopped.
- Experience : Student remains alert in the class to note down the possible valid statements.

B. Quiz Competition

- Activity objective: To help the student to understand the concept.
- Procedure:
  - After completing some topics divide the class into two groups.
  - Ask equal number of questions to both the groups.

- Rules: valid answer carry one point. Wrong answer carries zero point.
- Prize: (optional) chocolates can be given to winning team.
- Suggestion and advice: This activity can be conducted in last 10 min or in the middle of the lecture session. If instructor felt that the number of possible questions is asked to the students then the activity can be stopped.
- Experience: Students remain focused in the class, as the student needs to answer the questions at the end of topics, this leads to better understanding of the concepts discussed in the class.

C. *Classroom Paper*

- Activity objective: This helps students to review the day's lesson before they leave the room.
- Questions for Minute Papers might include: "what was the take-home message?", "what was the most confusing concept?", "what question could you ask about today's material?", "what will (or will not) stick in your brain from today's class?", or "what points do you want to make sure you retain for the next exam?". Figure 1 shows connectivity between student and teacher.
- Experience:
  - This technique prompts students to assess the day's lecture before they leave the room. It encourages them to identify key points and questions as a regular exercise.
  - In addition to the well-known benefits of repeating, summarizing, and reviewing information as effective components of learning, Classroom Paper can also decrease the impersonal, unidirectional nature of traditional lecture courses.
  - Through Classroom Paper, all students have an accessible opportunity to raise questions or a safe way to admit confusion [4].

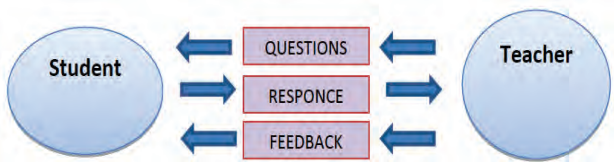

Fig. 1: Minute Paper Student and Teacher connectivity

D. *Group Work*

- Activity objective: This encourages all students to think, it allows all students to talk. Thus, students experience the advantages of explaining their responses to a peer, vetting their thoughts, and revising. Figure 2 shows connectivity between student and teacher.
- Experience: Group work offers multiple benefits. First, the moment set aside to think quietly communicates that all students are expected to think about the issue posed. It thereby reduces the chances that when an instructor poses a question to the class that most students will skip thinking an answer, counting on an eager or attention-seeking classmate to save the day. Similarly, dedicating time to think quietly also allows students who need just an extra moment to organize their thoughts (or gather their courage) a chance of contributing to the discussion [4].

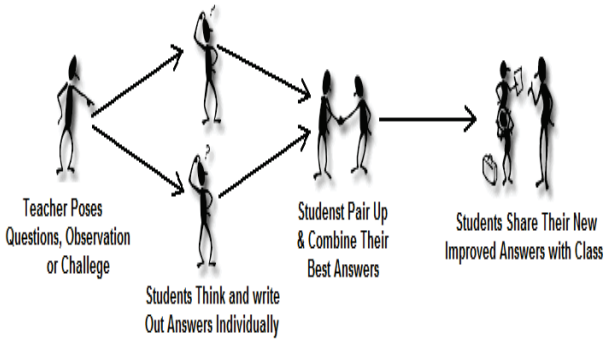

Fig. 2: Group Work block diagram [5].

E. *Product Marketing*

- Activity objective: To improve student's communication, presentation and group discussion skills (to provide a platform to work in a group).
- Procedure:
  - Form the students groups (size : 4 to 8 students).
  - Allow the students to think, discuss about the product and strategies of marketing for 10 min.
  - Students need to note down the points about their new product and its marketing strategies.
  - Each group will be given 5 min to present their idea.
  - Feedback must be given to each group about their presentation and communication skills.
- Suggestion and advice: This activity can be conducted in last 30 min of the lecture session.
- Experience: Student will learn the importance of communication and presentation skills.

III. MAPPING OF ACTIVITIES AND FEEDBACK QUESATIONNARIES

This section discusses about the various evaluation methods adapted for the course and the discussion about the effectiveness of the activities realized and their mapping towards program outcomes.

A. *Mapping of Activities Conducted:*

The effectiveness of the actives conducted as part of a core subject is mapped to the learning outcomes ,a,,to ,k,,defined according Accreditation Board for Engineering and Technology (ABET) [6]. The Table 1 represents the

outcomes ‚a„ to ‚e„ belong to technical outcomes and ‚f„ to ‚k„ belong to professional outcomes. It can be seen that the activities conducted addresses both technical and professional outcomes defined by the program [7].

TABLE I. MAPPING OF OE'S AND ABET PO'S

Name of the Activity	Outcome Elements(OE's)	Abet Program Outcomes(PO's) Addressed
Valid Statement	• Ability to apply knowledge of Engineering.	a
Quiz Competition	• An ability to function effectively as a leader and team member in multidisciplinary groups. • Ability to contribute effectively to the team discussions • Ability to collaborate effectively to choose the best of several solutions & justify.	d
Classroom Papers	• Ability to write clear and well organized paragraph of the discussion. • Ability to deliver an effective presentation.	g
Group Work	• An ability to function effectively as a leader and team member in multidisciplinary groups. • Ability to contribute effectively to the team discussions • Participates in professional activities, discussion	d, i
Product Marketing	• Ability to deliver an effective presentation. • Ability to understand the impact of engineering decisions on the local and global environment, economy and society. • Ability to interpret solutions in both societal and global contexts. • Participates in professional activities, discussion	g, h, i

B. Feedback Questionnaire response

The assessment based on student feedback has been collected by entire class (60 students) as detailed in the section below and the statistics shows that the objectives of the activity were satisfactorily met as mentioned in Fig 3. Question 1 and 2 related to understanding of concepts and attentiveness in the class has made an impact on learning. Question 5 relating to scope of understanding beyond curriculum is satisfactory. Suggestions by review committee and participation in technical events reflected in question 3 and 4 needs a scope for improvement.

The questionnaire consists of five questions, the students are asked to rate on a scale of 1-5.

- Does the activity help you in understanding the concepts better?
- Did the activity boost your activeness and attentiveness in the class?
- Does the activity planned and conducted properly?

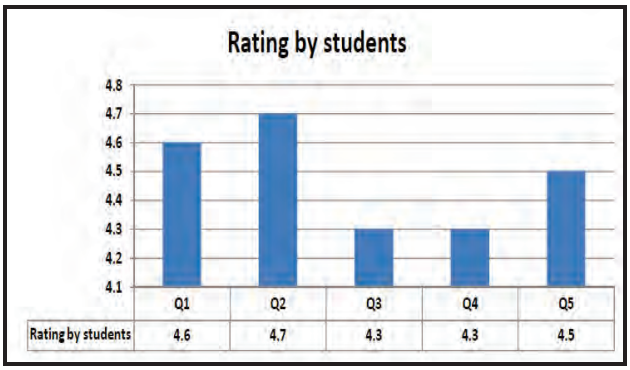

Fig. 3: Feedback Questionnaire response

- Does the activity (Product marketing) and review comment help you to identify your weakness and strength?
- Did the activity help you to participate in technical events and placement activities?

IV. CONCLUSION

The details of each pedagogical activity are presented and executed as a part of an innovative approach to enhance the learning outcome of the students such as d, i, g and h. Assessment based on student feedback has been collected detailed in the appendix section above and the statistics shows that the objectives of the activity were satisfactorily met as mentioned in section II. Based on the students feedback concentration of the student is increased and classroom teaching has become more interactive.

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