

Effectiveness of Active and Cooperative learning technique named Learning together for technical topic – A case study

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Abstract

The purpose of this study is to investigate the effects of cooperative learning methods and collaborative learning technique named learning together on final year B.Tech students of Automobile Engineering Department, RIT Sakhrale. This experiment is conducted for technical subject named “Engine Design” in seventh semester for topic Flywheel design. In this experimental study, students were divided into two groups named experimental group and a control group. There were 29 students in the control group and 35 students in the experimental group. Learning together cooperative learning technique is applied for experimental group to teach a topic named Flywheel design. A same topic is taught to control group by using traditional method of chalk and talk. A small test was conducted on same topic with design questions for both groups and results are analyzed. At the end of session experimental group students are asked to fill feedback form. Result of this research shows significant difference between the levels of achievements between the experimental group and traditional group.

Keywords

Learning together, Experimental group, control group, group discussion, flywheel design, Engine design.

1. Introduction

Next three sentences explain the human approach towards learning. i) Tell me and I'll listen and forget. ii) Show me and I'll remember. iii) Involve me and I'll learn, understand and apply. It indicates only telling something in very interesting manner will also not help to understand the concept behind words. Even only giving demos and showing videos will not help to build confidence in learner to apply knowledge in real life. The only thing that

helps in understanding the concepts in effective way is active involvement of learner in learning activities. So active and cooperative learning plays a vital role in today's education system where knowledge is available on one click for everyone interested to learn. Active learning comprises a wide range of activities that are defined as “any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing” (Prince, 2004). Evidence shows numerous benefits of using active learning activities. Some of them are as mentioned below:

- Increases students' satisfaction and positive attitude towards course material as well as their self confidence and self-reliance
- Motivates students to be engaged learners
- Increases content knowledge, critical thinking and recall of course content
- Allows for inclusion of different learning styles
- Increases enthusiasm for learning in both students and instructor
- Gets students involved in higher order thinking, such as analysis, synthesis, creative thinking, adaptability, problem-solving, etc.

Active learning activities can engage students in various ways by,

- reading, thinking and speaking critically,
- expressing ideas through writing,
- examining personal attitudes and values,
- giving and receiving feedback, and
- reflecting on the learning process.

Active learning activities can be completed by students working as individuals, pairs, small groups or the entire class.

Active learning activities can be tailored to specific time constraints. The activities can be as short or as long as time permits, ranging from between 1-2 minutes to 20-40 minutes.

2. *Application of learning together technique for experimental group*

The learning together method is a technique developed by D.W. Johnson and R.T. Johnson. The most important features of this technique are the existence of the group goal and sharing the opinion and materials, division of students and the group reward.

2.1 *Formation of experimental group*

As it is decided to apply method for experimental group so the first task is formation of group. There are total 64 students in B.Tech Automobile. Course instructor announced about the Learning Together (LT) technique during classroom session and asked interested students to register their name for the same within three days. Instructor also announced that same topic will be covered in traditional way for students who are not interested to join LT class. Rules for experimental group selection were also displayed to the students during lecture. These are as mentioned below

- Registration is open for three days
- Number of students in experimental group is limited to 34.
- Experimental group will be the heterogeneous group.
- Selection of students will be done on the basis of their performance in last semester subject named Machine Design (MD).
- If more than 34 students shown interest to join experimental group then students will be selected using following table to make heterogeneous group

Table 1. Experimental group selection

Sr.No.	Number of students	Marks in MD
1	7	Marks ≥ 40
2	14	$40 > \text{Marks} \geq 30$
3	7	$30 > \text{Marks} \geq 20$
4	7	From remaining
TOTAL	35	

In three days 57 students have registered their name to join experimental group. It indicates students are also ready to experience new methods of learning. By using above table 35 students were selected to form heterogeneous experimental group.

2.2 *Methodology*

Topic named Flywheel Design is selected for Learning Together. Instructor has arranged two hours lecture for the same on date 18/10/2016 from 11:40 to 12:40. Students were asked to come with topic notes for lecture which were provided by instructor in advance. Instructor has divided lecture in different activities as given below

Table 2. Activity chart

Activity No.	Name of Activity	Duration in minutes
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1.	Introduction to Flywheel and its design	5
2.	Formation of student groups	5
3.	Self study in a group (SSG)	20
4.	Preparation of "Give one- Get one" page in each group.	5
5.	Individual Performance (IP)	10
6.	Group Discussion on Solution (GDS)	5
7.	Reward and discussion with instructor	7
8.	Feedback	3
TOTAL DURATION		60

Details of each activity mentioned in above table are as given below.

Activity 1: Introduction to Flywheel and its design

It is opening session where instructor discuss about content in handouts or notes provided to students with the help of power point presentation. He also gives instructions regarding how to refer material available to learn flywheel design.

Activity 2: Group formation

There are different methods available to form a group. Here seven groups are formed containing five students in each group. The nature of group was heterogeneous. Each group was containing one member from serial number 1, 3&4 and two members from serial number 2 of table 1. Students were assigned number 1, 2, 3 and 4 as per the marks category and they are asked to form group of five with above mentioned constraint. This method helped to quick formation student groups.

Activity 3: Self study in a group (SSG)

In this activity students are supposed to carefully read the material provided to them. They should do it by sitting in a group. Students are free to discuss doubts with group members.



Photograph 1. Students doing Self Study in Group

Activity 4: Preparation of "Give one- Get one" page by each group.

During activity 4 each group has to fold a piece of paper lengthwise to form two columns and write "Give One" at the top of the left-hand column and "Get One" at the top of the right-hand column.

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Group has to write their understanding under column “Give One”. After that they have to share and discuss information with other groups. If group finds something extra information from other group then they have to add it under column “Get One”.



Photograph 2. Students preparing ‘Give-One Get-One’ sheet

Activity 5: Individual performance

Now instructor has to give example to students and they are asked to solve it individually by sitting on separate bench. In this activity students are not expected to discuss anything with others. Student may use available material for reference.



Photograph 3. Individual performance

Activity 6: Group Discussion on Solution (GDS)

After solving example student has to reform group and they have to discuss solution with group members only. After discussion they have to finalize answers and submit it to instructor by writing on paper.

Activity 7: Reward and discussion with instructor

Now instructor has to announce correct answer. During this session out of seven groups five groups have submitted correct answers. In remaining two groups out of 10 students four have got right answer but they were failed to convince it to other members. The most important thing was all students have followed correct procedure to get answer. It indicates students understanding about concept. Instructor has offered two chocolates to each member

of winning groups and one to each member of remaining groups.

Activity 8: Feedback about activity

Here students are asked to fill a feedback form which is as given below.

LEARNING TOGETHER ACTIVITY FEEDBACK FORM

- 1) The activity conducted was interesting.
 - Strongly agree
 - Agree
 - Neutral
 - Disagree
 - Strongly disagree
- 2) Activity helped to understand concept in a better way.
 - Strongly agree
 - Agree
 - Neutral
 - Disagree
 - Strongly disagree
- 3) Such learning techniques are essential for better learning.
 - Strongly agree
 - Agree
 - Neutral
 - Disagree
 - Strongly disagree

Comment:-

[Strongly agree (5), Agree (4), Neutral (2), Disagree (0), strongly disagree (-1)]

On the basis of feedback of 35 students the attainment is calculated. Activity got 510 marks out of 525. It indicates attainment of activity is around 97%.

3.0 Control group learning

Same topic was repeated for control group by traditional way of teaching on 21/10/2016 and after completion of topic students are asked to solve example. It is found that out of 29 only 11 students were able to solve example. Others were struggling to get answers.

4.0 Discussion

4.1 Learning Process

During learning process of Experimental group different activities were involved like formation of group, self study in group, discussion with group members, preparation of Give-One Get-One paper etc. Students found it interesting as they were allowed to move within class for certain activities. They read the material carefully and expressed their learning during discussion. As groups were allowed to exchange thoughts so number of doubts were cleared within short span of time. On the other hand control group learn the things by traditional way where students role is only as listener. These students used to sit on their place for entire lecture. They are not involved actively in learning process so it was difficult for them to express their learning.

4.2 Individual learning

As the Experimental group is a heterogeneous group and seven subgroups formed are

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also mixture of different grade students. Such mixture helps slow learner to learn the things from their friends. A student with better understanding will automatically become leader of group. During discussion students ask all kind of doubts to each other. In traditional classroom they have fear to ask question as they think question may be silly one. Such discussion clarifies doubts of each individual learner.

4.3 Frequently asked Questions (FAQ's)

Q.1. Is it possible to cover syllabus of technical subjects of Engineering by using Active learning techniques?

Ans: - Yes, Technical topic named flywheel design is covered effectively within one hour.

Q.2. Is active learning process effective?

Ans: - Yes, Out of 35 students from Experimental group 29 got correct answer of numerical. Remaining six students also got an idea where they did mistake. In control group out of 29 only 11 students got correct answers. It indicates in experimental group success rate is 82% while in control group it is only 38%.

Q.3. Is it possible to apply such technique in large classroom

Ans: - Yes, provided instructor should form proper groups and give relevant instructions and material required for activity.

Q.4. Is it possible to apply such technique in available infrastructure.

Ans:- Yes, check the photograph 1. There are rigid benches in classroom and students are asked to turn around to form a group.

5. Conclusion

Active learning techniques are useful to make students think about the topic they are learning. The most important thing is a selection of proper technique for a particular topic. Here learning together method is selected for a technical topic. During process students also go through active learning processes named think-pair-share and 'Give-One Get-One' technique. Combination of different techniques really improves learning of students and it gives fruitful results of entire process in terms of students learning and understanding.

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