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Assessment of students learning capability adapting activity based learning – STAD

[1]Bridjeshpappula, [2]Geetha narayanankannaiyan

ABSTRACT--Current educational approaches within higher education utilize blended learning. Students receive a combination of traditional face to face instruction in class and are also required to complete activities outside of the class, facilitated through a range of technological resources. The purpose of this study is to provide a comprehensive overview of activity based learning. Blended learning has become increasingly popular in higher education globally, forming the cornerstone of curriculum design and providing opportunity for learning not previously possible or available to students. The results indicate that there is much indirect evidence emerging of improved academic performance and student and staff satisfaction with the STAD approach but a paucity of conclusive evidence that it contributes to building lifelong learning. It can be concluded from this study that activity based learning not only fosters the self learning of a learner but also allows the learner to learn according to one's own skill and aptitude.

Keywords-- Activity based learning; STAD; Inclivity; Teaching Methodology.

I. INTRODUCTION

The first issue under consideration when an oral presentation or a publication or an article is "the audience". The message intended to be imparted should influence the content and what and how to teach [1,2]. With the transformation happening in teaching methodology, the academic community is undergoing increased pressure and feel pressed upon. Ways and means need to be adapted to meet the conceptual needs of the day.

The set of well researched principles about how people learn will apply onto learners. Such as born learner [3], learn through elaborative rehearsal [4,5], learn socially by constructing knowledge in a group [6], learn by inspiration and enthusiasm [7], learn well when it is student centered [8], learn by self-regulated learning [9], learn better when the content evokes emotions and not intellect [10]. In general the learning pattern mirrors the biological basis of learning, which entails a change in the brain. The key learning principle have some complementary teaching principles such as holding the students to high expectations, starting the content from where the students are, relate the content and abilities to what they are familiar to, demonstrate enthusiasm and passion towards the subject, assigning inventive creative and challenging tasks to small groups, using active learning techniques, whenever possible use experiential methods which involve real-life problem solving situations.

The objective of the present study is to analyse the impact of activity based learning, STAD on learning for undergraduate engineering students.

[1]*Department of Mechanical Engineering, MLR Institute of Technology, Hyderabad, India.*

[2]*Department of Science and Humanities, Sri Krishna College of Engineering and Technology, Coimbatore, India*

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II. METHODOLOGY

Inclivity

Classroom inclivity is the first and foremost problem encountered in technical education [11]. In a nutshell inclivity is the disruption of orderly environment that should prevail in class, which is conducive to learning. The exacerbated behaviour, large class taught by low status instructor and increasing diversity are probably the possible reasons for inclivity [12, 13]. One way to reduce classroom inclivity is the personality the teacher projects in the classroom that increases the performance dimension of teaching i.e a touch of fear and loyalty.

III. Motivation

Inducing a genuine fascination with the subject and applicability to the life and society falls under intrinsic motivation. Whereas, extrinsic motivators often eclipse the intrinsic motivation. The art of motivation is to know how to manipulate individual's values, attitudes and belief systems i.e like that of politicians and advertisers. The notion goes as, "Punishment teaches students what not to do, but it tells nothing about what they should do".

IV. Teaching methodology

Martimer Adler once quoted, "Lecturing is the transfer of information from the notes of the lecturer to the notes of the student without passing through the minds of either". Research dating back to 1920s proclaims that lectures have very infamous reputation for it is utterly forgettable [14]. In this regard, experiential learning activities are ranked higher for the continuum of student engagement. The following is the activity conducted from the subject, "Engineering Thermodynamics", on the topic, "First law of thermodynamics applied to an open system".

V. Activity: STAD

Topic: First law of thermodynamics applied to open system (SFEE)

- Open system
- Mass balance and energy balance (SFEE)
- Applications of SFEE

Objective of the activity: After completion of the activity, the student should be able to

- Describe energy interactions of thermodynamic open system.
- Apply the SFEE to a thermodynamics system such as turbine, compressor, heat exchanger, nozzle etc.,

VI. Lecture / presentation

A lecture on concepts of first law of thermodynamics will be taken to impart the basics of thermodynamics.

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Plan to create teams

- The class strength is 60.
- A sample test comprising of 10 objective questions will be conducted on the basic concepts of thermodynamics covered so far.
- Class will be asked to answer the set of questions individually.
- The scores will be tabulated and class will be divided into 15 teams of 4 members in each team. In specific the team will be a heterogeneous group of mixed performance level (high score + low score + medium score + average score). 4 members in a team is ideal as it encourages responsibility and accountability of individual and get equally motivated.

Time to be given to students

Out of the busy schedule of students, it is planned in the following way:

- Open system: 1/2 hour

½ hour is sufficient as it involves knowing what an open system is and what the characteristics of an open system are.

- Mass balance and energy balance (SFEE): 2 hours

2 hours time is needed so as the student understand how mass transfer and energy transfer takes place in an open system. Analyze various forms of energy interactions taking place at inlet and exit of the thermodynamic system.

Applications of SFEE: 2 hours

2 hours time is needed so as the student recall and apply the concepts of SFEE to various engineering devices. As such some systems are adiabatic and some processes in thermodynamic systems undergo throttling process.

In the strict sense of the word, students could spend time for preparation only during evening. Students will be requested to take 5 days time for preparation.

Evaluation of individual and group performance

A quiz of 20 objective questions will be taken up by students individually and the scores of individual; subsequently the teams will be recorded. During the quiz, students will perform individually and not as teams. The scores of individuals before the activity and after the activity will be recorded and compared along with earlier performance. Likewise, the format to record the team score is shown in Table 1.

Table1: Scores of teams

Student	Preliminary test marks	Team	Individual Assessment after activity	Team assessment after activity
1	-	1	-	-

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2	-	1	-	-
3	-	1	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

The following is the strategy used to form teams:

A set of 10 questions was given to class to answer.

Answers were evaluated and tabulated.

Marks scored by students were not in par to divide into groups normally.

There were 64 students in the class. (5 students scored 3 marks likewise 10 – 4 marks;25 – 5; 9 – 6; 4 – 7; 8 – 8; 3 – 9)

In order to make 4 students per team, the sum of scores of a team is ensured as 22 n 23. Such that average is 22.5.

In total 16 teams were formed.

Scores of individual and teams are presented in the Table 2.

Table 2: Individual and teams scores

Sl.No	H.T.No	Student Name	Preliminary test marks	Team
1	17R21A0302	A N ADITYA	4	1
2	17R21A0305	AQEEL UR RAHMAN	5	
3	17R21A0306	B TIRUPATHI YADAV	5	
4	17R21A0357	THOLIKONDA HEMANTHSAI	8	
5	17R21A0349	RAPAKA PRAVEEN	4	2
6	17R21A0308	BALAJI PRIYADARSHINI	5	
7	17R21A0309	BANTU MARUTHI PRASAD	5	
8	18R25A0307	CHETPELLI SATHISH	9	
9	-	-	-	3
10	-	-	-	
11	-	-	-	
12	-	-	-	

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The collaborative work taken up is STAD.

Topic under discussion was “Steady flow energy equation”

Lecture was delivered on SFEE.

Then students were made to sit as teams.

With the study material having in hand, teams had thorough discussion on the given topic. Time period of 20 minutes was given to teams and then students were asked to shuffle such that team members are not sitting together for conducting test. Students who were not participating in the discussion were advised to understand the importance of the topic. To keep the discussion going, a few applications on SFEE were also presented to the teams.

A “Test 1” was then conducted with MCQs on the topic.

Individual scores were tabulated along with the team score. Team score was taken as average of individual score.

For further analysis, “Test 2” was conducted with all the team members sitting together.

Scores were tabulated and analyzed.

The scores of teams with % differential are presented in Table 3.

Table 3: Scores of teams with % differential

Sl.No	H.T.No	Student Name	Preliminary test marks	Team	Test 1		Test 2	Team actual points differential	Team points % differential
					Individual	Team = Avg. of team	Team score		
1	17R21A0302	A N ADITYA	4	1	4	5.5	6	0.5	9.09
2	17R21A0305	AQEEL UR RAHMAN	5		5				
3	17R21A0306	B TIRUPATHI YADAV	5		6				
4	17R21A0357	THOLIKONDA HEMANTHSAI	8		7				
5	17R21A0349	RAPAKA PRAVEEN	4	2	3	5.25	6	0.75	14.29
6	17R21A0308	BALAJI PRIYADARSHINI	5		5				
7	17R21A0	BANTU MARUTHI	5		6				

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	309	PRASAD							
8	18R25A0307	CHETPELLI SATHISH	9		7				
9	-	-	-	-	-	-	-	-	-
10	-	-	-		-				
11	-	-	-		-				
12	-	-	-		-				

It is observed from the above table that team 14 scored less marks after the Test 2. Upon checking the individual scores of this team after Test 1, two students scored less as compared with Test 1. This could be due to the misconceptions about the topic or there could not be clear understanding about the topic. Remedial measures need to be taken to clear those misconceptions. I need to talk to this student personally and clarify the misconceptions. Other reasons probably be, either communication gap or misunderstanding of the concepts.

However, team 10 showed appreciable improvement in performance after the activity. This is shown with 40 % improvement as per the table.

VII. CONCLUSION

The results of the activity conducted indicated that activity based learning promotes positive attitude which also show better achievement and motivates learners to learn. The adaption of activity based learning increases the self efficacy and increased use of deep processing strategies.

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