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Exploring Team Based Learning Pedagogy for Machine Drawing Course

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Abstract: Today's scenario it was very difficult for instructor to go and check the progress of each student in the class. In traditional approach in drawing course instructor have to explain in black board each and every drawings and it is a time consuming, student will not understand each part drawings clearly. For improving the learning in students Team Based Learning applied to machine drawing course in engineering. The purpose of this paper is to know the progress by adapting the pedagogy team based learning in Machine Drawing subject. In this pedagogy, students learn in groups and this TBL method will improve the student learning skills, problem solving technique, good knowledge and communication. The faculty can easily identify the correct learning difficulties on the spot, but it is not possible to find easily in the traditional approach. These include motivating the student to learn in groups to understand the concept very clearly. This subject includes full of drawing problems by applying TBL pedagogy, student will learn the machine drawing clearly. In this TBL method on each team one lateral entry student or diploma passed student included in the every team.

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1. Introduction

Education research shown that students are more active in learning when compared to the traditional way of teaching. Dr. Robert O'Connell &Ms.Pil-Won On [1] 2012, describes the overcoming challenges made over three semesters. Case study, he has taken number of students (N=61), as a result (N=56) students, they learned more in group learning method as compared to traditional approaches.It is found that in this research paper as comparing to the evaluation survey results students are more comfortable and learned in TBL method. Dr. Chao Wang &Dr. Jennifer Mott [2] 2015, describes the with and without the use of TBL, challenges and any change student perception in learning. TBL method was implemented in the course (N=40) in this 86% student given the positive feedback. It is found that team based learning will give, the more learning to students and does not favor student in terms of gender and academic levels. Mr.Homero Gregorio Murzi [3] 2014, explains that working in the team will get a good benefit as will not get in individual work. Literature survey has been done on innovative pedagogy and this research was focused on improving student learning in the education field. It is found that the impact of TBL method will give the elevation of creative thinking in engineering education. Michaelsen, L &Parmalee, D. [4] 2009, explained the four essential elements of TBL

method. Case study has been done on essential elements of TBL are implemented in a course and it gives wide verity of benefits for students. It is found that group learning enables a good learning that are virtually impossible in traditional approach. Ms. Nicole Lynn Larson &Ms. Genevieve Hoffart [5] 2016, this paper describe a study that two type group learning behaviors one is exploring and another one is exploiting. TBL method was applied (N=540) students, the both team learning behaviors increase over time. It is found that, the extensive use of group learning in engineering education, an understanding of group learning is critical. Dr.Lorelle A Meadows &Dr. Denise Sekaquaptewa [6] 2013, this paper describe a study of effective student teams, proposal for team size, how to place the student in team and student diversity. Case study has been done (N=1123) 431 female participant, 692 male participants and 246 team have been done. It is found that in TBL on classroom observation men take on more active roles than woman students. It is suggested that creating a team gender balance can improve the team performance. Robert M. O'Connell [7] 2011, this paper describes the self-directed independent learning and group learning. The group learning provides deeper conceptual learning compared to traditional learning. TBL method was applied (N=45) students, 73% student felt that they learned more with TBL approach. It is found that many of practical challenges of implementing TBL in subject resolved satisfactorily. Brandon W. Olson [8] 2005, this paper describes the in TBL method to improve student interaction, conceptual learning, commitment and cooperative skills. Case study has been done 78% of students felt that team learning good compared to traditional approach. It is found that the group learning experiment has been awesomely positive, the student seems to largely enjoy education if it is presented in an efficient manner and group work.

Checking the progress of Dr. Robert O'Connell &Ms.Pil-Won On [1] 2012, research paper TBL given the good result when compared to traditional approach. By following this paper applying theTBL pedagogy to machine drawing course. In this course TBL applied and the number of student from section is (N=130).

2. Method

This study was conducted on students completing the course, “Mahine Drawing” (N=130) of second year Mechanical Engineering at Hyderabad Institute of Technology and Management (HITAM). This subject contains full of assembly drawing problems. Total 20 team has been made from two sections. While making a team rule has been followed like one team contain one polytechnic student (passed out student from diploma). This rule done because polytechnic students already once learned about assembly drawing in diploma. So this will help to solve the problem easily with great teamwork shown in fig.1.

Fig.1 Applying TBL method in class

Students are sitting in circular type and solving the drawing problem in a team shown in fig.2

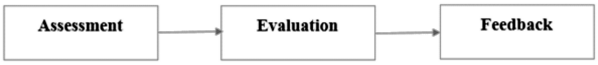

Fig. 3 TBL Process

Fig.3 shows the TBL process, at first assessment will be given to the group. Each group has a time limit of 2.5 hours. After solving an assembly problem of subject evaluation will be done in team wise.

From two sections contains 130 students, around 85% students are involved in team work and they solved the problem within the time limit. 15% of students lagging behind due to communication gap, but all 15% students have solved the problem with a

time of 3 hours. After evaluation process feedback has been taken 90% student felt that they have learned in TBL when compared to traditional approaches.

These are the essentials of TBL

- Teams must be properly formed and each team should contain one polytechnic student. Diverse and permanent teams of five to six students are required.
- Students have to give timely feedback about teamwork.
- Students make complex decision on course concepts during class that are reported in simple form.
- Team and individual member (N=130) students (N=20) teams evaluation done in this course. Team evaluation done by peer evaluation Peer evaluation question for teams are
- Overall, how effectively did your team work together?

  a. Poorly

  b. Adequately

  c. Well

  d. Extremely Well
- What problems have you had interacting as a team?
- What is a specific action that would help the team function and interact even better next time?
- How many of you were fully prepared for the teamwork most of the time?
- Give one specific example of something you learned from the team

Individual member team evaluation done shown in Table.1. Grade are 5- Exceptional; 4- above average; 3 – average; 2 – below average; 1 – barely meets the expectations

Table.1 Individual member evaluation Rubrics

	Team Member's Name	Roll No.1	Roll No.2	Roll No.3	.....	.....
1	Attendance in the class	5	4	5		
2	Ability to communicate effectively	4	4	4		
3	Completing his/her tasks	5	5	5		
4	Finishing assignments in a timely manner	5	4	5		
5	Collaboration with other team members	3	5	5		
6	Applying knowledge of drawing and engineering	5	5	4		
7	Identifying, formulating, and solving engineering problems	4	3	4		
	Overall grade	A	A	A +		

3. Results

Fall2015 batch student the traditional approaches followed in machine drawing subject. The class contains total of 84 students. In the internal assessment evaluation 64% students got more than 15 marks having an average of total 25 marks and 36% of students got less than 15 marks shown in Fig.4.

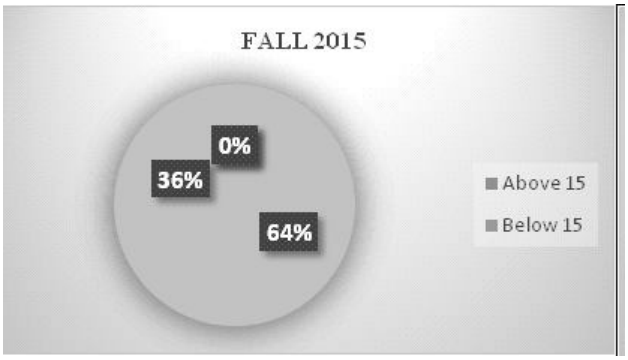

Fig.4 Internal assessment result

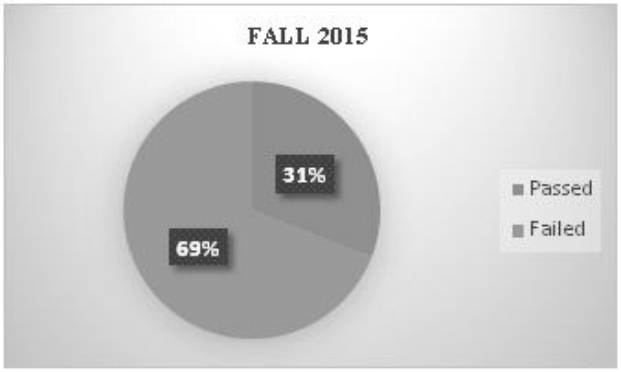

Fig.5. University results

As per university exam 31% of students passed in this subject shown in fig. 5.

Fall 2016 batch student the TBL pedagogy applied in machine drawing subject. The class contains total of 130 students. In the internal assessment evaluation 85% students got more than 15 marks having an average of total 25 marks and 15% of students got less than 15 marks shown in Fig.6.

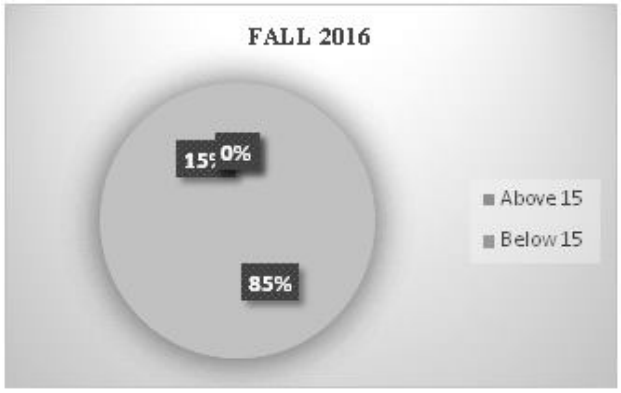

Fig. 6 Internal assessment evaluation results

As per university exam 60% of students passed in this subject shown in fig.7.

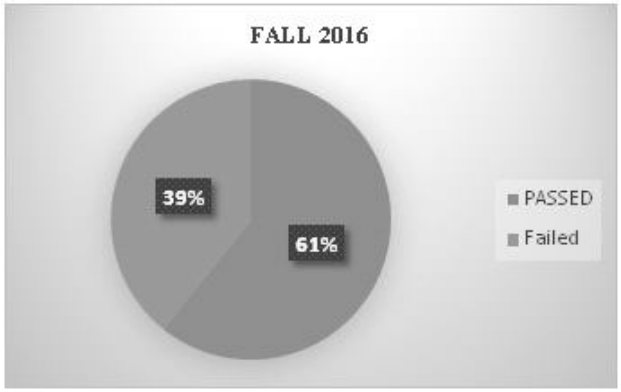

Fig.7 University results

Challenges phased while conducting TBL pedagogy in machine drawing course, team contains 6 students, if two or three are regularly absent in the previous session, it is very difficult for the team to involve in the session while solving the drawing problems. For absentees are not able to catch what are the learning happened previous session and it may affect the team work.

4. Discussion

By following previous research paper ofRobertM. O'Connell [7] 2011 the TBL method was applied (N=45) students, 73% student felt that they learned more with TBL approach and following this paper in machine drawing course from two sections contains 130 student and 85% students felt that from TBL they learned good communication and teamwork. The main purpose of the study was to improve the result, learning skills and teamwork in the students. Paper shows that while applying a TBL method there is a progress in result fall 2016 while comparing to fall 2015 traditional approach. The peer evaluation and individual rubrics it shows that students are much more interested and involved in activity. The current findings clearly suggest that faculty members need to adapt engaging practices of engineering education so that students are actively participated in teamwork and results will be improved in the course. Perhaps, different teaching and learning strategies have to be adapted to improve the results. This might warrant faculty improvement programs addressing innovative teaching techniques on a regular basis, keeping abreast with the developments in the area of pedagogy of different engineering courses.

5. Conclusion

TBL successfully implemented in this course. Therefore, we are trying to address that for applying the new pedagogies like team based learning it will give positive approach. The research focused on developing engineering skills desired by industry with the implementation of innovative teaching strategies. As applied TBL method more students are feeling that they are learning in teamwork as compared to traditional approaches. The TBL method can be applied to drawing and problematic subject. In this paper shows the TBL method results are good and students shown the more enthusiasm towards teamwork.

Limitation of this study is if section having a more than (N=160) it is very difficult to apply TBL for drawing course. If students are having less numbers (N=>130) TBL can be applied. In this course each group should contain one polytechnic student if the one or in two groups if polytechnic student is absent, this team take more time to solve the problem compared to other groups.

References

[1] Dr. Robert O'Connell &Ms.Pil-Won On (2012).Teaching circuit theory courses using

teambased learning. Journal of American Society for Engineering EducationPage 25.1371.3.

[2] Dr. Chao Wang &Dr. Jennifer Mott (2015).Implementing team based learning in a first year introduction to engineering course. 122nd ASEE Annual Conference & Exposition June 14-17.

[3] Mr.Homero Gregorio Murzi (2014).Team-based learning theory applied to engineering education: A systematic review of literature. 121stASEE Annual Conference & Exposition June 15-18.

[4] Michaelsen, L., Sweet, M. &Parmalee, D. (2009).The essential elements of team-based learning. New Direction in Teaching & Learning, 7-27.

[5] Ms. Nicole Lynn Larson &Ms. Genevieve Hoffart (2016.) Team Learning Behaviors: Supporting Team-Based Learning in a First-Year Design and Communications Course. 123rd ASEEAnnual Conference & Exposition June 26-29.

[6] Dr.Lorelle A Meadows &Dr. Denise Sekaquaptewa (2013).The Influence of Gender Stereotypes on Role Adoption in Student Teams. 120th ASEEAnnual Conference & Exposition June 23-26.

[7] Robert M. O'Connell (2011). Adapting team-based learning to early engineering courses.Proceedings Midwest Section ConferenceJournal of American Society for Engineering Education

[8] Brandon W. Olson (2005).Practical application of team based learning to Undergraduate engineering coursework. Proceedings of Midwest Section ConferenceJournal of American Society for Engineering Education.