**ORIGINAL ARTICLE**

# Quality of Medical Students Performance through Team-Based Learning in Comparison to Performance in Traditional Lecture

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## ABSTRACT

**Background:** Team based learning deserved more attention nowadays due to its superiority over traditional based learning. One of the methods used to determine advantages of tam based learning(TBL) over traditional lecture (TL) is to determine the standard setting of norm-referenced and criterion referenced (Angoff) for both methods of instruction.
**Aim:** To measure students' performance in TBL, TL through the norm-referenced, criterion-referenced, standard settings in undergraduate students program.
**Methodology:** This is an experimental study done in faculty of medicine, University of Bahri, Sudan during July 2018 for pediatrics course. All student enrolled received their TBL, TL activity fallowed by MCQs test, then standard setting performed by norm-referenced and criterion referenced (Angoff) for both methods of instruction.
**Result:** Standard setting using both methods showed significantly high level cut off score when instruction performed through TBL.
**Conclusion:** Cut off score to determine pass/fails usually high through TBL instruction, which insure high level of performance and ultimately safe doctors.
**Keywords:** Angoff, tam based learning, traditional lecture, criterion referenced, norm-referenced

## INTRODUCTION

Issue of assessment in medical education deserve more interest since it discovers gaps and area for development because it drives student learning (1). Accountability in medical education, ensure a system of ensuring quilted doctors by adopting standard settings as this is the case by many by many intuitions worldwide (2). Many definitions for standard setting exist and all agree about a boundary between those who have acceptable and not acceptable performance (2), those who are competent enough to care for their patients and those are not competent[1]. some authors regarded standard setting as examinee centered methods or test centered methods (4). In examinee-centered methods students' needs to be classified into qualified, nonqualified and borderline based on some criteria, while in test centered methods judgment of the expected achievement through judges are used, the famous example here is Angoff method (4). According to the mandate of the standard setting two groups were defined: either as relative (norm referenced), when only certain numbers of students requested to pass a test, or absolute standard setting (criterion-referenced ) when all students might pass a test for instance as in Angoff method[1,5,6,7]. In order to encourage long lasting learning, self-directed learning, problem solving as well as deep learning team based learning(TBL) should be encouraged to overcome shortage of traditional lecture (TL)[8,9,10].

The objective of the study was to measure students' performance in TBL,TL through the norm-referenced, criterion-referenced, standard settings in undergraduate students program.

**Research question:** Is there any significant differences in students' performance using different methods of instructions specifically through TBL and TL?

## METHODS

This is an experimental study done in faculty of medicine, University of Bahri, Sudan during July 2018 for pediatrics course. Pediatrics course usually delivered at introductory level in fifth year and advanced level in sixth year, the study conducted at the advanced level. Team based learning (TBL) consist of three stages: in stage one students do their reading at home and came ready to answer MCQs questions individually (iRat), followed by stage two where the same questions to be solved in pre-determined groups (gRat), then in stage three again few extra questions to be solved in group (Apt) and finally micro-lecture was delivered by the instructor[11]. For TBL class was divided into eight groups. The topics selected for TBL and traditional lecture (TL) as scheduled already in the time table ,one topic was selected for teaching as traditional lecture, followed by MCQs test as best of four (15 questions), another topic conducted after one week as TBL ( where 15 MCQs as best of four conducted individually, then in groups. The standard setting then applied by the norm-referenced methods (mean minus one standards deviation,(3) and the criterion reference methods by Angoff where five judges judge the cut off score for the minimally competent students[12]. Although TBL is small group teaching, our groups ranged from 25-28 students per a group, which is acceptable by some authors[13]. Traditional a lecture conducted by a teacher who only delivered information through multi-media. The Data were analyzed using PAST (Version 3.14; Øyvind Hammer, Natural History Museum, University of Oslo, 1999-2016). Two-way analysis of variance was used to examine whether the 2 teaching methods vary and whether there is a gender variation in these methods.

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## RESULTS

For TBL, TL, the maximum achieved marks was 86, 92 respectively, while the minimum achieved marks was 56, 19 respectively (Table 1). Mean, standard error, standard deviation and norn-referenced standard setting for TBL was 77.18, 0.4 ,5.83 and 71.35, respectively, at the same time Mean, standard error, standard deviation and norn-referenced standard setting for TL was 70.21, 1.01, 14.33 and 55.87, respectively with significant difference (p value = 0.000 (Table 1). It is very obvious when norm-reference standard setting is used for TBL and TL, cut off score (standard setting was 71.35, 55.88 for TBL and TL respectively, there for high marks is needed to pass a test when TBL is used as a methods of instruction than when TL is used. On the other hand when criterion referenced standard setting is used (Angoff)[4] to determine cut score in TBL, TL, it was found as 45.2%, 42.4% irrespectively and in such a case many student can pass TL than numbers who pass the TBL.

Table 1: Descriptive statistics and analysis of variance (p values) and charts showing norn-referenced standard setting

| Parameters | TBL | Traditional |
|---|---|---|
| Total number | 202 | 202 |
| Min score | 56 | 19 |
| Max score | 86 | 92 |
| Sum score | 15590 | 14183 |
| Mean score | 77.18 | 70.21 |
| Std. error | 0.41 | 1.01 |
| Variance | 33.10 | 205.51 |
| Stand. dev. | 5.83 | 14.33 |
| Norm-referenced standard setting Mean- 1 stand.dev,. | 71.35 | 55.88 |

P value: sig diff (p = 0.000)

Table 2: Descriptive statistics and analysis of variance (p values) and charts showing criterion referenced (Angoff) standard setting

| TBL | | TL | |
|---|---|---|---|
| N: of questions | 15 | N: of questions | 15 |
| Cut off score by criterion reference (Angoff) | 45.2% | Cut off score by criterion reference (Angoff) | 42.4% |

P value= 0.0029

## DISCUSSION

It is observed when norm-reference standard setting is used for determination of a pass mark in TBL and TL, marks required for standard setting is higher for TBL than for TL with p value = (p = 0.000) which is significant. At the same time when criterion referenced standard setting (Angoff) is used for determining standard setting in a test where instruction through TBL, TL, again higher marks needed in TBL than in TL with P value of = 0.0029 (significant). Therefore when instruction is conducted by TBL the stand setting is always high regardless of the methods of standard setting.

To my knowledge no previous study done in our context–to compare students' performance in TBL with Tl. In this study I aimed to search for evidence supporting thinking, students centered learning over traditional method of instruction.

Previous studies and (Dinan, 2002) of undergraduate students receive instruction by TBL showed that high grades needed to pass a test, weaker students will not pass, as a result safe graduate will be allowed to proceed a head ( compared to those received instruction through traditional instruction.[13] In American medical students achieved high in anatomy ,when they received instruction through TBL.[13] Equally study done for students taking pathology course at undergraduate level ,proved effectiveness of TBL than other strategy of instruction.[14] Some authority found that instruction through TBL helps student to perform competently.[15] Studies done among undergraduate students in microbiology course ,showed that retention of material was poor as reflected by student score.[16] The current paper clearly agreed with those how considered TBL allowed student to perform better than in TL. In fact TBL give students good chance to work together, share information, think critically, solves problem which makes performance better than in T, however the paper findings disagree with other findings among undergraduates doing microbiology in America. Actually many factors might determine success and failure of any program in general and instruction through TBL in particular: for instance students style of reading, availability of the resources ,educational environment, fluency in English language, selection of the question. In our set up we did our best to make environment ideal enough for the student by provision of suitable resources, preparing proper question that designed by subject experts and tow medical educators. Definitely answering question through a team particularly in gRAT and App allow more opportunity for sharing information.

## CONCLUSION

High scores will be achieved when TBL is used as instructional method and when standard setting is used for performance measurement.

**Recommendations:** Teaching through TBL is highly recommended since it grantee a candidate with highly reasonable graduates, cost effective and makes the sense of team and professionalism sounded.

**Strength**: Draw the attention and educators in low resources countries to make use of TBL.

**Area of improvement** many other tools to measure quality of TBL: like perception of the student and staff for TBL, use of many courses, and many levels are needed in the future more offer variation among the students in their reading preparation might affect the results.

**Conflict of interest:** no conflict of interest

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