

## ORIGINAL ARTICLE

## The Effect of team-based learning on study skill course of Nutrition Students of Shiraz University of Medical Sciences

**Background:** Team-based learning is a recent education strategy which is taken in to consideration by medical education associations. In populated centers and high educational levels, this method lets a teacher manage the class in the form of small groups. Different studies have classified the advantages of this method as increasing the involvement of students in class, becoming able to communicate with classmates, increasing the students' scores, and needing less instructors. The aim of this study is to determine the effect of team-based learning on study skills course of Nutrition students of Shiraz University of Medical Sciences.

**Methods:** The sample of the study was 36 first year nutrition students. In the preparation stage, students studied the assigned lessons before the class, in the second stage first individually and then in groups filled in the questionnaire about the discussed issues in the class. The third stage which included presenting short topics by the team leader and having group discussions only was performed in some sessions. Finally the satisfaction evaluation form which validity and reliability was confirmed was distributed among the students.

**Results:** In both groups of the study a meaningful difference was observed in answering the questions individually and in groups and the average of score of the students after the group work was higher ( $P < 0.05$ ). The students were more pleased using this method.

**Conclusions:** It seems that team-based learning methodology can be used as a more effective method for approaching the student-based educational goals among medical science students.

**Keywords:** team-based learning, Medical science student

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## تأثیر التعلیم المبتنی علی التعلیم الجماعی عند طلاب فرع التغذية فی جامعه شیراز للمعلوم الطبیه

**التمهید و الهدف:** فنالك توجه فی التعلیم الطبی الی أسلوب التعلیم المبتنی علی فریق عمل.

فذا الأسلوب یعطى المعلم رخصة الی تقسیم الطلاب فی الصف الدراسي الی مجموعات صغیره فی المراكز العلمیه المزدحمه و فی السطوح العلمیه.

اثبتت الدراسات عدة فوائد لهذا الأسلوب منربا: ادخال الطالب بشكل فعال فی الدرس و مناقشته المطالب. رفع مستوى ايجاد روابط العلمیه بین الطلاب. ارتفاع مستوى العلامات و العاجه الی عدد اقل من الاساتذہ.

إن الهدف من اجراء هذه الدراسه هو تعیین تأثير اجراء أسلوب التعلیم المبتنی علی فریق عمل فی مجال تعلم الوصحات الدراسيہ «أسلوب المطالعه و التعلیم» عند طلاب فرع التغزیہ.

**الأسلوب:** إن افراد الدراسه كانوا 36 طالبا من طلاب السنه الاولى من فرع التغزیہ.

فی المرحله التمهیدیه يطالع الطلاب الدرس الممین قبل الدخول الی الصف و فی المرحله الثانيه تستخدم استمارات یوجد فیها اسئله من نفس البحت يتم الجواب علیها بشكل فردی اولاً و ثانياً بشكل جماعی.

و فی المرحله الثالثه يتم توضیح بعض النقاط بشكل مطالب مختصره من قبل قائد المجموعه و اجراء مباحثه جماعیه. و فی النربایه تم اعطا الطلاب استماره تعیین مستوى رضا الطلاب من هذا الأسلوب.

**النتائج:** كان هناك اختلاف زوئیمه فی نتیجه بین الفریقین المسترکین فی هذه الدراسه و كان هناك معدل علامات افضل بعد العمل من خلال فریق علمى ( $p < 0.05$ ) كانت نسبة الرضا عالیه جداً عند الطلاب نجاه اجراء هذا الأسلوب.

**النتیجه:** نستنتج أن الأسلوب المذكور یعطى اثرا کبیرا فی الاهداف التعلیمیة المتصوره حول الطالب عند طلاب العلوم الطبیه.

**الكلمات الرئيسية:** التعلیم المبتنی علی فریق عمل. طالب العلوم الطبیه.

## تأثیر آموزش مبتنی بر یادگیری گروهی در درس روش مطالعه در دانشجویان رشته تغذیه دانشگاه علوم پزشکی شیراز

**زمینه و هدف:** آموزش مبتنی بر تیم یک استراتژی آموزشی نوین می باشد که مورد توجه جوامع آموزش پزشکی قرار گرفته است. در مراکز پرجمعیت و سطوح بالای آموزشی، این روش به یک معلم اجازه می دهد که بتواند یک کلاس را در قالب گروه-های کوچک اداره کند. مطالعات مختلف، برخی از مزایای این روش را شامل افزایش درگیر شدن دانشجویان در کلاس درس، توانایی در برقراری ارتباط با همکلاسی ها، افزایش نمرات دانشجویان و نیاز به تعداد اساتید کمتر برشمرده اند. هدف از انجام این مطالعه تعیین تاثیر اجرای روش آموزش مبتنی بر تیم در فراگیری واحد درسی "روش مطالعه و یادگیری" در دانشجویان رشته تغذیه می باشد.

**روش:** نمونه پژوهش شامل 36 دانشجوی تغذیه سال اول بود. دانشجویان در مرحله آمادگی، پیش از کلاس به مطالعه مباحث تعیین شده پرداخته و در مرحله دوم، ابتدا به صورت فردی و سپس به صورت گروهی به سوالات پرسشنامه ای که از مباحث مطرح شده در کلاس تهیه شده بود، پاسخ دادند. مرحله سوم، که شامل ارائه مطالب کوتاه توسط رهبر تیم و انجام مباحث بین گروهی بود، تنها در برخی از جلسات اجرا شد. در پایان فرم رضایت سنجی از اجرای این روش که روایی و پایایی آن تایید شده بود، در اختیار دانشجویان قرار گرفت.

**یافته ها:** در هر دو گروه مورد مطالعه، اختلاف معنی داری در پاسخ گویی به سوالات در مرحله فردی و گروهی مشاهده گردیده و میانگین نمرات بالاتری پس از کار گروهی به وسیله دانشجویان کسب شد ( $p < 0.05$ ). دانشجویان میزان رضایت بالایی را از اجرای این روش ابراز داشتند.

**نتیجه گیری:** به نظر می رسد که روش آموزش مبتنی بر تیم می تواند به عنوان روشی موثر برای نزدیک تر شدن به اهداف آموزشی دانشجویان-مدر در دانشجویان علوم پزشکی مورد استفاده قرار گیرد.

**واژه های کلیدی:** آموزش مبتنی بر تیم، دانشجوی علوم پزشکی

## گروبی تعلیمی روش ایک نئی روش بی جس طبی تعلیمی حملتے کافی توجه ده رہے ہیں

**بیگ گروانڈ:** کلاس میں طلباء کی زیادہ تعداد اور تعلیم کی پیشرفتہ صورت میں گروبی تعلیمی روش سے نیچر کلاس کو کئی گروہوں میں بانٹ کر مفید طریقے سے تعلیم دے سکتا ہے۔ اس روش کی افادیت کا ذکر کرتے ہوئے کہا گیا ہے کہ اس روش کے ذریعے مختلف چیزیں پڑھائی جاسکتی ہیں، طلباء ایک دوسرے سے بہتر آشنا ہوتے ہیں، ان کے نمبر اچھے آتے ہیں اور متعدد نیچروں کی ضرورت نہیں پڑتی۔ اس تحقیق کا ہدف ڈائیت کے موضوع کے طلباء کے سیکھنے اور مطالعے کی روشوں پر اثرات کا جائزہ لینا ہے۔

**روش:** ڈائٹ سبجیکٹ کے چھتیس طلباء نے اس تحقیق میں حصہ لیا جو یونیورسٹی کے پہلے سال میں تھے۔ طلباء نے کلاس میں آنے سے پہلے ان حصوں کا مطالعہ کیا جو انہیں کلاس میں پڑھایا جانا تھا، اور دوسرے مرحلے میں فردی اور گروبی صورت میں انہوں نے کلاس میں دئے جانے والے لکچر کے مطابق تیار کئے گئے سوالنامے کے جواب دئے۔ تیسرے مرحلے میں گروہ کے لیڈر نے مختصر طریقے سے گروبی بحث و مباحثہ کا خلاصہ پیش کیا۔ تحقیق کے اختتام پر طلباء کو سوالنامے دئے گئے جس میں انہوں نے اپنے اطمینان اور رضایت کا اظہار کیا۔

**نتیجے:** دونوں گروہوں میں فردی اور گروبی جوابات میں اچھا خاصہ فرق پایا گیا۔ طلباء نے گروبی بحث و مباحثہ کے بعد اچھے نمبر حاصل کئے۔ طلباء نے اس روش پر بھر پور اطمینان اور رضایت کا اظہار کیا۔

**سفارشات:** ایسا لگتا ہے کہ گروبی تعلیمی روش میڈیکل طلباء کو ان کے تعلیمی اہداف سے نزدیک کرنے میں مفید واقع ہوسکتی ہے۔

**کلیدی الفاظ:** گروبی تعلیم، طبی طلباء

## INTRODUCTION

Team based learning (TBL) is one of the training methods in small group which is a changed type of problem based learning (PBL). Unlike PBL, this method doesn't have a searching stage (1).

TBL as an active teaching method is applicable for medical students and other fields of medicine. This method could provide the possibility for students to compare themselves with others (2).

At high level education and busy centers, this method would let a teacher to manage several small groups in a class, simultaneously. This method because of its potential to promote active learning without the need for many teachers has been favored by communities of medical education. Some of benefits of this method include students' increased involvement in classrooms, ability to communicate with their classmates, and increase the final scores of national medical board examinations(3-5).

First, TBL was developed in order to facilitate the training of medical students with a large population in general classes, but after that, its effect was proved in a wide range of education fields. Also it has been shown that TBL reduced the faculty burnout due to promote students' increased responsibility, increase their involvement in the process of learning, and positive interaction between the teachers and students (6).

For the first time TBL method has been performed by Professor Michelson of the University of Oklahoma in 1990. He performed this method because the members of his class were increasing and he decided to increase the class efficiency too, also he wanted to use the time of class in the form of solving the problems of trade and business issues which student would face in the future .In this method, students studied the subjects before the class, then they individually answered multiple choice questions at a specified time in the class room. After that, the students were divided into 4-5 individual groups and answered the same questions as a group. Finally the findings of these two methods were compared together. The findings of this study showed that TBL could greatly increase students' skills for solving conceptual issues. Also their thinking power was increased by this method. He showed major reason of weakness in student performance was due to unfavorable assigned tasks not to inappropriate learning in team activities (7).

McInerney et al in 2003 showed that team-based learning increased students' final grades compared to the last year during which TBL was not implemented in the course entitled "Metabolism and Physiology of Microorganisms". This study also showed that students' team work increased understanding of course content and development of critical thinking and data stayed longer in their memory(8).

Kim performed a study entitled "students' evaluation of team based learning on development and research of medical morality" at university of Hallym. He evaluated the students' changes of attitude via questionnaires and concluded that their knowledge of medical morality was increased by teamwork. Also students were satisfied with group work. Changes in students' attitudes and reported gained awareness were the positive outcomes of this work

in the classroom. Also positive outcome of this research on medical morality provided an incentive for its continuing(9).

In 2007, Thompson et al studied team-based learning method in 10 medical schools during 32 terms. After 2 years, professional supervisors and partners in the project were asked to evaluate their tendency for continuing. The results showed out of 32 terms of team based learning, TBL continued in 19 terms. Also this method began in 18 other learning terms (10).

In 2008 Tai and Koh, performed a study entitled "Does teamwork education of students stimulate them to engage in evidence-based medicine ?". This study showed that 69% of students enjoyed TBL method more and 73% of them preferred it to conventional methods, so this approach caused them involve in evidence-based medicine at a high level(11).

In 2009, Weiner et al studied the effect of team-based education for basic courses learning in a 3-day intensive period among first year medical students. The results indicated that students' tendency to TBL was very high and students participating in this method obtained 25.3% higher scores than those who didn't participate in team-based learning course in the final exam(12).

In 2009 at the University of Cincinnati, Beathy et al. studied the effect of TBL in treatment learning workshops. Findings showed that students who performed teamwork gained 20% higher scores than the others. Also almost 91% of students felt TBL would increase their course understanding and 93% had a tendency to continue team work in workshops (13).

A study entitled "Medical students' attitudes about team-based learning in course curriculum before clinical course" was published by Parmelee et al in 2009. In this study, team-based learning was performed before clinical course among medical students, and then 180 medical students answered 19 questions about their attitudes to TBL during the first and second years of their study. The results of this study indicated that a clear change took place in students' professional attitude. Despite the fact that students were satisfied with teamwork, and finally gained their classmates' evaluating ability, this method couldn't affect their learning quality and clinical reasoning power clearly (14).

Chung et al. in 2009, studied the effect of team-based learning on medical ethics course, they observed that TBL method was more enjoyable than common and traditional techniques for students and they gained higher scores after team working. Also findings indicated that this method improved the students' performance and increased their satisfaction with the learning process(15).

In 2010 at Hong Kong University Abdelkhalik et al. evaluated the subject of using team-based education as an introduction for making students ready to problem-based learning in the future. Results showed that at the end of TBL course, students gained problem solving skills and they were highly satisfied (16).

In 2010, Conway et al. in their study entitled "Team-based learning strategies at the cardiovascular unit" reported that team-based learning improved the satisfaction of teachers and students of cardiology unit. Also, this method didn't decrease students' scores despite a 14% reduction in class

time (17).

In 2011 at the Queen University, Davidson evaluated a three year experience of team-based learning combined with online learning in skeletal - muscle course of anatomy of medical students. After three years, large numbers of students described this method ideally that caused them to gain new skills. Also, these students declared their effort properly at group workshops (18).

TBL has been used in teaching different subjects at world's different medical universities. We decided to perform this technique due to the short history of using this method in Iran, its positive approaches, decreasing classroom time, and low number of needed teachers in comparison to traditional methods.

## METHODS

Based on TBL's profile and its procedure this study was performed:

### TBL's specifications defined

1. Application of fixed and targeted non-uniform working groups
2. Promoting of each learning unit by using ensuring process due to the readiness for team's development
3. Application of individuals' rating in the same groups due to the facilitation of the development of interpersonal skills and ensuring fairness in grading
4. Determining of much time of class to small group activity, educator's need to change from transporting individuals to the department of Education (6).

### Stages of TBL

Step 1: Readiness: Students individually study the determined contents due to surrounding subjects before class.

Step 2: Readiness assurance: In this stage learners first should answer the multiple choice questions individually, due to ensure their readiness for applying gained data from stage one. This stage is called individual readiness assurance test (IRAT) . Then the students were divided to 7-6 people teams and answer the same questions in a group form. Obtained responses from each group had to be delivered due to scoring immediately. This stage is called group readiness assurance test (GRAT) .

Step 3: The application of course concepts: When the trainer felt that students had mastered the basic concepts of steps one and two, class would lead to step3, application of course concepts, namely. Students completed their homework in classroom due to promotion of their collaboration and they could use obtained knowledge from steps one and two, also they discovered their defects. At this stage, all groups expressed their answers at the same time due to quick response and compared it together; this stimulated the students to participate in classroom energetic discussions by defending the answers of groups. Also, professors and educators would help to students for learning to strengthen at this stage (19).

### The sample and sampling method

This study was performed in course of reading and learning methods among the students of Nutrition. 36 Nutrition students participated in this project, including 6 males and 30 females.

### Data collection tool

In this study, data collection tool included a questionnaire consisted two parts:

The first part was about demographic information such as gender, year of entering college, and profession. The second part of the questionnaire consisted 10 questions at each session and the questions were according to the topic of that meeting.

The satisfaction form of this method which included 11 questions, were collected from students of both fields. The content validity of questionnaire was confirmed by experts of Medical Education Development Center. The reliability of satisfaction questionnaire was confirmed ( $\alpha = 0,84$ ) after a primary study, which was calculated at the first session of nutrition students.

### Plan performance method

As described in the introduction, students studied pre-selected topics before the class. Then at the individual readiness assurance stage, the questionnaire included 10 questions in each section related to topic same meeting was given to students and they answered at certain time.

At the next stage, questionnaires were collected and participating students were divided into groups of 4-5 individual and they answered the same questions as a group, this stage was group readiness assurance.

The application of course concepts was held in the form of short presentations in a small number of meetings. Teachers also helped students to strengthen their learning at this stage. In the last session of the course, satisfaction form of team-based learning was given to the students and collected after answering. Because of respecting ethical codes, the students were alerted that the results would be confidential.

## RESULTS

Average grades of students are shown in each session in two forms, individual and group in Table1.

As it is observed, students could gain higher average scores after team work at all sessions. Also, the difference between groups and individuals average scores was calculated by Paired sample t test, that showed significant differences in all sessions ( $p$ -value  $< 0.05$ ). No significant difference was found between gender and average scores of group and individual stages.

Figure 1 shows nutrition students' satisfaction rate with team-based learning method in learning and reading course. As it is shown, nutrition students' satisfaction of this method has been reported high. Satisfaction level of third stage was studied in the form of oral questions and answers from students. Students were generally satisfied with the third stage, but they said that a lot of time spent on small subjects and somewhat of the time was wasted.

## DISCUSSION

During the two past decades, most medical schools have been altered their curriculum and teaching methods in response to new changes and new horizons of medical education. The axis of these changes is from teacher-centered to student-centered (20).

Medical students are adult learners who need to learn new skills and team work with other service providers and counterparts due to the special character of the medical

Table1. Comparison of scores average in nutrition students' learning and studying course at individual and group stages* (n=36)			
Session no.	Score average of individual stage	Score average of group stage	Level of significance
1	2.17	2.98	<0.001
2	2.08	3	<0.001
3	2.03	2.92	<0.001
4	2.06	2.94	<0.001
5	2.09	2.96	<0.001
6	3.43	4.53	<0.001
7	3.38	4.56	<0.001
8	2.95	4.30	<0.001
9	3.05	4.45	<0.001
10	3.63	4.58	<0.001
11	3.73	4.47	<0.001
12	3.45	4.45	<0.001
13	3.05	4.28	<0.001

\* Questionnaires consisted 10 questions per each session, 1 score for each correct answer and 0 points for each incorrect answer , then based on scores in all questionnaires scores the average was calculated before and after group work in each session.

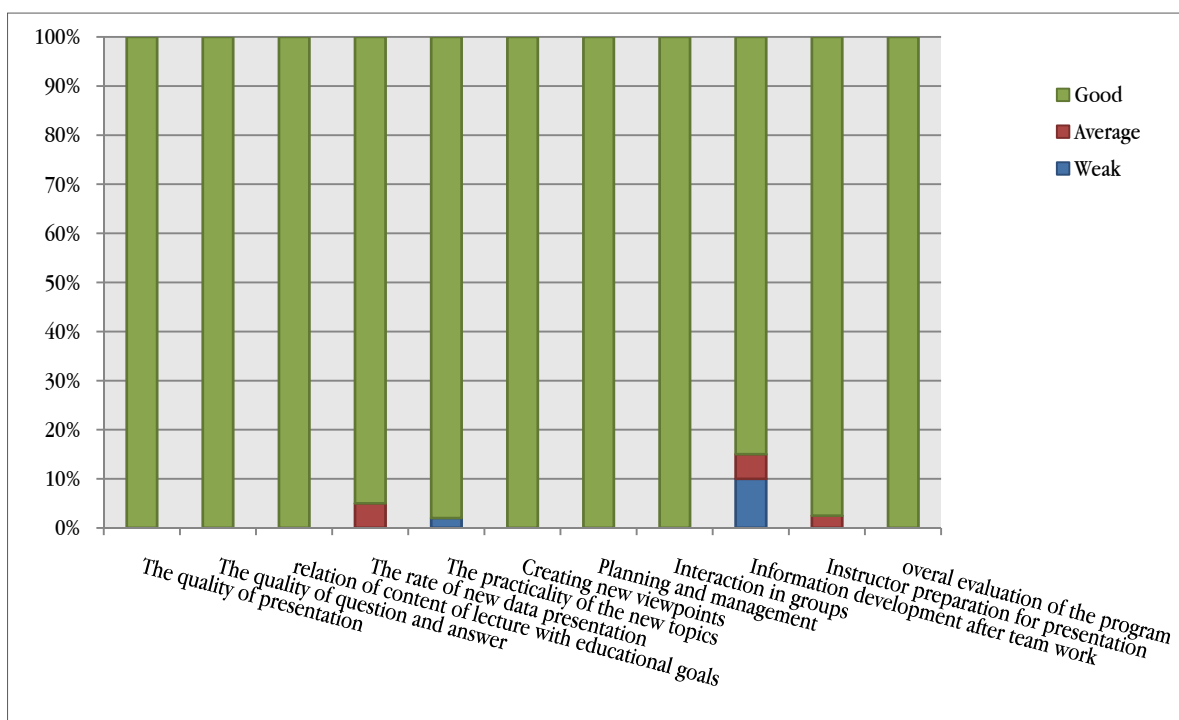


Figure 1. The rate of nutrition students' satisfaction with team work methodology used in teaching study skills courses

profession (21).

One of the new and student - centered methods, is team-based learning technique. TBL is a new approach to education, significantly it has been noted in medical education communities due to the promotion of active learning and reducing the need for teachers. In this method a teacher could handle many students as small group in a large class alone. In this field, many studies have been performed that indicated positive outcomes of this teaching method. (9,12,17).

These outcomes included increased students' involvement in learning, increased ability to communicate with classmates, improved students attention in presenting content and performing practical tasks more efficiently. This

method was used to teach science courses about 20 years ago for the first time (11). Considering that this method of learning is new and the history of using this method is not very long in Iran, performance of this method was difficult and some of the concepts were intangible to students. Students were a little satisfied with these methods during the first encounter with TBL, because this method was different with their traditional teaching methods. Students also complained to method's difficulty and their performance wasn't favorable at first. The most common complaint was its conflict with students' common education. In addition, student didn't believe in the effects of this method on knowledge comprehension.

In 2007, Kim et al. studied team-based learning, some

students complained to the difficulty of this method, in contrast, many students were satisfied with content course, and also with TBL learning model(9).

The results of the present study indicated that the average of student scores increased after team work.

Also ,a significant difference in individual and group answering was observed in all question and score averages, that is indicated in gathering, discussing, group working, learning in small groups, communicating with their own classmates, using their skills, and having favorable effects on enabling the students. In Weiner et al's. study on TBL effects performed on medical students, this method resulted in getting higher scores among students(12).

From the point of satisfaction, students were quite satisfied with it in all cases due to the familiarization of the students with this method, its advantages, and preparing them to perform this method over several learning sessions.

Between these students, the third part of TBL was held in the presentation of short contents during a few sessions. Satisfaction of the third stage was qualitatively studied with the format of students' oral question and answer. Students were generally satisfied with the third stage of performance, but they said that a lot of time was spent on small ranges of

subjects and some time was wasted. Also students discovered powerful skills of their classmates and used them better to perform this method in more sessions of the classes, to have sufficient time to interact and work as a team . Thus, these results indicated that continuous and prolonged use of this method is associated with higher levels of satisfaction in learning groups.

According to above results and students' satisfaction of this method, it seems that the results of this study can be used in order to promote education for teaching different courses in medical science universities, and by using this method medical science teachers could help students to get involved in learning and teaching closer.

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**Conflict of interest:** The authors declare no conflict of interest.

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