

ORIGINAL ARTICLE

Jigsaw: A good student-centered method in medical education

جیگساو : هو املوب ذو محوریه طلابیه و جید فی التعلیم الطبی.

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Introduction: Today, student-centered methods must be used to train students with professional competency. One of the most valuable methods is Jigsaw (JT). Despite its various positive effects on students' learning, not all teachers are familiar with Jigsaw. In order to familiarize teachers with this method and encourage them to use it in teaching their students, this article introduces Jigsaw, its types, its effects, and its applications as well.

Method: This is a review study evaluating the related articles using keywords such as Jigsaw Method, cooperative method and student-centered learning in Pub Med, ProQuest, Scopus, SID, and Magiran in 2004-2017. At first, 122 papers were found and finally 46 articles were examined.

Results: JT is a cooperative teaching method in small groups and its stages include: activities before class by teacher (preparing written curricula and preparing test), activities during class (forming random home groups, providing the same course content to all groups, individual study at a particular time, forming JT groups and discussion on content at a particular time, returning to home groups, designating an administrator in each group, and providing content by any of the members of home groups to the other group members at a specific time), evaluating groups through multiple-choice tests. JT is a small group that has 4 types (I, II, III, and IV). The positive effects of JT include: an increase in motivation, enjoying learning, learning achievement, self-confidence, and self-esteem, refreshment of information, interest, and communication.

Conclusion: This cooperative method can be used in different educational levels (primary school, high school, and university) as well as in different disciplines (Medicine, Nursing, Dentistry, Rehabilitation, Midwifery, Pharmacy, Medicine, Education, English, Social Sciences, Chemistry, Islamic Education, Physics, and Mathematics). This cooperative method is recommended to teachers in different courses to improve various aspects of students' intelligence such as critical thinking, problem solving, achievement, self esteem, self confidence, and interest for learning.

Key word: jigsaw method, cooperative, learning, student-center

المقدمه: يجب استخدام أساليب تعليمية متمحورة حول الطالب لأجل تربية طلاب ذو كفاءة حرفية عالية. إن إحدى أساليب التعليم هو أسلوب جیگساو الذي يعتبر ذو تأثيرات إيجابية عالية في التعليم الطلابي والذي لم يكن هناك معرفة كافية من قبل المدرسين حيال هذا الأسلوب. ولأجل تعريف المدرسين على هذا الأسلوب و تحفيزهم للاستخدام هذا الأسلوب في تدريس الطلاب تسمى هذه الدراسة لتعريف جیگساو. أنواع جیگساو، آثاره وكيفية تطبيقه

أملوب العمل: إن في هذه المقالة الروورية تم استخدام الكلمات العبارات التالية جیگساو. الإنترنت تعليمي بحورية الطالب. تم البحث في مواقع pub mad, magiran, SID, scopus, ProQuest بين أعوام 2004 حتى 2017. وفي البداية حصلنا على 122 مقالة. اخترنا منهم 46 مقالة مرتبطة بموضوعنا وتم تحليلها

النتائج: يعتبر أسلوب جیگساو أسلوب تدريسي إشتراكی فی المجموعات الصغيرة و يشمل على المراحل التالية. الفعاليات قبل التدريس التي تتم من قبل المدرس (يتم تحضير المحتوى الدراسي بشكل كئبي و تحضير الإختبار) الفعاليات حين الصف (تشكيل مجموعات بيتية عشوائية. إتاحة المحتوى الدراسي لجميع المجموعات على حد سواء. الطالبة الأخرافية في أوقات خاصة. تشكيل مجموعات جیگساو و بحث المحتوى في وقت معين. العودة إلى المجموعات البيتية. تعيين مدير لكل مجموعة. اعطاء المحتوى بواسطة كل من أعضاء المجموعات البيتية إلى أعضاء مائر المجموعة في وقت معين) تقييم المجموعات بواسطة إختيار متعدد و ذو آثار إيجابية كالتالي: رفع مستوى الحافز في تعلم الدروس. إبداع تعلم متبع. رفع مستوى النجاح الدراسي. رفع مستوى الثقة بالنفس. رفع مستوى عزه النفس. تطوير المعلومات. رفع مستوى العلاقة و ارتقاء التواصل.

الاستنتاج: إن هذا الأسلوب الإشتراكی يمكن أن يتم استخدامه في جميع المستويات العلمية (المدارس و الجامعات و في مختلف التخصصات الطبية. التمريض. طب الإنسان. التأهيل. القبالة. الصبيرة. التخدير. تعليم اللغة. العلوم الإجتماعية. الكيمياء. التعليم الإسلامي. الفيزياء. الرياضيات) نوصي باستخدام هذا الأسلوب في تدريس الدروس المختلفة للحصول على الأهداف التالية: ارتقاء التفكير النقاد. تحصيل قدره حل المشكلات. النجاح العلمي. الثقة بالنفس. رفع مستوى العلاقة التعليمية عند الطلاب

الكلمات المفتاح: أسلوب جیگساو - الإشتراكی - التعليم البنني على محتوى الطالب

جیگساو : یک روش دانشجو محور خوب در آموزش پزشکی

جیگساو طلباء محور میڈیکل تعلیم کی ایک اچھی روش

مقدمه: امروزه روشهای تدریس دانشجو محور باید جهت تربیت دانشجویان با صلاحیت حرفه ای بالا مورد استفاده قرار گیرد. یکی از بارزترین این روش ها جیگساو است که با وجود تأثیرات مثبت زیادی بر یادگیری دانشجویان، اکثر مدرسین با آن آشنایی ندارند. به منظور آشنایی مدرسین با این روش و تشویق آنان در استفاده از این روش در تدریس دانشجویان، این مقاله به معرفی جیگساو، انواع جیگساو، اثرات آن و کاربرد آن می پردازد.

روش کار: در این مقاله مروری، با استفاده از کلید واژه های جیگساو، مشارکتی، یادگیری دانشجو محور، مقالات در پایگاههای اطلاعاتی Pub Med, ProQuest, Scopus, SID, Magiran در بازه زمانی 2004 تا 2017 جستجو شده و در ابتدا 122 مقاله یافت شد که نهایتاً 46 مقاله مرتبط با موضوع انتخاب و مورد بررسی قرار گرفت. **یافته ها:** جیگساو به عنوان یک روش تدریس مشارکتی در گروههای کوچک بوده و مراحل آن عبارتند از: فعالیتهای قبل از کلاس توسط مدرس (آماده کردن محتوای درسی به صورت کئبی و تهیه آزمون)، فعالیت حين کلاس (تشکیل گروههای خانگی تصادفی، در اختیار قرار دادن محتوای درسی یکسان به کلیه گروهها، مطالعه انفرادی در زمان خاص، تشکیل گروههای جیگساو و بحث محتوا در زمان خاص، برگشت به گروههای خانگی، تعیین مدیر در هر گروه، ارائه محتوا توسط هر یک از اعضای گروههای خانگی به سایر اعضای گروه در زمان خاص)، ارزشیابی گروهها با آزمون چند گزینه ای. جیگساو 4 نوع تکاملی دارد و اثرات مثبت آن نیز عبارتند از: افزایش انگیزه در یادگیری دروس، ایجاد یادگیری لذت بخش، افزایش موفقیت تحصیلی، افزایش اعتماد به نفس، افزایش عزت نفس، به روز شدن اطلاعات، افزایش علاقه، ارتقاء ارتباطات.

نتیجه گیری: این روش مشارکتی می تواند در سطوح مختلف تحصیلی (دبستان، دبیرستان، دانشگاه) و در رشته های مختلف (پزشکی، پرستاری، دندانپزشکی، توانبخشی، مامایی، داروسازی، هوشبری، آموزش، انگلیسی، علوم اجتماعی، شیمی، آموزش اسلامی، فیزیک، ریاضیات) استفاده شود. این روش تدریس به مدرسین در دروس مختلف با هدف ارتقاء تفکر انتقادی، توانایی حل مشکل، موفقیت تحصیلی، اعتماد به نفس، عزت نفس و افزایش علاقه به یادگیری دانشجویان توصیه می شود. **واژه های کلیدی:** روش جیگساو، مشارکتی، یادگیری دانشجو محور

بیک گراوند: تدریس کی روشون کو طلباء کی ٹریننگ کے لئے ان کی اعلیٰ پیشہ ورانہ صلاحیت میں نکھار لانے کے لئے استعمال کیا جانا چاہیے۔ اسے طلباء کی پڑھائی اور اپنے مدرسین کی آشنائی پر کافی مثبت اثرات پڑتے ہیں۔ مدرسین کو اس روش سے آشنا کرنے اور انہیں اس سے استفادہ کرنے کی ترغیب دلانے کے لئے آج کی تحقیق میں جیگساو روش اور اس کی افادیت کے بارے میں بتایا جا رہا ہے۔

روش: اس تحقیق میں جیگساو، مشارکت، پڑھائی، طلباء محور، مقالات جیسے الفاظ سے ایس آئی ڈی، اسکوپس، پروکویسٹ، پب میڈ، اور میگراں جیسے سائٹوں میں دوہزار چار سے دوہزار سترہ تک سرچ کی گئی اور ابتدا میں ایک بائیس مقالے ڈھونڈ نکالے گئے لیکن جانچ پڑتال کرنے کے بعد چھالیس مقالوں کا جو موضوع سے متعلق تھے انتخاب کیا گیا۔

نتیجے: جیگساو، چھوٹے چھوٹے گروہوں میں تدریس کی مشارکتی روش ہے اور اس کے مراحل ہیں کلاس سے پہلے سبق کو دیکھ کر آنا، کلاس میں دھیان سے لکچر سنا، تمام گروہوں کو یکساں درسی مواد دینا، وقت ملنے پر انفرادی مطالعہ بر گروہ میں مدیر کا تعین کرنا، جیگساو آجیکٹیو سوالوں سے اپنی گروہوں کی صلاحیتوں کا جائزہ لینا۔

سفاارش: اسم مشارکتی روش سے چونکہ تعلیم محرکات میں اضافہ ہوتا اور یہ روش لذت بخش ہے اور طلباء کی خود اعتمادی میں اضافہ ہوتا ہے لہذا اس تعلیم کی مختلف سطوح جیسے پرائمری، سینڈری اور کالج و یونیورسٹی کی سطح پر لاگو کیا جانا چاہیے۔

کلیدی الفاظ: جیگساو، مشارکتی، طلباء محور

INTRODUCTION

The primary objective of teaching in medical education is the development of clinical competency and training successful and empowered graduates with professional competency so that they can use knowledge for problem solving in their careers (1, 2). Accordingly, professional competency in teaching and learning environment is influenced by factors such as the type of educational content and teaching method (3, 4). These can cause an effective learning and academic motivation in students (2).

Teaching method refers to behaviors that teachers show in their interaction with students. It plays an important role in different aspects of teaching. It can be used in both teacher-centered and student-centered spectrums (5)

The dominant method at most universities in Iran is in the form of lecture that 80% of educational content is forgotten within 8 weeks using this method (6). Teachers like to use lecture because it can be applied in large classes. Factors such as high volume of educational topics, time limit, lack of need to particular physical space and implementation in large classes are among the main reasons why teachers prefer to use lecture method. However, it is the one-way training and can quickly become boring and prevent effective learning of students (7).

In this method, students only learn or at least represent what they have already learned. But teacher should be trying to help students better learn and how to learn to learn. To achieve this goal, teachers must use modern teaching methods in teaching planning (8).

Today, Medical science education has moved from teacher-centered to student-centered methods and from passive and individual learning to team and active learning (9, 10). In the research conducted at Iran University of Medical Sciences, about 35.7% of teachers preferred cooperative learning so as to develop deep learning (5). Cooperative method is one of the subsets of social models in education. This model guide students to chat, search and train each other (11). Such student-centered teaching models categorized by Joyce and Weill emphasize on the formation of learning groups, working together and collaboration, effective communications, energy generation and that the teacher manages the class using collaboration (12). Social models include: Partners in learning, discussion, group discussion, small group discussion, etc.

One of the methods in small groups that the results of studies have indicated its effects is Jigsaw. JT is a good way appropriate to class structure and time at the country universities and applicable in various disciplines and many lessons. Despite the convenience and attractiveness of cooperative methods, particularly JT, the dominant teaching method at universities in Iran is lecturing. The lecturing used by teachers more can be addressed because the teachers are familiar with the method in which much content is transferred at much less time. Lecturers considered one of the main reasons for not using modern methods time-consuming and lack of time in class. If a teacher recognizes JT and its effects, the less time required to implement this method compared to lecturing method and the energy and

enthusiasm for learning in students will encourage him to use JT in multiple sessions. So, due to low use or non-use by teachers, it seems that teachers are not familiar with this method well and they need to have more awareness of JT details and its applicability in various subjects so that students could take advantages of this method in teaching. Therefore, the current study sought to introduce JT, its variants, its practical steps, and its use in different levels of education and various fields and its positive effects to teachers.

METHODS

This is a review study evaluating the related articles using keywords such as Jigsaw Method, cooperative method and student-centered learning in Pub MED, ProQuest, Scopus, SID, and Magiran in 2004-2017. At first, 122 papers were found, then Non-English articles, letters to the editor, theses, and review articles were excluded and finally 46 articles were examined. The articles were analyzed carefully in terms of introduction to jigsaw, its effects on various outcomes of learning, and its applications in various courses.

RESULTS

Dr Elliot Aronson, a psychologist at the University of Texas at Austin, proposed Jigsaw in 1971 in Texas school. Jigsaw is based on cooperative teaching and learning. It decreases competitive attitudes because each member is equally important. (13)

Then, Slavin suggested jigsaw II in 1978. Jigsaw II included the familiarity of the entire students with the whole task, completion of the expert sheets for home group and group evaluation of each student. Therefore, in jigsaw II, the competition is considered to be rewarded with a higher average score of the group and students' satisfaction and enthusiasm increased as well. (14)

In jigsaw III, the promotion of students' interactions in different languages was considered in bilingual classes. Jigsaw IV was introduced by Hollidaye (2002). He combined jigsaw II & jigsaw III to ensure student learning (15). This version consisted of "teacher's introduction of the material, the expert group quizzes, review process prior to individual assessment and re-teaching of any material that was not adequately explored in collaborative group work". (16).

The primary objective of jigsaw is student's comprehension; however, the objectives of Reverse jigsaw are student's participation and understanding some of the content (15) It improves student's participation (14) and student to become expert in part of the content.

Jigsaw technique

Its specifications include: class size: 10-50 individuals; class time: 20 minutes or more; setting: anywhere (12)

Al-Salkhi (2015) used three stages of Albaghdadi work (2005) in his study:

1- Planning:

- Determining behavioral objectives
- Preparing the required content and tools (paper/textbooks) by teacher
- grouping the students (number, heterogeneity, random grouping)

- preparing test for the end of class
- 2- Implementation :
 - grouping (forming several home group, distributing content to each home group, studying content by each student)
 - Briefly explaining the method by teacher and assigning number 1 to ... to each member of a home group
 - Studying the content by each student
 - Forming expert groups or JT (students form JT groups through the same sheet number in each home group) and discussing on the content of the related sheet at the right time
 - Returning each member to their home group and providing a summary of the key points related to their sheet content to other team members
 - Selecting a director in each home group to get equal time for providing each individual at the time specified by teacher
 - Supervising by teacher to participate all members in discussion and debating the time for study and discussion and removing error in groups' questions
- 3- Evaluation
 - Testing to ensure student learning
 - Considering the average of the whole members of a group for all people to create a spirit of cooperation among the members (17)

Azizi et al conducted jigsaw: activity before class and in four phases of group work:

❖ Before class: (2min)

At first, the teacher chooses the content then determines the number of people in each group. The number of sheets of paper is equal to the number of the members in each group.

❖ Phase 1: home group

At the beginning of the class, the teacher explains its details and familiarizes students with the benefits of the method. Then he randomly divides the students into several home groups. Randomization can be done using color chart or a list of the class. Smart students or lazy ones should not be assigned in the same group. The teacher gives the same content to all of the home groups, but each member is assigned a subtopic in a home group. Then each student studies his subjects for his own in 5-10 min. (13)

❖ Phase 2: jigsaw group

Home group is like a broken puzzle and each member of the home groups with the same paper form jigsaw the jigsaw or expert group. In other words, members of jigsaw group consist of members of different home groups that have the same subtopic and communicate together for sharing the information and discuss until they learn from each other (5-10 min) and master the topic. (18)

❖ Phase 3: home group

The students return to their home group again to present their subtopic to others. One of them is appointed as the leader in each group to control the time and monitor members to teach what they have understood to their home group. Each home group is given 20-30 min so that each student could present his subtopic. Finally, they will discuss together to improve their thinking ability, cooperation, interaction together, and active learning.

The role of teacher is facilitating and monitoring students in discussion, reminding time in class and answering the questions.

❖ Phase 4: terminal

The teacher tests all students by MCQ tests and the average score of the home group is considered for each student. In this method, student must try to learn each share and practice it.

Finally, the teacher can randomly ask students to summarize and present one of the subtopics for the entire class by each group in a short time. (13) (diagram1)

Effects of jigsaw

Most studies reported the following findings: an increase in students' motivation for teamwork (19,20,17,21) and enjoyable learning (12) which promoted learning achievement (20,21,22,23,24,25,26,27, 28, 29), increase satisfaction(28,29), success in learning related to raises in self-confidence and refreshment of information (10, 23,24,25,26,30,31,32), creation of interest (33) self-confidence, self-esteem among students (10) as well as decrease in anxiety and disinterest in group activities. (13)

Application

It has been used in different level such as primary school, high school, and university (15) as well as various disciplines, for example: medical (Anatomy, biochemistry and physiology) (34,35), Nursing (13,36,19), Dentistry (37), Rehabilitation (Neurology) (38), Midwifery (pregnancy&maternity) (39), pharmacy (40), Anesthesiology (13, 36) Education (41), Master of science (42), English classes (43,44,31,14), social and science fields (10), chemistry (15), Islamic education (17), Abstract lessons (physics, mathematics) (23,23,25,26, 28) (table 1)

It has been applied in High school courses including Religion and Life lesson (22,29), statistics and modeling (20, 23) and in the sixth grade of primary school: Science, social studies, heavenly gift and writing (32), and in the second grade: Physical Education (45). It can be used a maximum of four times in one year in order for learner interest to be maintained (46).

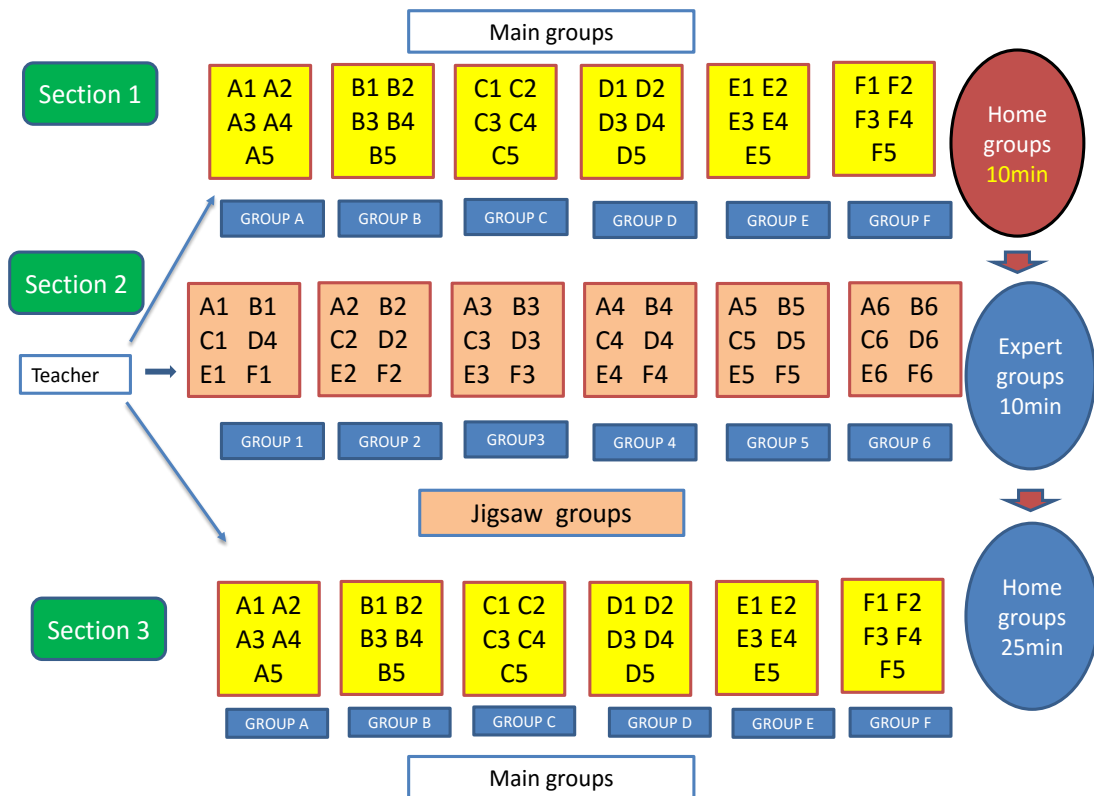
DISCUSSION

"When you teach, you learn twice". The first advantage is for the teacher and the second advantage is for the student (17).

JT has an effective role in changing passive students to active ones and enhancing participation and enthusiasm in learning. Therefore, it increases learning in clinical skills. Students' opinion on this method is positive and they prefer to experience more in their courses (40) which represents an increase in student satisfaction (27, 13, and 36). It also develops self-confidence (18, 17, 47), communication among students (18), student support (15), logical thinking, ability in problem solving, motivation (17, 1), and critical thinking (47)

The outcomes of this method may pertain to the created cooperation among the students because working together creates group energy. Transferring knowledge to students in Jigsaw classes helps to create security, intimacy and atmosphere of cooperation and competition without fraud, violence, negative emotion and jealousy (11). In JT, the

Author	Year	Course	Country	Measures	Results
Doymus (10)	2007	First year general chemistry course	turkey	Learning	Increase
leyva- moral & (19)	2016	The Second year of the Nursing degree (N=129)	spain	satisfaction	decrease
Sengul & katranci(18)	2014	7 grade primary school student (mathematics)(N=55)	Turkey	Learning Attitude	Increase No effect
Doymus & karacop & simsek(15)	2010	First- year chemistery (celectrochemistry) (N=122)	Turkey	Learning	Increase but not significant
Al- Salkhi(17)	2015	7th primery grade student (N=53)	Jordan	Achievement Motivation	Increase Increase
Phillips(40)	2015	Third years pharmacy proram	Chicago	Level of Engagemet learning	Increase Increase
Mengduo& Xiaoling(14)	2010	College English class(N= 57)	chin	Motivation Learning different skills (listening, writing, reading,...)	Increase Increase



Digram 1. jigsaw Method

teacher tries to improve intellectual experience more than students' knowledge in the class. It is an active learning strategy (10). Studies confirm the effectiveness of participatory methods such as jigsaw on the learning of academic disciplines at different levels and in different courses. (13)

Despite its good effects, JT has disadvantages such as the possibility to share incorrect material if the teacher is not present. The group may go to incorrect line if the teacher

does not monitor or has poor control over students. Sense of superiority in strong students or sense of disappointment in weaker students may be created in the group (14). It does not promote values in students (19).

In the study by Juan Leyva, Satisfaction of students with JT was low. In his study, most of the students believed that JT should not be used in the future and it was not more effective than traditional methods in teaching. This finding may be

related to heavy workload and fixed chairs in class that was difficult for group debate and focus. Students said that they could not take notes and that it brought about insecurity (19). According to the study by Sengul & Katranci (2014), female students favored jigsaw method more than male students did (18)

Anderson et al (2005) showed that no significant difference was found between jigsaw and lecture in biochemistry lesson in medical student (48). Also, the results of the study by Ghazi in the first semester of nutrition course confirmed the same issue (49). Moskowitz et al showed that the use of jigsaw had not a positive effect on learning. The effect of Jigsaw method was even less than that of animation method in the chemistry course (15). It should be noted that the ineffectiveness of this method may pertain to the teachers' unfamiliar with it as well as lack of competency of teachers in the application of modern teaching methods (such as jigsaw). Therefore in-service training programs are suggested

for teachers that they must participate and become familiar with its benefits in learning and its effects on the success of students (13). It should be noted that one of the limitations of the researcher was at the time of the research that due to different names of Jigsaw such as TMTD, Jigsaw, Puzzle, small group participation, other studies may have used other common names other than the names mentioned in the title and abstract.

CONCLUSION

Education is a basic need for human. Communities will not survive without education. Today active teaching methods are emphasized in new curriculums in which students play the main role in learning. JT is one of the most important teaching methods. JT improves teamwork and interpersonal communication, thinking, and problem-solving skills. In addition, it can promote learning among postgraduate and undergraduate students. Teachers are suggested to use JT in their class to improve students' learning.

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