



# Combining Jigsaw Classroom Pedagogy to Team Based Learning (TBL)-Technology and e-Blackboard in Nursing Education: Attaching Innovative Pieces to the Puzzle

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## Abstract

**Background:** Today's nursing profession required to know so much more content and learn it in a much shorter time and stored for a long period until updates and innovations will arrived. The content saturation often seems overwhelming, for both nursing students and faculty. Academic institutions are devising new strategies to meet this challenge; thus, several teaching strategies are being proposed and implemented for this noble purpose. **Objective:** The study sought to determine the effectiveness of the teaching-learning model of combined jigsaw pedagogy, TBL, and e-Blackboard teaching strategies to improve the academic performance of nursing students of Fakeeh College for Medical Sciences (FCMS). **Methods:** The study utilized mixed method, and exploratory design of research, which is composed of the quasi-experimental design for the quantitative part and an exploratory descriptive design for the qualitative part of the study. **Results:** The analysis of variance (ANOVA) between the two groups for both the pretest and post test is conducted. It is worthwhile to note that the pretest results both groups showed "no significant difference" ( $N = 22$ ;  $sig. = 0.905$ ) in the scores. But when introduced with different teaching techniques and given posttest, the two groups show "significant difference" ( $N = 22$ ;  $sig. = 0.000$ ) in their mean score. This was further supported that the mean score of the experimental group improved significantly. This simply implies that the differentiating methods and additional techniques used show an improvement to the learning of the students. **Conclusions:** It revealed that Jigsaw as an alternative learning strategy done outside from the traditional learning set up is an effective strategy when tested to nursing students of Fakeeh College of Medical Sciences. The study is in consonance to the claim of other experts that tested Jigsaw in over four decades

that it is an effective strategy for learning and developing other skills such as leadership and social engagements. This study suggests proliferating the idea of Jigsaw to other programs of the college as a new dimension of learning.

### **Subject Areas**

Education, Nursing

### **Keywords**

Jigsaw, Team Based Learning (TBL), e-Blackboard, Pedagogy, Collaborative Learning

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## **1. Introduction**

Fakeeh College of Medical Sciences is committed to provide quality medical science education in Saudi Arabia. This commitment is translated on this study, measuring the capability and capacity of the institution to be at the forefront using Collaborative Learning as aided by Jigsaw, TBL-Technology and e-Board Learning. This study tested a nursing class as an exploratory research based from their academic performance as response to the Teaching-Learning Design implemented by the department.

Today's nursing profession required to know so much more content, and learn it in a much shorter time and stored for a long period until updates and innovations will arrived. The content saturation often seems overwhelming, for both nursing students and faculty. Academic institutions are devising new strategies to meet this challenge; thus, several teaching strategies are being proposed and implemented for this noble purpose.

There are existing teaching strategies utilized by various nurse educators to reinforce the lecture-based methodology. Usually, in the nursing discipline, hybrid teaching strategies are being implemented such as lecture with return demonstration, lecture with Problem-based learning, lecture with case analysis, and other known *mélanges* of methods and strategies. In this paper, the effectiveness of jigsaw classroom pedagogy combined with TBL-technology and e-Blackboard will be verified using the rigors of research.

As facilitators of learning, nurse educators and teachers should value the needed substance that the learners should acquire as new educational design being introduced. This should be an important menu when education is being planned and designed. Ten strategies are to improve nurses' learning [1] [2]. These pertain to multi-level instructional delivery such as concept mapping, lecture, debates, online courses, games, performances, problem-based learning and jigsaw. The jigsaw classroom is synonymous to "home groups" that is mandated to complete a given task [1]. Members of the home group are being given specific tasks to accomplish and shall report to the home group, the gathered data or tasks. On this strategy learner gained exposure in developing various

skills in research, listening, speaking and character development such as social engagements and self-esteem.

### 1.1. Conceptual Framework and Literature

Figure 1 shows the conceptual framework that demonstrates the combination of three strategies: jigsaw pedagogy, team-based learning (TBL), and e-Blackboard as the approach to improve the academic performance of nursing students. However, there are also some factors that can influence why or not this combination of strategies is effective to improve the academic performance, which can also be considered in the crafting of a curriculum plan that is somehow relevant to the combined strategies. The output of this study is a proposed curriculum plan that integrates the results of this study.

### 1.2. Jigsaw Teaching and Learning Styles (TLS)

Jigsaw classroom or home group is a research-based kind of cooperative learning, it is an educational technique designed by Elliot Aronson in 1970 at the University of Texas and the University of California. In his four-decade educational experiment it reduces stereotyping and other forms of discrimination. It promoted dialogue among members of the group in and outside of the classroom using jigsaw method.

He recommended the following for jigsaw application 1) the group consists of 5 members not to big and not to small 2) Assign a group leader and a recorder 3) divide the lessons according to segments and assign one segment/topic per student member of the group 4) the students must be given enough time to gather the needed data, internalize and interpret 5) students having the same segment/topic must be group together into another group known as the expert group on that segment 6) students will return to their original segment group and share the ideas as discussed by the expert group 7) process the activity and do an evaluation.

### 1.3. Team-Based Learning using Technology as Teaching Strategy

Team-based learning (TBL) refers to a structured form of small-group learning

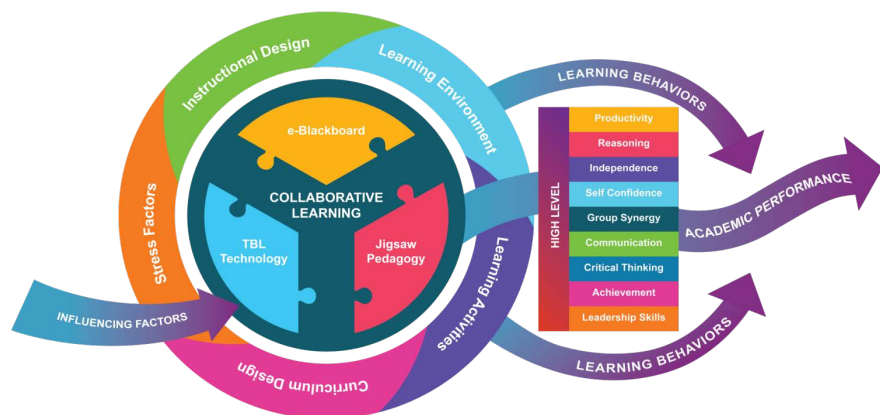


Figure 1. The pedagogical piece in nursing education.

in the application of knowledge. The students are group not too big and not too small in number on the average about 5 to 7 members. The group must be diverse, it should not be pre-determined, it must be treated fairly [3] [4].

Students will then share their insights from the topic given to them; each student in the group has different topics; they are sort of resource speakers that shall share their ideas [4]. There will be an assessment after the discussion or group sharing; individual scores and group scores will be added to determine the performance of the student. It may be an individual test and group test to determine the effectivity of the jigsaw application as an individual and as a group [5].

Moreover, this kind of activity encourages collaborative learning and team work among members [5]. This promotes articulation and debate among members in order to arrive at a convincing conclusion of the subject matter presented and to be evaluated later. Members and leaders alike are accountable of the outcome of their performance both as individual and group performance in the examination. Several scholars have their own version of this team-based learning. The experiment suggested 100 points for distribution among group members in the jigsaw group, the more a member exerted his effort the bigger share in the points he gets while those who don't perform well shall get less points from the total 100 points [5]. Using variation of points system, members of the group will evaluate their co-members and given them set of points [3] [5]. All his points will be added from one topic and the rest of the assigned topics to him as his total score. The application of jigsaw as a grading method including comments is provided by the students to their fellow students as an individual or group [6]. This activity describes the teacher as facilitator that clarifies perception versus new knowledge in discussing relevant problems as encountered by the group. The activity promotes interaction that requires reflection to the changing realities or the content of the subject matter as discussed. As a facilitator, he must provide clarity to the tasks assign and mechanics of the presentation, process all ideas and create a new set of ideas from a diverse home group. TBL will allow students to undergo reflection, designed conclusion and peer evaluation process [5].

#### **1.4. e-Blackboard in Teaching and Learning**

E-blackboard or the Blackboard is a Learning Management Systems (LMS) which comes in different names such as Cornell's Online Course Management System, Blackboard Learn, Blackboard Collaborate, and etc. This is a tailored program that will allow the learner to learn at any given place [7] [8]. The system is encouraging a new platform of learning using online resources in enhancing teaching and learning process [8]. As a learning management system can be used as a learning venue at any time equip with substantial learning e-materials and accessible anywhere online. Moreover, this system enables instructors to organize student records; establish an online discussion component for the course; and create learning activities such as quizzes and tests that can be

designed to engage and check comprehension. Students in this system are enabled to submit and store class notes and other work; collaborate with one another; and view their peers' work and give and receive feedback [9].

It was revealed in a study that this learning system has shown a positive impact on students' performance, thus, it can encourage institutions of higher learning in implementing e-Blackboard for improved academic performance [8]. However, in many studies, it was argued that implementing technology can be characterizing by students' acceptability as it is integrated in the teaching system [10]. E-resources is beneficial both off and on campus learning venue a new learning platform that is interactive and challenging that requires flexibility between teacher and learner [11]. No doubt that the e-blackboard is quite beneficial to the teaching and learning process, however, it has also some limitations. One of these is the problem with acceptance by users, the system, for them, is a waste of time and energy [8] [12]. Also, the system does not accommodate socialization among and instructor and students in the context of the learning process as there is no face to face interaction. Participants have no direct communication [13].

### **1.5. The State of Nursing Education in Fakeeh College**

Since no approach is without limitation and challenges, it is best to combine the three as each one complements and supplements each other. Jigsaw classroom or pedagogy and TBL talk about an enriched social aspect of the learning process, which e-blackboard lacks. While on the other hand, complements the relatively crude aspect of the jigsaw and sometimes TBL "primitive" the use of digital technology which makes nursing education more competitive. Thus, this research came into being.

Moreover, this sought to determine the effectiveness of the teaching-learning model of combined jigsaw pedagogy, TBL, and e-Blackboard teaching strategies to improve the academic performance of nursing students of FCMS. Further, this answered the following sub-questions: 1) what is the level of the academic performance as reflected in the pretest scores of selected nursing students in a chosen nursing course before the implementation of the combined model of teaching strategies for both experimental and control groups; 2) what is the level of the academic performance as reflected in the post-test of selected nursing students in a chosen nursing course after the implementation of the combined model of teaching strategies for both experimental and control groups; 3) is there a significant difference between pretest and posttest scores of students? 4) what are the factors that influence why or why not the difference exists between pretest and posttest scores; 5) what evidence-based curriculum plan can be proposed using the results of this study to better improve the academic performance of nursing students in FCMS?

## **2. Methodology**

The study utilized mixed method, exploratory design of research, in which is

composed of the quasi-experimental design for the quantitative part and an exploratory descriptive design for the qualitative part of the study. The qualitative part reinforced the quantitative part that answered the research questions posted. A sample of two groups of nursing students in FCMS belonging to one section was utilized. This section was given a validated pretest in a major nursing course. Then after the pretest, the group were divided randomly using the fish ball method into experimental and controlled groups. The experimental group was taught using lecture and the combined strategies proposed. The controlled group was taught using only the lecture method. After a term, a post-test was given to both groups. The post-test was patterned to the pretest in form and structure and validated by experts. Then, the mean scores of the experimental and controlled groups was compared and treated statistically using the analysis of variance (ANOVA) comparing the results among pretest and post-test for both controlled and experimental groups. To reinforce the result, an interview was conducted to not less than 10 participants included in the study. Then, using the editing style, common patterns of an association was determined to extract themes for discussion.

### 3. Discussion and Presentation of Findings

#### 3.1. On the Effectiveness of the Teaching Strategies

A Pre-Test and Posttest was conducted in a nursing class in the Fakeeh College of Medical Sciences to determine the significant application of Jigsaw in the learning outcomes of the students.

**Table 1** shows the result of the analysis of variance (ANOVA) between the two groups for both the pretest and post test conducted. It is worthwhile to note that the pretest results both groups showed “*no significant difference*” (N = 22; sig. = 0.905) in the scores. But when introduced with different teaching techniques and was given posttest, the two groups show “*significant difference*” (N = 22; sig. = 0.000) in their mean score. This was further supported that the mean score of the experimental group improved significantly. This simply implies that the differentiating methods and additional techniques used show an improvement to the learning of the students.

#### 3.2. On what the Students Can Say about Their Experiences of the Teaching Strategies

The following themes emerged during the focus group discussion (FDG) and interviews conducted to reinforce the findings.

#### 3.3. Jigsaw Application: More Heads Are Better than One

Today’s nursing profession requires lots of research, which is actually tiring especially when you’re doing it alone and it consumes so much time. So, this drives the Academic institution to you’re doing it alone and it consumes so much time. So, this drives the Academic institution to devise new strategy, which is the jigsaw classroom pedagogy, to help students meet this challenge.

**Table 1.** Mean score result of the pre-test and post-test.

		Sum of Squares	df	Mean Square	F	Sig.	Interpretation
Pre test	Between Groups	0.114	1	0.114	0.015	0.905	<i>No significant difference</i>
	Within Groups	163.205	21	7.772			
	Total	163.319	22				
Post test	Between Groups	242.982	1	242.982	29.655	0.000	<i>There is a significant Difference</i>
	Within Groups	172.069	21	8.194			
	Total	415.050	22				

Jigsaw pedagogy involves “home groups” in which students can gather data and return the information to the group. This kind of strategy can actually help students to improve their thinking skills, communication skills, since it involves group activities, and aside from that, the students will have fun while they are learning which is actually good because it will help them to be able to think clearly.

The devise approach or strategy is actually effective. It shows on the number of students who passed. All 11 students were able to passed 8 got A, 2 got B and 1 got C. It is obvious that jigsaw pedagogy is effective. Indeed, more heads is better than one. In general, as shown in the data given, jigsaw pedagogy is indeed as effective strategy. Working in a group is really helpful and is better than working alone.

### 3.4. Jigsaw Is Fun: Learning while Bonding with Friends

The cliché that says “learning is fun” is true in this context looking into the positive acceptance of Jigsaw application in Fakeeh College of Medical Sciences as tested to a nursing class. It is logically acceptable that learning is fun when the performance outcome is positive. The nursing students exerted effort because they found jigsaw as educational and fun. Some of the testimonies are:

*Group home work promotes camaraderie among my study team mates, it encouraged me to study more because I enjoy being with my classmates. It changed my perception about learning; it can be fun as well (Nursing Student 4).*

*As an adolescent, we need to enjoy, this is something that is unique, we learn, and we enjoy. I hope other students will be given the same exposure in the college (Nursing Student 7).*

*Through this learning technique, it provided me an opportunity to engage intellectually with the group, we share anecdotes of information incorporated with jokes (Nursing Student 8).*

What made jigsaw then fun? It’s fun and entertaining because this educational experiment was aided by technology to make learning exciting. It welcomes electronic gadgets to make discussion of the subject matter attractive. As the data shows the two sample groups which are the experimental and control group. The experimental group was taught using the lecture-method and the combined

strategies proposed. On the other hand, the control group was taught using only the lecture-method. It is obvious that the experimental group got higher scores compare to the control group. Most of the students from the experimental group got A+. Using both strategies is effective for the students would be able to show-case both their critical thinking skills and application skills.

### 3.5. Speak Jigsaw: More Information Promotes Discussion

Literature suggests that jigsaw classroom is a research-based cooperative learning technique other would describe it as home group technique and is empirically tested in four decades and counting. Similar observation was found in this research as tested in the nursing class of Fakeeh College of Medical Sciences. Jigsaw is now a learning language in the classroom and has influence other classes to speak the same learning language. Below are the testimonies of the respondents;

*Everyone does his part, I share what I know, and in fact everyone is excited to share what they know about the subject matter (Nursing Student 1).*

*The Jigsaw method gave me a better learning environment, it improved my communication skill. It allowed me freely to share my ideas in a small group rather than in a larger group (Nursing Student 2).*

*It became like a jargon; jigsaw, jigsaw on the go... lets go jigsaw now. It's a language for everyone that is consonance in saying it's time to study as a group (Nursing Student 5).*

The logic behind jigsaw is that it encourages the students to speak, the more they speak the more ideas are coming out. It connotes creativity and substance in the discussion; it gives an impression to the students the value of public sphere when sharing their thoughts. A closer look at the result, it shows the students who were enrolled in second semester 2017-2018 in the Academic year with an average of 86, highest score of 95, and lowest score of 78, with 11 total numbers of students who all passed the midterm and final exam. Thus, this study implies that all variables played quite evident that male/female section critical care nursing are all qualified to stay in Critical Care nursing. Hence, this study proves that Critical Care Nursing students can be even more competitive with the use of both lecture-method and the combined strategies proposed. Therefore, in this study the combined strategy is more effective. Since the controlled group using the two strategies got higher scores while the uncontrolled group which did not use any strategies got low scores.

### 3.6. Truth about Jigsaw: Learning as Active and Passive

The result of the given data showed that there are active and there were also passive, this is a normal occurrence in any given learning atmosphere. Students do not have equal reaction when it comes to learning absorption and tasks responsibility. However, the data provided that Jigsaw is overwhelmingly acceptable when tested among nursing students in the college. Collaborative learning is an



educational concept of intellectual effort of students and/or the teacher. It is known as collaborative since it's a joint effort between students and the teacher or among small group of students sharing their thoughts or tasks in a given situation, problem or experiment. It is a shared process of interaction, creation and reflection on the discipline as practice and agrees on certain conclusion. Collaborative learning may involve activities such as presentation, projects or position paper (<http://sydney.edu.au>). The following are testimonies on this;

*There are also a few in the team tend to become passive in this method, they just rely to the leader of the group (Nursing Student 3).*

*Honestly there are instances that we talk more of nonsense things than about the subject matter, there are times we failed to accomplish what should be accomplished (Nursing Student 11).*

*The time element is also a factor here, not all are available, there are excuses made by some group members (Nursing Student 6).*

*The testimonies of some nursing students on jigsaw explains its imperfection, these requires the faculty to address on how to improve the delivery and implementation of the program. Rules and instructions must be clearly stated and agreed upon.*

### **3.7. Jigsaw Works: Completing the Tasks Takes Longer**

Jigsaw classroom is about “home groups” to complete tasks, a group study session done outside the traditional set-up. This strategy according to empirical studies and educational experiments is an effective strategy in developing leadership skills, responsibility and social engagements other than learning. In the case of Fakeeh College of Medical Sciences Jigsaw really works as tested in the nursing class.

Similar to this, the University of Cornell identified Collaborative learning is about peers or teams, it is referred as peer learning or peer instruction as a type of learning. This kind of collaborative learning includes small group discussion, solving concepts, project making and research activities. It is belief that two heads, more heads better than one, through this method peer learn from each other as they teach each other. Collaborative learning allows the students to experience and get engage in the subject matter and gain unlimited benefits such as higher-level thinking, oral communication, self-management, and leadership skills, self-esteem, and responsibility, exposure to diverse perspectives and for real life situations (<https://teaching.cornell.edu>). Some testimonies are;

*We all agreed that time is a factor, this method needs longer time because of the substantial discussion (Nursing Student 9).*

*During the class presentation there are interruptions due to sharing of ideas including comments from other groups, the classes ended up debating (Nursing Student 2).*

*I think a proper time program must be clarified by the professor in given such tasks and the number of interruptions must be allowed to give others the op-*

portunity to speak (Nursing student 5).

The longer the time the more substantial information can be absorbed; this suggests that jigsaw is about time element. Proper program is needed to achieve its expected outcome. Jigsaw means requires a lot of time for the discussion and therefore it must be addressed.

#### 4. Conclusion

With the given data of among respondents in this study, it revealed that Jigsaw as an alternative learning strategy done outside from the traditional learning set up is an effective strategy when tested to nursing students of Fakeeh College of Medical Sciences. The study is in consonance to the claim of other experts that tested Jigsaw in over four decades that it is an effective strategy for learning and developing other skills such as leadership and social engagements. This study suggests proliferating the idea of Jigsaw to other programs of the college as a new dimension of learning.

#### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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