

## CHAPTER 2 REVIEW OF LITERATURE

### 2.1 Introduction to the Literature Review

This descriptive study was conducted to examine instructors' and students' perceptions of team-based learning (TBL) in universities in the Bangkok metropolitan area. The review of the literature focuses on issues that relate to TBL and other disciplines and an overview of the TBL strategy. The review has seven main parts, which are: (a) Traditional Lectures, (b) Team-Based Learning, (c) Principles of Team-Based Learning, (d) Benefits of Team-Based Learning, (e) Implementation of Team-Based Learning, (f) Review of Team-Based Learning Research, and (g) Conclusion of the Literature Review

### 2.2 Traditional Lectures

The traditional lecture is one of the most commonly used and most well-known teaching strategies and refers to a learning environment in which the instructor is the focus for the student (Di Leonardi, 2007; Touchet & Coon, 2005). It is mostly one-way communication that does not allow for student engagement and often encourages simple memorization of the content rather than application (Di Leonardi, 2007; Janssen, Skeen, Schutt, & McMahon, 2008; Touchet & Coon, 2005). Following this method, instructors primarily provide information to students through verbal dissemination which may include handouts or visual aids (Rowles, 2005) and control the course's content or the pace of teaching (Bowles, 2006). They offer students a non-participatory role in the learning process (Di Leonardi, 2007 & Jones, 2007). As a result, students not only have few opportunities to apply knowledge but also feel overwhelmed with information (Di Leonardi, 2007). This passive learning environment creates students who develop neither the interest nor the skills to learn and apply the information independently (McInerney & Fink, 2003; Touchet & Coon, 2005). These phenomena can cause a lack of deep learning (Jones, 2007). In fact, didactic teaching may encourage complacency and replace curiosity with the desire to achieve a higher grade instead of a higher level of knowledge (Janssen *et al.*, 2008, p. 76)

Chickering and Gamson, members of the board of the American Association for Higher Education (AAHE), had concerns about the improvement of undergraduate education.

They researched and published “*Seven Principles for Good Practice in Undergraduate Education*” in 1987. These principles are an essential component of a good undergraduate education that encourages cooperation among students and active learning (Chickering & Gamson 1999). Many faculty members across the nation have used these seven principles as a guide for undergraduate education and agreed that traditional lectures lack student-faculty interaction (Adams & Gilman, 2002). Moreover, Di Leonardi (2007) showed similar research which reports that traditional lectures fail to meet the requirements of these principles:

- Encouragement of student-faculty contact;
- Encouragement of cooperation among students;
- Encouragement of active learning;
- Provision of prompt feedback;
- Emphasis of time on task;
- Communication of high expectations; and
- Respect for diverse talents and ways of learning (Chickering & Gamson, 1999, p. 76).

In additional research, Young (2009) found that traditional lectures, including the use of PowerPoint<sup>®</sup>, are the most boring method of teaching. He challenges instructors to use teaching strategies, such as debates, to provide an interesting class to students and increase participation. However, in promoting this style of teaching, he initially met resistance from students who were usually trained simply to receive the important or necessary material. Most of them have been socialized to view the educational process as essentially passive (Young, 2009). Particularly in large classroom settings, when the instructor assigns students a daunting task or hard topic of discussion, students often revert to merely memorizing the material and discarding it when no longer needed (Jones, 2007).

### **2.3 Team-Based Learning (TBL)**

The idea of team-based learning (TBL) was originally coined during the 1970s by Larry Michaelsen at the University of Oklahoma (Michaelsen, Knight, & Fink, 2004). Michaelsen (2004) recognized the success that resulted from integrating group assignments in his smaller classes, and decided to apply the same strategy to his larger classes. The first purpose of TBL is to encourage the formation of “high performance

learning teams” (Fink, 2004, p.7). The second purpose is to allow learning teams to participate and gain experience in tasks that are important and educational (Fink, 2004).

According to Katzenbach and Smith (1993), a team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and an approach for which they are mutually accountable. Team-based learning (TBL) is “...a particular instructional strategy that is designed to (a) support the development of high-performance learning teams, and (b) provide opportunities for these teams to engage in significant learning tasks” (Fink, 2004, p. 9). Team activities must be an overarching strategy sequentially throughout the entire course, rather than being used occasionally (Fink, 2004). Additionally, teams are constructed for long-term interactions so that individual members feel committed to the team and the challenging tasks that they will be required to complete. The organization of the teams is around problem solving (instrumental learning), but, specifically, team tasks involve coming to a consensus among several choices regarding the “best” choice. This coming to consensus forces communicative learning. Students must discuss subject matter in depth, promoting their own choice or coming to understand others’ choices. In the process, students are freed of prior misconceptions (Michaelsen, 1973).

## 2.4 Principles of Team-Based Learning

Team-based Learning (TBL) relies heavily on group cohesion developed by continuous interaction between team members (Michaelsen, 2004). It is based on the foundation of four key principles for a specific pattern of preparation and implementation.

**Principle 1. Groups must be properly formed and managed:** Groups need to be formed in a way that enables them to do their work. This involves minimizing barriers to group cohesiveness and then giving them the necessary resources. Probably the greatest inhibitors to the development of group cohesiveness are either a previously established relationship between a subset of members in the group such as personal relationship or fraternity or the background factors such as nationality, culture, or native language. Thus, instructors should develop a group formation process that can mix students up in the most effective way and reveal the group’s cohesiveness.

In order to function as effectively as possible, the group should be formed by distributing the member resources. Each individual group should have access to whatever assets exist within the whole class and not carry more than a “fair share” of the liabilities. Member assets might include full-time work experience, previous relevant course work, or access to perspectives from other cultures. Member liabilities may be in the form of negative attitudes towards the course, limited fluency in English, or no previous relevant course work. When relevant member assets, liabilities and characteristics are evenly distributed, learning teams will work more effectively. Generally, students do not intuitively have enough information or use their inclination to form the team. Therefore, the instructors should be the ones who determine how the groups will be formed. The teams must be large enough to maximize their intellectual resources and also allow for full participation of members. In general, there is a suggestion that teams should be comprised of 5-7 members. The members in group or team should be permanent. It takes time for groups to evolve into effectively functioning teams. Each time groups are re-formed, the team development process such as relative development, compromising in group, or time management must begin all over again. The development of groups into teams is a long-standing educational approach. As communication becomes more open and as long as members have information relevant to the issues at hand, team work is far more conducive to learning. The trust and understanding build to the point that members are willing and able to engage in intense give-and-take interactions without self-regard, vanity or misunderstanding. In addition, team members are willing to risk challenging each other because the success of the group is their own success. When this occurs, there is a study which shows that 98% of teams will outperform their own best member on learning-related tasks (Michaelsen, Watson & Black, 1989)

**Principle 2. Students must be made accountable:** In lecture classes, there is no need for students to be accountable to anyone other than the instructor. By contrast, TBL requires students to be accountable to both the instructor and their teammates for the quality and quantity of their individual work. Furthermore, teams must be accountable for the quality and quantity of their work as a unit. In order for teams to function, students must be made accountable for the performance of certain duties. They must also be given the decision-making power to carry these duties out. It is a matter of logic that in order to "make someone accountable" the maker, or instructors, must originally have

been accountable themselves. It is impossible to establish a reasonable degree of accountability by simply assigning grades to students' work. The development of a group into a cohesive learning team requires assessing and rewarding a number of different kinds of student behavior. The students must be accountable for (a) individually preparing for group work, (b) devoting time and effort to completing group assignments, and (c) interacting with each other in productive ways. Team learning offers opportunities for establishing each of these three forms of accountability.

1. Accountability for individual pre-class preparation: The first step in developing cohesive learning team is making members accountable for pre-class individual preparation. The individual students will be unable to contribute to the efforts of their team if they fail to complete pre-class assignments. Lack of preparedness places clear limits on both individual learning and team development and hinders the development of group cohesiveness. The better students resent having to carry their less willing or less able peers. As a result, As a result, the effective use of learning groups clearly requires that individual students be made accountable for class preparation.

In team-based learning, the basic mechanism that ensures individual accountability for pre-class preparation is the Readiness Assurance Process that occurs at the beginning of each major unit of instruction. The first step in the process is an individual Readiness Assessment Test (RAT) that typically consists of 18-20 multiple-choice questions over a set of pre-assigned readings. Next, students turn in their answers and are given an additional answer sheet so that groups can re-take the same test and turn in their consensus answers for immediate scoring. This process promotes students' accountability to both the instructor and to each other. Students are responsible to the instructor because the individual scores count as part of the course grade. In addition, during the group test, each member is invariably asked to voice and defend their choice on every question. As a result, students are clearly and explicitly accountable to their peers for not only completing their assigned readings but for being able to explain the concepts to each other as well.

2. Accountability for contributing to their team: Once students have developed responsibility for coming to class prepared, the next step is ensuring that members contribute time and effort to group work. In order to accurately assess members' contributions to the success of their teams, it is imperative that instructors involve the students themselves in a peer assessment process. That is, members should be given the

opportunity to evaluate one another's contributions to the activities of the team. Contributions to the team include activities such as individual preparation for teamwork, reliable class attendance, and attendance at team meetings that may have occurred outside class, positive contributions to team discussions, and valuing and encouraging contributions from fellow team members. Peer assessment is essential because team members are typically the only ones who have enough information to evaluate one another's contributions accurately.

3. Accountability for high quality team performance: The third significant factor in ensuring accountability is developing an effective system to assess team performance. To do this, the instructor needs to have the teams to create a "product" that can be readily compared across teams and with "expert" opinions, and the other is using procedures to ensure that such comparisons occur frequently and in a timely manner.

An important one that only belongs to the instructors is "Grading system". It is essential that an overall assessment system for the course can be used that encourages the various student behaviors which will promote learning in and from group interaction. In this case, the teacher must develop a grading system that includes students' preparation for group work, their contribution to the group, and the effectiveness of their teamwork.

**Principle 3. Team assignments must promote both learning and team development:** The development of appropriate group assignments is a critical aspect of successfully implementing team-based learning. In fact, most of the reported "problems" with learning groups, such as free-riders or member conflict are the direct result of inappropriate group assignments. The most fundamental aspect of designing team assignments that promote both learning and team development is ensuring that they truly require group interaction. In most cases, team assignments generate a high level of interaction if they require teams to use course concepts to make decisions that involve a complex set of issues and enable teams to report their decisions in a simple form. By contrast, assignments that involve producing complex output such as a lengthy document or an oral presentation often limit both learning and team development because they typically inhibit intra-group interaction and limit interaction among groups by making it difficult to compare performance among teams. Thus, complex product outputs such as a lengthy document seldom contribute to team development because

they are likely to have been created by individual members working alone on their part of the overall project.

**Principle 4. Students must receive frequent and immediate feedback:** Immediate feedback is the primary instructional lever in TBL for two important reasons. The first one is the timely feedback from the readiness assessment tests (RATs) supports both learning and team development. This feedback supports learning by informing individual students and the groups as to how effective their current learning procedures are. High scores mean they are doing what they need to be doing to learn, and vice versa for low scores. Feedback from the RATs also facilitates the team development process in important ways. Because the group scores are made public, group members are highly motivated to pull together to protect their public image. Also, because the feedback is immediate, students are both aware of situations when the group failed to capitalize on the knowledge of one or more of their members and are highly motivated to do something about it (Watson, Michaelsen & Sharp, 1991). As a result, they very quickly learn the importance of including everyone in the decision making process

The second reason is that timely feedback on application-focused team assignments is important for both learning and team development. But it typically also presents a much greater challenge than providing immediate feedback on the RATs. Whereas RATs are designed to ensure that students understand basic concepts, most application-focused team assignments are aimed at developing students' higher-level learning skills and, as a result, can be much more difficult to evaluate. One key to providing immediate feedback on application-focused team assignments is requiring the right kind of "output" from the teams (that is assignments that require students to make complex decisions, but represent their work in a simple form (see below). The other is using procedures that enable teams to assess and provide feedback on each other's work.

## **2.5 Benefits of Team-Based Learning**

In part because of its versatility in dealing with the problems associated with the multiple teaching venues in higher education, TBL produces a wide variety of benefits for students, educational administrators, and individual faculty members who are engaged in the instruction process. For example:

**Benefits for classes:** Team-based learning is one of the few ways, maybe the only way, to achieve higher-level cognitive skills in large classes. Team-based learning is also effective in motivating attendance, handling discipline problems, and engaging members, who would benefit from group work but, given the opportunity, would prefer to work alone. While temporary groups can provide a valuable aid in small classes where the instructor's physical presence is sufficient to ensure that no one "escapes" (either physically or mentally) and that students are actually working on assigned tasks, temporary groups simply cannot exert enough influence on their peers to motivate attendance, handle discipline problems or engage members, especially in large classes (Michaelsen, 2004).

**Benefits for students I:** the students in team-based learning classes have a social support base that is beneficial in multiple ways, unlike temporary groups whose social support typically ends when the class period is over. For example, group-based instructional approaches have been shown to reduce stereotypes of racial and ethnic minorities and physically handicapped students (Johnson, Johnson & Maruyama, 1983) and increase self-esteem (Johnson & Johnson, 1983). In most classes, the social interaction, which is a natural part of team-based learning, provides benefits to students who often do not feel at ease in a traditional classroom. For example, international students often form lasting friendships and grow in their understanding of a new culture; older students discover that their accumulated life awareness is an appreciated and valuable asset; students who are at risk of dropping out form working relationships that assure them of help in future assignments and other classes; and students who are having difficulty maneuvering their way through the campus bureaucracy have a ready source for answers to their questions and concerns (Michaelsen, 2004).

**Benefits for students II:** Unlike temporary groups, where tough interpersonal issues can be avoided simply by waiting until the groups are re-formed, students in team-based learning classes cannot easily escape the problems they encounter in their groups. As a result, many learn lessons about themselves that allow them to be more effective and productive when they finish school and enter the work force. In addition, because students have to learn to work together, they develop the understanding and skills they need to work productively as task group members. Finally, part of effective group work believes that the benefits of working in groups outweigh the costs. Unlike groups used

in a supplementary way, the vast majority of team-based learning groups provide solid evidence of the terrific potential of effective learning teams for accomplishing difficult intellectual tasks (Michaelsen, 2004).

**Benefits for instructors:** Team-based learning also produces instructor enthusiasm because it taps into the energy that is released as the student groups develop into learning teams. Although there are typically some initial struggles, most groups' capabilities steadily improve to the point where students behave more like colleagues than "empty vessels." This is the natural outcome of empowering groups by structuring them so that they have needed resources, are exposed to appropriate performance evaluation systems, and have the opportunity to engage in meaningful and challenging assignments. As a result, the vast majority of students willingly share responsibility to ensure that learning occurs. When the instructor adopts the view that the education process is about learning, not about teaching, instructors and students tend to become true partners in the education process (Michaelsen, 2004).

**Benefits for faculty:** There is tremendous benefit to faculty who use TBL. Because of the student apathy that seems to be an increasingly common response to traditional lecture-based instruction, even the most dedicated faculty tends to burn out. By contrast, TBL prompts most students to engage in the learning process with a level of energy and enthusiasm that transforms classrooms into places of excitement that are rewarding for both them and the instructor. When this happens, teaching with team-based learning is well implemented (Michaelsen, 2004).

## **2.6 Implementation of Team-Based Learning**

In order to effectively use team-based learning (TBL) in the classroom, the instructor must completely change the course. The process of redesigning the course should begin prior to the start of the semester and involves decision-making about the activities that will be undertaken pre-classroom, in-classroom, and at the post-classroom stage.

In the first stage, or the pre-classroom, the principal role of instructor in team-based learning (TBL) is to gather information about the students in order to design and manage the whole process of instruction. Michaelsen, Knight and Fink (2004) state that the proper formation and management of groups is an essential principle of cohesive

TBL. In most case these groups are determined by the instructor. As various studies suggest, the success of TBL depends on the interaction among members, group size (Aggarwal & O'Brien, 2008), and instructor-specified objectives and guidelines on necessary advanced preparation (Sibley & Parmelee, 2008). Therefore, a TBL instructor can be regarded as a designer or a manager (Michaelsen, 2004), or a coach (Fines, McCabe & Sparrow, 2010). In the case of students, TBL pedagogy emphasizes the importance of pre-class preparation based upon clear learning objectives and activities (Touchet & Coon, 2005). Students learn to take responsibility for themselves when they learn independently outside of the classroom, and take responsibility for their group when they interact with one another through activities. It can be said that TBL serves to promote greater resident engagement with and responsibility for the learning process.

In the second stage, or in-classroom, instructors can understand their students better through assessment in an authentic environment, and students are able to work together effectively. The assessment techniques used include performance evaluations, criterion-referenced appraisals, systematic observations by instructors, peer and self-assessment and portfolios (Wellington, Thomas, Powell, & Clarke, 2002). There are two other assessment tests which form a foundation to the present study: (a) the individual readiness assurance test (IRAT) is used to assess their basic understanding of facts and concepts learnt and (b) the group readiness assurance test (GRAT) in which each item needs a consensus from a team of 5-7 students (Tai & Koh, 2008). Hence, TBL allows students to demonstrate individual and group accountability, devote their time and effort to completing group assignments, and interact with one another in productive ways. This is known as collaboration (Michaelsen, Knight, & Fink, 2002). As Fines, McCabe & Sparrow (2010) put it, TBL is "group work on steroids". It denotes participation from all members in helping one another, and it implies facilitation among students themselves, although instructors can facilitate as needed. Over time, students show more appreciation of their team when learning through collaboration. Several studies imply a similar success of TBL during the classroom period (for instance, Hunt, Haidet, Coverdale, & Richards, 2003). Vasan, DeFouw and Holland (2008) observed active student performance in an anatomy course, and Deeter-Schemelz, Kennedy and Ramsey (2002) also report how a learning team impacts on team effectiveness through consensus and sharing a common goal. To recap, the second stage gives instructors

opportunities to make an authentic assessment of their students while students learn a professional skill which cannot be achieved individually; that skill is collaboration.

In the third stage, or the post-classroom, students are likely to think highly of sustainable learning. Sibley and Parmelee (2008) report that TBL enables students to solve progressively more complex problems and to build bodies of knowledge that promote higher levels of understanding. Parmelee, DeStephen and Borges (2009) also note that student attitude towards responsibilities change as they interact with other team members to collaborate as a team. This implies their development of interpersonal skills. These interpersonal skills can be observed in TBL for, when compared to other pedagogical approaches, only teams can provide such skills (Kelly, Haidet, Schneider, Searle, Seidel, & Richards, 2005). Furthermore, Letassy, Fugate, Medina, Stroup and Britton (2008) find that a successfully implemented TBL format leads to the promotion of self-directed learning in students as they apply knowledge to real-life situations. According to McInerney & Fink (2003), students who finish TBL lessons become more motivated, develop an understanding of content, and learn complex problem-solving skills. Therefore, it can be said that the third stage draws on the measures of knowledge construction and problem solving for continuous learning.

## **2.7 Review of Team-Based Learning Research**

Haberyan (2007) tested TBL with a course for her undergraduate Industrial/Organizational psychology course. The course structure as well as a pretest/posttest evaluation of student knowledge and perceptions is discussed, found that the students ( $n = 40$ ) achieved statistically significant gains between the pretest and the posttest. She used a  $t$  test to analyze the results (pretest:  $M = 3.90$ ,  $SD = 1.53$ ; posttest:  $M = 5.63$ ,  $SD = 1.70$ ),  $t(39) = 5.16$ ,  $p < .001$ .

Wiener, Plass, and Marz (2009) examined the impact of team-based learning (TBL) on educational outcomes in the first year of the curriculum of the Medical University of Vienna. The results of the study showed out of 1417 eligible students, 386 participated in eight parallel courses offered in the TBL block. The reaction of students to TBL was highly positive. Using the final exam as an outcome measure, 220 students who completed the intensive courses had a 25.3% higher score (non-TBL and TBL students:  $22 \pm 9$  and  $28 \pm 9$  points) in the TBL block. They also had a 16.5% higher score (non-

TBL and TBL students: 94+/-29 and 109+/-26 points) in the remaining 5 non-TBL blocks of the year.

Gomez, Wu, Passerini, and Bieber (2007) present the results from pilot assessments of computer-supported team-based learning. This approach was examined through field studies in the course of two semesters at a US public technological university. The findings indicated that the perceptions of team learning experience such as perceived motivation, enjoyment, and learning in such a Web-based CMC environment are higher than in traditional face-to-face courses.

Koles, Nelson, Stolfi, Parmelee, and Destephen (2005) conducted a study impact of TBL on the academic performance of Year 2 medical students at Wright State University by comparing this active learning strategy against a traditional method of case-based group discussion (CBGD). The results of the study showed no significant differences in whole group performance on pathology-based examination questions were observed as a consequence of experiencing TBL versus CBGD. However, students in the lowest academic quartile showed better examination performance after experiencing TBL than CBGD in 4 of 8 modules ( $P = 0.035$ ). Students perceived that the contributions of peers to learning were more helpful during TBL than CBGD ( $P = 0.003$ ).

Letassy, Fugate, Medina, Stroup, and Britton (2008) examined the implemented team-based learning (TBL) format in an endocrine module to promote students' active learning in a course delivered to 2 campuses. The results of the study, course grades were higher using the TBL method compared to the traditional lecture-based method that was used previously. Individual readiness assurance tests and team contribution scores significantly predicted overall course grades ( $p < 0.001$ ). Students accepted the change in course format as indicated by course evaluation results.

Pileggi, and O'Neill (2008) examined the improvement in student ability to diagnose diseases using TBL combined with an audience response system (ARS). Three measures were used to assess the outcomes: 1) pre-and posttest scores, 2) a diagnostic skills assessment during the final examination, and 3) an attitudinal survey completed by the students. At the beginning of the course, second-year students ( $n=64$ ) were

evaluated to determine entry-level knowledge. Six groups of ten to eleven students each were pretested, followed by a parallel posttest following the implementation of the TBL experience. Students' performance on the posttest (63.4 percent) showed improved results when compared to the pretest (36.9 percent). Students also exhibited improved diagnostic skills with the final examination. The results of the students' attitudinal survey indicated an 80 percent agreement that TBL enhanced their powers of critical analysis.

Shellenberger, Seale, Harris, Johnson, Dodrill, and Velasquez (2009) present data evaluating the ability of TBL to reinforce and enhance concepts taught during initial training in a National Institutes of health-funded alcohol screening and brief intervention (SBI) program conducted in eight residency programs from 2005 to 2007 under the auspices of Mercer University School of Medicine. After initial training and three TBL reinforcement sessions, 42 residents (63%) reported that they performed SBI and that their levels of confidence in performing interventions in their current and future practices were moderately high. Participants preferred TBL formats over lectures. Faculty found TBL to be efficient but labor-intensive for training large groups.

Thompson, Schneider, Haidet, Perkowski and Richards (2007) conducted a study to identify contextual factors associated with the implementation of TBL with a larger pool of individuals. The administered a questionnaire to those who had implemented TBL via the Web to participants who attended TBL workshops; 297 of 594 responded. The constant comparative method was used to analyze responses. The results of the study revealed five factors important to successful implementation of TBL: buy-in, expertise, resources, time, and course characteristics, with 60%, 38%, 37%, 36%, and 16% of respondents identifying each factor, respectively.

Wiener, Plass, and Marz (2009) examined the impact of team-based learning (TBL) on educational outcomes in the first year of the curriculum of the Medical University of Vienna. The results of the study indicated that out of 1,417 eligible students, 386 participated in eight parallel courses offered in the TBL block. The reaction of students to TBL was highly positive. Using the final exam as an outcome measure, 220 students who completed the intensive courses had a 25.3% higher score (non-TBL & TBL students: 22+/-9 & 28+/-9 points) in the TBL block. They also had a 16.5% higher score

(non-TBL & TBL students: 94+/-29 & 109+/-26 points) in the remaining 5 non-TBL blocks of the year.

## **2.8 Conclusion of the Literature Review**

Studies of team-based learning (TBL) are most common in the health sciences such as medicine and nursing (see Clark, Nguyen, Bray & Levine, 2008; Dunaway, 2005; Haidet, O'Malley, & Richards, 2002; Hunt, Haidet, Coverdale, & Richards, 2003; Koles, Stolfi, Borges, Nelson, Parmelee, 2010). Studies have also been conducted in management education (Fairfield, 2003), legal education (Dana, 2007), and marketing education (Hernandez, 2002). Courses such as Quantity Food Production, Meeting and Convention Sales and Service, Introduction to Tourism, Introduction to Hospitality and Tourism Management, Hospitality Management and Organization, Bistro Cooking, and Service Quality Management have used TBL techniques in classrooms in universities worldwide (Frash, Kline, & Stahura, 2004; Kline, Frash & Stahura, 2004; Su, 2004; Wolfe & Gould, 2001).

Michaelsen, Knight and Fink (2004) found that the proper formation and management of groups is an essential principle of cohesive TBL. In most case these groups are determined by the instructor. The success of TBL depends on the interaction among members, group size (Aggarwal & O'Brien, 2008), and instructor-specified objectives and guidelines on necessary advanced preparation (Sibley & Parmelee, 2008). Therefore, a TBL instructor can be regarded as a designer or a manager (Michaelsen, 2004), or a coach (Fines, McCabe & Sparrow, 2010). In the case of students, TBL pedagogy emphasizes the importance of pre-class preparation based upon clear learning objectives and activities (Touchet & Coon, 2005). Students learn to take responsibility for themselves when they learn independently outside of the classroom and to take responsibility for their group when they interact with one another through activities.

TBL assessment techniques include performance evaluations, criterion-referenced appraisals, systematic observations by instructors, peer and self-assessment and portfolios (Wellington, Thomas, Powell, & Clarke, 2002). TBL allows students to demonstrate individual and group accountability, devote their time and effort to completing group assignments, and interact with one another in productive ways. This is known as collaboration (Michaelsen, Knight, & Fink, 2004). As Fines, McCabe and Sparrow

(2010) explain, TBL is “group work on steroids.” Collaboration denotes participation from all members in helping one another, and it implies facilitation among students themselves, although instructors can facilitate as needed. Over time, students show more appreciation of their team when learning through collaboration. Several studies imply a similar success of TBL during the classroom period (see Hunt, Haidet, Coverdale, & Richards, 2003). Vasan, DeFouw and Holland (2008) observed active student performance in an anatomy course, and Deeter-Schemelz, Kennedy and Ramsey (2002) also report how a learning team impacts on team effectiveness through consensus and sharing a common goal.

Sibley and Parmelee (2008) reported that TBL enables students to solve progressively more complex problems and to build bodies of knowledge that promote higher levels of understanding. Parmelee, DeStephen and Borges (2009) also observed that students’ attitudes towards responsibilities changed as they interacted with other team members to collaborate as a team. This implies the development of interpersonal skills. These interpersonal skills can be observed in TBL for, when compared to other pedagogical approaches, only teams can provide such skills (Kelly, Haidet, Schneider, Searle, Seidel, & Richards, 2005). Letassy, Fugate, Medina, Stroup and Britton (2008) found that a successfully implemented TBL leads to the promotion of self-directed learning as students apply knowledge to real-life situations. According to McNerney and Fink (2003), students who finish TBL lessons become more motivated, develop an understanding of content, and learn complex problem-solving skills.