



## The Effectiveness of Peer-Led Team Learning (PLTL) in the Achievement of Seventh-Grade Students in the Subject of Science and Developing their Team Working Skills

**Mahabad Mustafa Ahmed**

General Science Department, faculty of Education, Soran University, Kurdistan Region-Iraq

Email: [mma030h@gsci.soran.edu.iq](mailto:mma030h@gsci.soran.edu.iq)

**Sattar Jabbar Haji**

Department of General Psychology, Faculty of Education, University of Zakho, Kurdistan Region-Iraq

Email: [sttar.haji@uoz.edu.krd](mailto:sttar.haji@uoz.edu.krd)

### ABSTRACT

This research aims at investigating the Effectiveness of Peer-Led Team Learning (PLTL) in the Achievement of Seventh-Grade Students in the Subject of Science and Developing their Team Working skills. To achieve the objectives of the study, two null hypotheses have been set by the researcher. The population of the study was limited to the seventh-grade basic students for the academic year (2021-2022) at (Shahin basic School for Girls) which has been chosen intentionally. The sample of the study was purposefully chosen. The researcher relied on the experimental design, with control and experimental groups. The experimental group has been taught according to the PLTL Strategy, while the control group according to the Traditional Teaching Methods. The sample consisted of (58) students, distributed over two groups; (28) students in the experimental group, and (30) students in the control group. The equivalence between the two groups was done on the basis of the variables. The researcher has prepared two tools. The first one an academic achievement test to measure the academic achievement. It consists of (30) multiple choice items. Second tool is the team working skills scale which consisted of (40) items. The validity and reliability of the tools have been duly confirmed. After completing the administration of the tools, the data has been obtained by using statistical means, by using (T-test). The Results have shown that Using PLTL strategy in teaching the science subjects to the 7th grade basic students has no effect on students' academic achievement. Using PLTL strategy in teaching has its own effect and positive influence on developing students' team working skills, based on the results the researcher put some recommendations, and further future studies have been suggested.

**Keywords:** Peer Led team Learning, Academic Achievement, Science Subject, Basic Education, Team Working Skills.



## 1. Introduction

Education is a creative endeavor as well as a transforming process. Students become new creatures as a result of Education. Education is a global movement that advocates the expansion and development of learning opportunities for all children, adolescents, and adults. As such, learning is always a predictable action (Little, 2006). On this basis, education is a means of obtaining scientific knowledge and discovering the sources of educational opportunity (Knight & Kuntz, 2020).

Teaching is a complex and varied process that requires breadth of knowledge and comprehension, as well as the ability to synthesize, integrate, and apply that knowledge in a variety of situations, under a variety of settings, and with a diverse range of groups and individuals. This knowledge is applied in ways that provide equitable access and opportunities that build on and extend what learners currently know to facilitate the ability to acquire, develop, and generate new information through high-quality instruction (Hollins, 2011).

Many educators believe that teaching science is difficult because it involves extensive preparation and forethought. Before drafting lesson plans for scientific classes, teachers must be aware of their students' abilities. A teacher's first task is to determine a student's attention span, degree of interest or ability, past knowledge or experience, and any special requirements (Hassard & Dias, 2013).

Teachers can adopt the following steps to develop their lesson plans. Teachers can adopt the following steps to develop their lesson plans. The first step is to mix the most appropriate content and materials for the lesson; the second step is to figure out what they want to accomplish with their science classes and what outcomes they hope to achieve. Science teaching plans may include a wide range of objectives, but they should at least be linked to the skills and knowledge that teachers hope students will gain from their classes. As a rule of thumb, objectives, unlike aims, should be explicit and reflect the teachers' aspirations for their students in the learning process. In scientific classes, the aims students are expected to meet usually focus on performance and behavior (Martin, & Franklin, 2009).

Teaching science enables students to develop a broader grasp of how and why things work. Science informs children about their environment. Science can explain the mechanics and reasoning for complex systems, ranging from the human body to modes of transportation (Davies, & McGregor, 2010). Science teaching is a complicated activity that is central to the standards' vision of science education. The teaching standards establish criteria for evaluating progress toward the vision and specifying what science teachers at all school levels should know and be able to perform (National Academies of Sciences, Engineering, and Medicine, 1996).

Collaborative learning is a student-centered, teacher-facilitated educational technique in which a small group of students is responsible for their learning as well as the learning of the entire group. Students work collaboratively in groups to acquire and practice subject matter aspects necessary to solve a problem, perform a task, or accomplish an aim. The teacher designs both the social interaction structures and the learning activities in collaborative learning. (Li & Lam, 2013) assert that when students collaborate, they can maximize their own and one another's learning.



Collaborative learning is well-known in the education sector as a very effective teaching strategy for developing students' intellectual accomplishments. It is critical for collaborative learning that team members are connected in such a way that they cannot succeed unless everyone succeeds; otherwise, they will successfully assist one another in completing the work and achieving the team's aim (Tsay,2010). Students accomplish this purpose by mutual assistance and support, resource exchange, and encouragement of one another's acts. As a result, team members who work together perform better than students who study alone or compete with one another (Prince, 2004). Collaborative learning can be an extremely effective way of transferring knowledge between learners. To accomplish this, it is critical to strategically regulate processes such as cognition and affect (including metacognition, emotion, and motivation). Collaborative learning further enables us to shift from individual to collaborative learning and work (Järvelä & Kirschner, 2020).

Peer-Led Team Learning (PLTL) is a type of collaborative learning in which students establish permanent, peer-led teams (Johnson, & Loui, 2015). It is a unique method of teaching science. Student leaders (peers) direct the work of small teams (groups) of students at weekly Class meetings. The students work through difficult problems that are intended to be solved together. Peer leaders are trained to ensure that students interact actively and constructively with both the material and one another (Gosser & Gosser, 2001). Peer leaders are not expected to be subject matter experts or substitute teachers; rather, they should be graduates of the course who have undergone training in small group dynamics and learning theory (Quitadamo & Crouch, 2009). Team Led by Peers Learning is a cutting-edge approach to the science teacher. In weekly Class meetings, student leaders (peers) direct the work of small groups of students. The students work collaboratively to overcome difficult difficulties. Peer leaders are taught to facilitate students' active and productive engagement with the curriculum and with one another. This technique facilitates the following educational opportunities: The supportive framework fosters questions and conversations that result in conceptual understanding; students gain experience working in teams and communicating more effectively; Peer leaders acquire abilities in teaching and group management (Gosser et al., 2000).

Peer Learning is a way of training and learning in which groups of students work together to solve a problem, accomplish a task, or create a product. Each team member is accountable for not just learning what is taught, but also for assisting team members in learning; thereby generating an attitude of achievement. Students work through the assignment until each group member comprehends and completes it satisfactorily (Johnston, 2009).

For students who work full-time and/or are raising families, PLTL classes assist establish a rhythm for the course and give a scheduled time for completing assigned work and comprehending lesson content. Finally, PLTL instructs students in the manner in which knowledge is generated in research groups, where students are trained to conduct "real science." It is not remedial, yet serves both traditional and non-traditional students' educational needs (Varma,2006).



To comprehend the building of teamwork skills, it is necessary to first grasp what teams are and how they function. A team is defined as "two or more individuals with distinct roles and responsibilities who work collaboratively and socially within an organizational framework to fulfill tasks and achieve common aims." Particular criteria, including a certain level of competency in certain talents, are required for a team to function well. Much has been published in organizational psychology over the previous couple of decades on what these talents entail.

Teamwork and collaboration abilities are also operationalized in the educational literature as 21st-century talents. In general, organizational psychology literature describes a broader spectrum of teamwork skills (Nelson, 2017). While teamwork skills are crucial for work, teachers' efforts to monitor development in this area have been impeded in many nations by a lack of evaluation methods and student participation. The Teamwork Skills Inventory relies on peer and self-evaluation to develop accountability, define competencies, and determine learning requirements (Strom and Strom, 2011).

Effective teamwork abilities are critical for success in an increasingly team-oriented workplace. According to research, there is frequently confusion regarding how cooperation is measured and evaluated, making it challenging to integrate these abilities into the student curriculum. According to preliminary research, teaching and measuring teamwork abilities enhance teamwork skills over time. This means that the Team should be used to promote teamwork skills in student education (Britton, and Stephenson, 2017).

### 1.1. Statement of the Problem

Over the last few decades, many of the most important science and science education groups have said that group work is important for students' understanding of concepts and, more recently, for them to be more productive in science. This has led to a call for a paradigm shift from traditional, teacher-centered classrooms to student-centered classrooms, where students have a chance to be actively involved in their learning and learn from each other. Group activities for students who are studying science are very important because they give them a chance to get involved in science (Snyder and Wiles, 2015).

PLTL fosters an active learning environment in which students can re-examine lesson content, communicate and collaborate effectively with one another, think deeply, ask numerous questions easily, discuss their scientific perspectives in a friendly environment, and construct their knowledge through the use of higher-level reasoning and problem-solving skills (Tien & Kampmeier, 2002; Varma, 2006).

Through individual interviews with several general science teachers in Kurdistan Region, the survey of the practical reality of teaching general science in the overall education stages in general, and particularly in the stage of basic education, has come out with the fact that the teaching of this subject area continues to rely on the traditional method of teaching and is still based on the teacher's information and receiving the student's conversation and memorization without understanding or thinking. Through their work as science teachers in basic schools, the researcher has



noticed a lack of students' achievement in the subject of science; they are unmotivated. Additionally, the teachers of the material suffer from a lack of time and the difficulty of covering the entire course book due to the traditional method of teaching.

The field of modern teaching methods strives to alter the educational process, particularly the role of traditional school and home practices, by encouraging learners to take a more active role in adopting responsibility and learning.

The current research problem can be framed with the following question:  
*(What is Effectiveness of Peer-Led Team Learning (PLTL) in the Achievement of seventh-grade Students in the Subject of Science and Developing their Team Working skills?).*

## 1.2. Importance of the Research

The Current research derives its importance from the following:

1. The results of this research may help the educational staff to use a modern strategy that will increase the effectiveness of the outputs of the educational process.
2. Teachers may benefit from various educational subjects and all educational stages, with a realistic vision of the extent to which Students benefit from the use of (PLTL).
3. It may help curriculum developers to reconsider the possibility of including some activities in the curriculum based on the use of this strategy.
4. It may help pedagogical centers to arrange training lessons and materials based on PLTL strategy, and teacher education programs.

## 1.3. Aims of the Research

This research aims to:

1. Identify the effectiveness of using (PLTL) in the academic achievement of seventh-grade students in the subject of science.
2. Identify the effectiveness of using (PLTL) in the development of team working skills of seventh-grade students.

## 1.4. Research Hypotheses

1. The first null hypothesis states that **"There is no statistically significant difference at the significance level (0.05) between the average scores of the students in the experimental group who were taught according to the (PLTL) and the average scores of the students of the control group who were taught according to the Usual Method in terms of Academic achievement"**.
2. The second null hypothesis stated that **" There is no statistically significant difference at the significance level (0.05) between the average difference between the students' scores of the experimental group who were taught according to the (PLTL) Strategy and the average difference for students 'scores of the control group who were taught according to the Usual Method in terms of developing team working skills."**



## 1.5. Limits of the Research

This research is limited to:

1. Seventh-grade students in the basic schools at the Soran independent administration.
2. First semester of the academic year (2021-2022).
3. Units: (**A: Cells are life vision units B: Environmentalist. C; the earth's shell sources**) of the subject of science for 7th grade for the basic schools in Kurdistan Region - Iraq for the academic year (2021-2022) Ministry of Education, General Directorate of Programs & Publications 2021 Science for All, 14<sup>th</sup> Edition, Students Book, Kurdistan Region, Iraq (pp. 6 -120).

## 1.6. Definition of Basic Terms

The following terms will be used regularly in the study according to these definitions:

### 1.7.1. Effectiveness is defined by:

- **Samara & Al-Adaili (2008)** as the degree to which students' achievement in science subjects improves as a result of the use of hybrid learning in science classes. It is quantified statistically.
- **Nsengimana (2020)** as the capacity to achieve a desired outcome or output. When something is regarded as effective, it either achieves the desired or expected result or leaves a lasting, vivid impact.

### 1.7.2. Peer-Led Team Learning is defined by:

- **Snyder. and Wiles (2015)** as an instructional strategy that creates an environment in which students can engage in intellectual discourse and collaborate in problem-solving teams guided by a peer leader.
- **Stephenson and Sadler-McKnight (2019)** as the substantial emphasis on collaboration that is based on student-student interactions within teams. The class atmosphere, which has a discussion-friendly seating arrangement, is designed to maximize interactions. (PLTL) is a student-centered, active learning program that incorporates, in varying degrees, writing, inquiry, collaboration, and reflection.
- **The researcher defines PLTL procedurally** as an educational strategy that aims to teach students the topic in the general sciences. The model complements lessons, which can be used in a study course in the form of collaborative learning classes consisting of six to seven students, led by students, to share information among students to understand the heavy touches.

### 1.7.3. Achievement is defined by

- **Gilar-Corbi and Vidal (2020)** as the result of a complex interaction of psychological, social, and economic factors that contribute to students' optimal development. It is explained by factors related to instruction, such as social interaction, evaluation and feedback, clear information, and extracurricular training programs.



- **The researcher defines academic achievement procedurally** as the information and skills achieved by 7<sup>th</sup> grade students in the subject of general science. It is measured by the scores obtained by the students in the academic achievement test prepared for this purpose.

**1.7.4. Team working skills** is defined by

- **Credit and Webb (2011)** as a team working together on a common project in complementary roles to achieve a common objective with outcomes that are larger than those feasible for any one person working alone. Team working skills need a combination of interactive, interpersonal, problem-solving, and communication abilities.

- **Nelson (2018)** as the conviction that collaboration is necessary for the successful completion of team tasks. Teamwork abilities are acquired in disciplines other than informal education, such as formal education and organizational psychology.

- **Goñi and Miranda (2020)** as encompassing a range of cognitive, motivational, and behavioural abilities. Additionally, individuals and teams can be used to examine teamwork skills.

- **The researcher defines it procedurally:** as purposeful behavioural skills as a way to raise the sense of 7<sup>th</sup> grade student skills to work together as a team to solve problems and to create a sense of collaboration among students, which is measured under the results in team working skill scale applied in this study.

## 2. Theoretical Background And Previous Related Studies

### First: Theoretical background

#### 2.1. Peer-Led Team Learning (PLTL)

Peer-Led Team Learning (PLTL) is a method for teaching small groups. The PLTL method was created in the early 1990s by Woodward and Gosser. It was used in student chemistry lessons to let students work together to solve problems (Gosser & Weiner, 1996). Six to eight students work together in small groups led by a student who has already done well in the class. Peer leaders work together with the course teacher to help small groups solve problems. They have been trained in learning theory, pedagogical methods, and the course's conceptual content before this (Gosser & Roth, 1998).

To foster teamwork and active learning on the basis of a variety of strategies that include several techniques and as follows:

1. Eliciting group consensus and encouraging the group to compare responses.
2. Asking students to explain their work and decision-making process.
3. Requiring students to present their answers to other groups.
4. Encouraging students to consult references (Lewis, 2011).

It is a systematic method of team learning in which a group of students meets weekly with their peer leader to discuss and solve a series of deliberately constructed challenges linked to the course topic (Gosser & Roth, 1998). PLTL with adaptive behavior may be enhanced by incorporating collaborative learning (Roach and Villa, 2008).



### 2.1.1. Historical background of Peer-Led Team Learning

A model called PLTL was first used in 1993 by Woodward, Gosser, and Weiner, who came up with it. At The City College of New York, they came up with PLTL to help students learn and stay in the sciences, as well as to help them stay in the field. It was made even better at New York City Technical College, St. Xavier University, and the University of Rochester, among other places. The PLTL model has spread to other fields and is now used across all the sciences (Merkel & Brania, 2015).

This methodology has been widely spread in response to faculty members' concerns regarding student learning and high attrition rates in STEM lessons at several colleges and institutions throughout the United States (Goodwin, 2002). As a result of the increased student performance and the favorable outcomes of the PLTL classes in these universities, the PLTL model was successfully developed and expanded to other institutions (Gafney & Varma-Nelson, 2008; Gosser, 2001). Concerning the dissemination of PLT, in 1991, the National Science Foundation funded PLTL as a pilot experiment. Originally termed Class Chemistry, the initiative was chosen as a means of enhancing student success in The City College of New York's introductory chemistry classes. Between 1991 and 1998, the approach was adopted by over 50 faculty members at thirty colleges and institutions (Hickman, 2016).

### 2.1.2. The Characteristics of Peer-Led Team Learning

PLTL seeks to provide students with active and collaborative learning opportunities, demonstrates how to work collaboratively with their peers, enhances their problem-solving abilities, and provides the required advice to team members. The following are the program's guiding principles:

- A. Activities and materials are challenging yet accessible.
- B. The program is integrated into the course through required attendance at two hours of weekly class time.
- C. Schools are deeply involved in the program.
- D. Peer leaders are trained in group leadership and course content.
- E. Physical space and environments are conducive to discussion and learning.
- F. The program receives strong institutional support (Arendale, 2004).

### 2.1.3. The Objectives of PLTL:

#### PLTL Seeks to achieve the following objectives

- A. Teaching students how to use group study efficiently.
- B. Strengthening students' problem-solving abilities.
- C. Providing facilitated assistance to students.
- D. Creating an environment conducive to active learning for students (Hockings and Frey, 2008).

### 2.1.4. Basic Elements of PLTL

**1. Positive Interdependence:** A group member cannot be effective without the cooperation of the other members. The tasks should be framed in such a way that students rely on one another (sink or swim together) to successfully finish the job and optimize their learning. This can be accomplished by utilizing shared resources,





convincing students to agree on a single, group-wide consensus response, and providing the group with a single set of materials.

**2. Individual Accountability:** Each group member's labor is required; no 'hitchhiking' is permitted. Individual accountability can be structured in a variety of ways. Teachers can have groups learning together but administer individual tests, randomly verify the learning of individual group members, or assign each group the duty of checker.

**3. Face to Face Promotive Interaction:** Members of the group contribute to one another's learning through assisting, sharing, and supporting efforts to learn. To explain, discuss, educate, and encourage specific collaborative actions, students must be knee-to-knee and eye-to-eye.

**4. Interpersonal and Small Group Skills:** The teacher must constantly identify, teach, and support specific collaborative behaviours (e.g., leadership, trust-building, communication, decision-making, and conflict resolution) through the use of clear expectations, role assignments, and precise feedback.

**5. Monitoring, Intervening, and Processing:** Members of a group must be knowledgeable of how their organization operates. While students work in Peer Learning groups, the teacher monitors their work and interacts and intervenes as needed to encourage teamwork and task completion, as well as to assist groups with strategy development (Johnston, 2009).

## 2.2. Team Working skills

Learning to work well in a team is a critical skill for scientific grades. A science curriculum that promotes teamwork guarantees that students have the workplace skills necessary for research and other professional professions. Teamwork exercises are beneficial because they help students develop interpersonal skills, promote peer sharing, and simulate a real-world situation.

Effective teamwork abilities are a highly valued attribute for a student of science. Developing teamwork abilities concurrently contributes to the development of deeper cognition linked with peer interaction, such as dialogue, problem-solving, and cooperation. Additionally, teamwork's social character benefits students' mental health and social competence. This increases the breadth of abilities and the development of stronger social networks results in a more thorough educational experience (Brookes, 2019).

In the team work to succeed academically and professionally, need a very important experience in the following sides:

**1. Communication:** It is the most important part of any educational process, and it is also the foundation of good teamwork. Communication aims to pass along or exchange ideas and thoughts. If academics had good communication skills, it would be provided in the right way (Sharifirad & Etemadi, 2012).

**2. Time management:** Time management aims to use the time that is an important resource to get things done quickly (Cemalolu & Filiz, 2010). Time is thought of as a valuable commodity that can be divided and used at will (Pehlivan, 2013).

**3. Problem-solving:** People's lives are complicated by problems. These occur in a variety of situations, such as at home, and school. In some instances, issues can be



major. In other circumstances, they may be minor, yet they are still significant issues. When individuals in educational institutions and at work have difficulty grasping academic concepts and performing their jobs effectively, they receive assistance and support from their teachers, classmates, collaborative workers, supervisors, and employers (Kapur, 2021).

**4. Listening:** Listening is a rarely taught ability. It is critical to maintain an open mind when working in a group. Students are taught speaking, reading, and writing skills in school, but there are relatively few lessons devoted to the subject of listening. Additionally, most people are so preoccupied with talking or thinking about what they are about to say next that they miss out on numerous wonderful opportunities to learn about new concepts, ideas, and cultures. Listening can help improve speaking abilities. For the learner, spoken language enables interaction (Woottipong, 2014).

**5. Critical thinking:** Empowering critical thinking abilities is vital at all levels of education, not just primary and secondary. A person who can think critically can see and solve problems. By developing these skills, students will be able to develop into persons who can maintain attention and identify the reasons (Permana & Azizah, 2019).

**6. Collaboration:** Collaboration is regarded as a critical ability for success in the twenty-first century. Collaboration and teamwork in education benefit students by providing peer support and feedback. While working in a team might be tough at times, it is frequently an excellent opportunity to develop new ideas (Xiao & Manser, 2013).

**7. Leadership:** Leadership has many different meanings, but at its most basic level, it is about being able to influence others to reach their aims and make them do what they want to. Leaders can show strong teamwork skills by encouraging collaboration, acting as mentors or coaches for their employees, and giving others the chance to learn, grow, and progress.

## 2.1. Characteristics of Effective Teamworking

- Commitment to team success and common aims - team members are committed to the team's success and the project's common aims. Successful teams are motivated, engaged, and driven to excel;
- Interdependence - team members must foster an environment in which they can offer significantly more collectively than they can individually. A positive interdependent team atmosphere brings out the best in each individual, helping the team to accomplish its objectives significantly more effectively. Individuals motivate and inspire their teammates to succeed, contribute, and learn.
- Interpersonal skills include the capacity to communicate openly with team members, to be honest, trustworthy, and supportive, as well as to demonstrate respect for the team and its members. It is critical to foster a compassionate work atmosphere, which includes the capacity to collaborate well with other team members.
- Open communication and positive feedback - actively listening to team members' problems and needs and showing appreciation for their contributions help foster a productive work environment. Members of the team should be open to offering and receiving constructive criticism and providing real feedback.



- Appropriate team composition is critical to the success of any team. Team members must be completely aware of their assigned team role and understand what is expected of them in terms of team and project contributions.
- Commitment to team processes, leadership, and accountability - team members must accept responsibility for their contribution to the team and project. They must be knowledgeable about team processes, best practices, and innovative ideas. Effective leadership, including collaborative decision-making and problem-solving, is critical for team success (Tarricone and Luca,2002).

## 2.2. Advantages of Teamwork

Technical reading and writing, applied physics, statistics, logic, problem-solving, listening and spoken communication abilities, critical thinking skills, decision-making, and group and teamwork skills are all areas where educational deficiencies exist. As may be predicted, all institutions seek personnel who possess fundamental academic abilities and problem-solving abilities. Along with these fundamental talents, interpersonal and teamwork abilities were deemed necessary.

(Bensimon & Neumann, 1992) and (Land & Innis, 1994) identify the following as necessary skills:

1. Effectiveness of the organization and leadership abilities
2. Interpersonal skills, such as bargaining and collaboration
3. Personal competencies such as self-esteem, aim setting, and motivation, as well as employability and career development competencies.
4. Ability to think creatively and solve problems
5. Interpersonal communication abilities, including active listening and spoken communication
6. Mastering the art of learning
7. Aiding in cognitive complexity.
8. Assisting in the provision of help by teams.
9. Helping improve accountability.

## 2.3. Disadvantages of Teamwork:

Recent research finding by (Crebert & Webb, 2011) Using teamwork has some disadvantages such as:

1. Not all students acquire comprehensive knowledge of a subject, particularly when tasks and responsibilities are segmented.
2. Some students want to work independently and be evaluated.
3. The existence of a greater degree of danger, as the degree of uncertainty is greater than in a typical classroom environment
4. .If students lack proper help, they may feel as though they have been 'thrown in at the deep end.
5. Some students don't know their real level
6. If an aggregate group grade is assigned, individual grades may be influenced.
7. Some team members prefer to dominate others and can hijack agendas.



## Second: Previous related studies:

The researchers searched at many previous studies related at (PLTL) strategy such as the study of **Snyder (2012)**, aim to determine the possible effects of the Peer-Led Team Learning (PLTL) teaching paradigm on the critical thinking abilities of undergraduate biology peer leaders. The study included participants in both the treatment and control groups. Nearly 600 students were contacted through email before the start of the Spring 2011 semester. independent t-tests were used to compare students' achievement as shown by their grades in an introductory biology lesson. The results of this study indicated that there were no statistically significant variations in critical thinking abilities (Snyder, 2012).

And (**Kaveh, and Tabatabaei, 2014**) study aimed to determine the influence of a peer-led training program on female students' self-esteem at Shiraz public secondary schools. The sample consisted of 223 female second-graders in secondary schools in Shiraz. They were randomly allocated to the experimental and control groups; 115 students in the experimental group and 108 in the control group. A multi-stage cluster random sampling method was used. SPSS, version 14, was used to analyze the data. The results of this study indicated that the average self-esteem and sub-criteria scores in test groups were significantly different from those in control groups when the PLTL technique was used (Kaveh & Tabatabaei, 2014).

**Eren, şışman and Geban (2018)**, study aimed to evaluate the exam performance of freshmen engineering students taking a general chemistry course using a peer-led team learning paradigm to that of traditional learning. This study used a sample of 128 students. Due to the usage of PLTL techniques, wherein controlled groups are taught by traditional yet experienced groups. As a result of the statistically significant interaction effect, it was discovered that low and medium achievers' general chemistry exam grades were statistically higher in the PLTL group than in the traditional group; however, there was no statistically significant mean difference in high achievers' scores between the PLTL and traditional instruction groups (Eren, şışman & Geban, 2018).

**Zorlu & Zorlu (2020)** study, investigate the influence of adopting a Peer-Led Team Learning Instructional Model (PLTL) on the teaching of simple electrical circuits to prospective primary school teachers using the seven principles of effective practice. This inquiry used an experimental design. The study enrolled prospective teachers at the sophomore level from a public university's Department of Primary School Teaching. The control group did an open-ended experiment, whereas the experimental group did a PLTL experiment. The data were collected by using the "Seven Principles Opinion Scale for Good Practice" (SPOS). Pre- and post-tests on EG1 and CG were done using the SPOS. According to the post-test, experimental groups that used the PLTL outperformed the control group on the following principles: "Encouraging Student-Faculty Contact," "Encouraging Student Cooperation," "Respecting Diverse Talents/Ways of Learning," "Encouraging Active Learning," and "Prompt Feedback." The PLTL is effective in meeting the objectives of the seven standards of good practice (Zorlu & Zorlu, 2020).



**Lamina (2020)**, the aim of this study was to determine the effect of Peer-Led Team Learning on student achievement and engagement in Chemistry during the second quarter of the 2019-2020 academic year. The participants in this study were Grade 9 students, totaling 36. This study employed a pre-experimental design with a single group. The results indicate that there was a substantial change in the mean scores of students' chemistry achievement and engagement before and after their exposure to Peer-Led Team Learning. (Lamina, 2020).

**Regarding the previous studies related to Team Working Skills, the researcher searched in an number of studies, such as: Seymour (2013) study**, which aimed to investigate how a PBL curriculum impacted the development of team-working skills and how it prepared the students for professional practice for working as part of a team on the completion of the course. The sample in this study consisted of 10 occupational therapy students. The study used a qualitative method of open, in-depth interviews, The interview data were analyzed using thematic analysis, and four key themes relating to the team working were identified, namely socio-emotional skills; the arena; the process; confidence. The findings demonstrated that aspects of a PBL curriculum impacted the development of team-working skills from the students' perspective (Seymour, 2013).

And **Al-Sawi (2019) study**, that aimed to determine the efficacy of the cube technique in developing fifth-grade students, their abilities in historical imagination and their attitudes toward collective work. The study employed a quasi-experimental design and enrolled 60 fifth-grade students as participants. To accomplish the study's objective, the following instruments and materials were created: (Historical Imagination test & scale of Attitudes towards group work). The study concluded that there were statistically significant differences at the 0.01 level between the mean scores of the study group on both the historical imagination test and the scale of attitudes toward group work during pre-post testing, favoring post-testing (Al-Sawi, 2019).

**While, Al-Fanjari et al (2019) study**, aimed to improve the teamwork of middle and eighth-graders by preparing a teaching unit in technical education that used collaborative learning application skills to help them learn. A group of 60 students was chosen as the target sample, divided into 2 groups with 30 students in each group. Descriptive and semi-experimental approaches were used in the study. Collaborative learning was used to improve the collective work of the people in the research sample by learning from each other. Research tools included an arbitration form to show how important the elements were in planning the technical activity of the teaching unit, the main structure of the subject of the activity, the note card of cooperative behaviors of the students, and an educational test to show how well students did in the technical aspect of the subunit. The result in this study indicates that, there were significant statistically differences at experimental group and control group, which using collaborative learning to improve the collective work on the performance of the middle eighth graders in Kuwait is great for the experimental group (Al-Fanjari, et al 2019).



**Fazari et al (2019)**, study aimed to find out how well the guidance program worked at improving the teamwork skills of 11th graders. The sample included 120 students, who were split into two groups: experimental and control. Each group included 60 students. The students in the experimental group had the career guidance program, while those in the control group did not have any treatment. The results showed that the average responses of the experimental group and the control group on all dimensions of the teamwork skills scale were significantly different in the post-application. In favor of the experimental group. There were statistically significant differences between the males and females on some dimensions of the teamwork skills scale, but the interaction between gender and the group was not statistically significant. There were no statistically significant differences in the average scores of the experimental group on the post-implementation and follow-up tests (Fazari et al 2019).

### 3. Methodology

#### 3.1. The Experimental Design

Before starting any experimental study, an appropriate experimental design should be selected to check the validity of the results derived from the hypotheses. The choice of the experimental design is advantageous to the research as it guarantees the proper structure and the appropriate strategy that control the researcher's investigation and enables arriving at the results which can be relied on to answer the research questions (Nabi & Haji, 2022).

Therefore, the researcher has adopted the experimental design of equivalent groups as it fits the current research and achieves its objectives. This design includes two groups that are equivalent in terms of several variables (Beins,2012). The first group, an experimental was taught according to Peer - Lead Team Learning (PLTL), while the second one, the control was taught according to the traditional method. The experiment includes a pre-test and post-test of the Team Working skills and only the post-test for academic achievement, as shown in figure (3.1):

Group	Pre-test	Independent variable	Depended variable Post-test)(
Experimental	Team Working skills	Peer - Lead Team Learning	- Academic Achievement - Team working skills
Control		Usual Method	

**Figure 3.1 The experimental design of the research**

#### 3.2. Research Population

The research population is represented by all seventh-grade female students in the basic schools with high schools in Soran independent administration, their numer (633) for the academic year (2021-2022). There are 3 basic schools and 4 high schools for girls.



### 3.3. Research Sample

The researcher chose (Shahin basic school) purposefully to apply the experiment as the researcher was knowledgeable about the school's administration who expressed willingness to cooperate with the researcher and provide the necessary facilities to conduct the research experiment. Added to that, this school had more than one class of the seventh-grade basic who were not subject to the distribution of any condition. Also, the students in this school were almost identical in terms of the social, economic and cultural conditions. This assisted the researcher to fix some variables between the two groups for the sake of equivalence bearing in mind that the researcher got formal permission from the Directorate of Education of Soran.

The researcher visited the school. There were 2 groups of seventh basic grade. The teaching methods were randomly distributed among the groups. Then the sample was randomly selected from the groups. Group B was chosen to be the experimental group which included (28) students who were, taught according to (PLTL). Likewise, group (D) was selected as the control group which included (30) students who were taught by the usual Method. On this basis, the total number of students selected as sample was (58) as shown in table (3.1).

**Table 3. 1**

**The distribution of the members of the research sample over the two groups**

Class	Group	Teaching Method	Number of students
B	Experimental	PLTL	28
D	Control	Usual Method	30
<b>Total</b>			<b>58</b>

### 3.4 Procedure of the Equivalence of the Two Research Groups

The researcher managed the equivalence between the two research groups on several variables that were specified to affect the two dependent variables and consequently the results of the research and their accuracy. The researcher relied on testing these variables by some previous studies and related literature. The variables are as follows:

#### 1. Chronological Age:

The chronological ages of the students of the two groups of research were calculated in months until 1/10/2021. To verify the equivalence between the two groups of research in this respect, the researcher extracted the average lifetime of the experimental and control groups. The average age of students in the experimental group was (150.214) months, and in the control group (151.800) months. To determine the indication of the difference between the two averages, the researcher used a T-test for two independent samples. The calculated T- value (0.378) is less than the scheduled T-value (2.021) at the level of significance (0.05) and the degree of freedom (56). This indicates that there is no statistical difference. As such, the two groups were equal in terms of the chronological age variable, as shown in table (3.2).



**Table 3.2**  
**The arithmetic mean, and standard deviation, the calculated and scheduled values (T) for the two groups of research in terms of the chronological age variable**

Group	Number of students	Arithmetic mean	Standard deviation	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	150.214	10.093	0.378	2.021d	Not significant statistically
Control	30	151.800	19.928			

## 2. Intelligence Degree:

The researcher applied the IQ test prepared by (Ahmad Zaki Saleh), and adapted to the Iraqi environment by Al-Qazzaz (1989). It included (60) illustrated items with degrees ranging from 0 to 60. After collecting the answers of the students of the two research groups, the results showed difference was not statistically significant, as the calculated T value (0.045) was less than the schedule T- value (2.021) at the significance level (0.05) at the degree of freedom (56). This means that the two groups were equal with regard to the IQ. Consider table (3.3).

**Table 3.3**  
**The arithmetic mean, the standard deviation, and the calculated and scheduled T- values for the two groups in the IQ test**

Group	Number of students	Arithmetic mean	Standard deviation	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	33.821	7.693	0.045	2.021	Not significant statistically
Control	30	33.900	5.622			

## 3. Academic Achievement in Science subject of the sixth Basic class:

The researcher obtained the students final marks of the general science subjects which were studied in the seventh grade for the academic year (2020-2021) from the record school grades, the test showed that there were no statistically significant differences as the calculated T-value (0.231) was less than the scheduled T- value (2.021) at the level of significance (0.05), a degree of freedom (56). This means that the two groups are equal in terms of the prior knowledge of the subject material as shown in table (3.4).





**Table 3.4**  
**The arithmetic mean, the standard deviation, and the calculated and scheduled T- values for the grades of the two groups of research in science for the sixth basic class**

Group	Number of students	Arithmetic mean	Standard deviation	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	71.036	3.228	0.231	2.021	Not significant statistically
Control	30	70.033	2.911			

#### 4. The Overall Average Degree for Students of the two Research Groups for the Sixth Basic Class

The researcher obtained the general average score of the students in the two groups in the sixth basic grade from the school records. The result showed that there were no statistically significant differences as the calculated T-value (0.286) was less than the scheduled T- value (2.021) at the level of significance (0.05) and the degree of freedom (56). On this basis, the two groups are equal in terms of the prior knowledge of the subject material, as shown in table (3.5).

**Table 3.5**  
**The calculated mean, standard deviation, calculated and tabulated T-values for two research groups in the overall rate**

Group	Number of students	Arithmetic mean	Standard deviation	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	71.643	11.046	0.286	2.021	Not significant statistically
Control	30	72.500	11.729			

#### 5. Parents' Educational Attainment

##### A. Fathers

The researcher conducted statistical analyses by applying Chi-square ( $\chi^2$ ) on the data of the educational attainment of student's fathers. The results showed that the calculated value of the chi-square (0.08) was less than its scheduled T- value (3.841) at the level of significance (0.05) and a degree of freedom (1). As such, the two groups were equal in terms of fathers' educational attainment, as shown in table (3.6).



Table 3.6

The educational attainment of students' fathers the two research groups and the calculated and scheduled value of the chi-square

Group	Number of students	Fathers' Educational Attainment				$\chi^2$ value		Fathers' Educational
		Primary and below	secondary	High school	Institute and higher	Calculated	Scheduled	
Experimental	28	15	3	7	3	0.08	3.841	Not significant statistically
Control	30	15	6	4	5			

#### B. Mothers:

The researcher conducted the statistical analyses by applying Chi-square test to the data of the students mothers' educational attainment of the two research groups. The results showed that the calculated value of the Chi-square (0.03) was less than its scheduled value (5.991) at the level of significance (0.05) and degree of freedom (2). ON this basis, the two groups were equal in terms of mothers' educational attainment, as shown in Table (3.7).

Table 3.7

Students' mothers' educational attainment of the two research groups and the calculated and scheduled values of the chi-square

Group	Number of students	Students Mothers' Educational Attainment				$\chi^2$ value		Significance level (0.05)
		Primary and below	secondary	High school	Institute and higher	Calculated	Scheduled	
Experimental	28	14	7	5	2	0.03	5.991	Not significant statistically
Control	30	15	8	7	--			

#### 6. Team working Scale:

The researcher applied a team working scale which was prepared for this purpose to the students of the experimental and control groups. The results showed that there is



no statistically significant difference. As such, the two groups are equivalent in terms of this variable, as shown in table (3.8).

**Table 3.8**  
**The calculated mean, standard deviation, calculated and scheduled T-values for two research groups on the team working scale**

Group	Number of students	Arithmetic mean	Standard deviation	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	173.464	25.356	0.200	2.021	Not significance statistically
Control	30	172.2000	22.803			

### 3.5 Research Tools

Bringing about the aims the research required the preparation of two tools, namely an academic Achievement Test and the Team working Scale.

#### 3.5.1 Academic Achievement Test

##### A. Preparation of Specifications Schedule (Test Map):

Unit	Chapter	Number of pages	Importance of the content	Importance of behavioral objectives			Total test items 100%
				Remembering %32	Understanding %46	Applying %22	
A	1	16	14%	1	2	1	4
	2	24	21%	2	3	1	6
	3	16	14%	1	2	1	4
B	4	21	19%	2	3	1	6
C	5	14	12%	1	2	1	4
	6	22	20%	2	3	1	6
<b>Total</b>		<b>113</b>	<b>100%</b>	<b>9</b>	<b>15</b>	<b>6</b>	<b>30</b>



## B. Test Items:

The researcher formulated the test items of the multiple-choice type in a way that makes them conform to several features, namely the comprehensiveness for the content and the full objectivity in assessing the degree and measuring it for multiple objectives (Haladyna, 2004)

Therefore, the researcher prepared an initial formula of the test, which included (30) items of the multiple-choice type. Each item had four alternatives, with instructions explaining how to answer the test. And tested it is validity and reliability.

### 3.6. Team Working Scale

Since one of the aims of the current research is to identify the impact of the use of (PLTL) on the development of Teamwork, the researcher prepared a scale for team working on the basis of the following considerations:

- The scales obtained by the researcher from previous studies are designed for environments that are different from the environment of the current research community.
- Insufficiency of the scales that measure team working and do not meet the purpose of research - as far as the researcher knows. Therefore, the researcher prepared a special scale for that.
- Innovating a scale of the team working that can be used by other researchers in Iraq generally, and in Kurdistan Region of Iraq in particular, and in cases similar to the nature of the current research.

For the previous considerations, the researcher prepared the items of the scale, according to the following procedures:

- A. Reviewing the available literature related to direct and indirect team working, such as (Che Hassan, 2015),(Grack Nelson, 2018), and (Tools, 2016).
- B. Reviewing previous studies that dealt with the team working, such as (Ismail and Abdel Moneim 2021), (Al-Fanjari, et al 2019), (Al-Saw, 2019), (Seymour, 2013).
- C. Consulting several experienced specialists in this field and adding several items suggested by them.

In the light of the preceding procedures, the researcher prepared a preliminary version of the team working test including (40) items. Each paragraph had five alternatives to answer according to instructions explaining the way to answer. And the researcher tested it is validity and reliability.

### 3.7 Preparing Teaching Plans

In view of the content of the educational subject to be taught during the first semester taking into consideration the duration of the experiment, (48) teaching plan were prepared on the basis of the specific behavioral goals and educational material for the two experimental groups according to the (PLTL), and the control group according to the usual method. A copy of all the plans was presented to a group of arbitrators with expertise in the field of teaching methods, educational and psychological sciences, history, material supervisors, and teachers, to state their opinions about the plans, the extent to which their contents were matching the steps of each of the two methods,



and their suitability for behavioral purposes. The panel of juries' notes and observations were taken into consideration and the plans were put in their forms.

### 3.8 Procedures for Applying the Experiment

After completing the requirements of the experiment, the researcher started the following procedures:

1. Starting the experiment at (Shahen Basic School of Girls) on 2/10 /2021 until 19/10/2019. This period was allocated for conducting the parity procedures between students of the two research groups, doing a pre-application of the test of contemplative thinking and arranging the scheduled study for the researcher with the school administration.
2. The actual teaching of the two research groups started on 20/10/2021 and ended on 24/12/2021, with a full semester of the academic year (2021-2022). As such, the application continued for a period of (10) weeks.

### 3.9 Applying the Research Tools

After completing the application of the experiment, the researcher started applying the two research tools to the students of the two groups. She supervised them herself with the assistance of the subject teacher in the school according to the below application processes:

#### 1. Academic Achievement Test:

The researcher applied the academic achievement test to the students of the two groups on the same day and date 23/12/2021. The students were informed one day before the date of the test.

#### 2. Team working Scale:

The team working test was applied to the students of the two groups on the same day and date 25/12/2021, with prior notification.

### 3.10 Correcting the Research Tools

After completing the application of the research tools, the researcher devoted her time to correct the answers of the students of the two groups as follows:

#### 1. Academic Achievement Test:

The researcher corrected the answers of the students of the two groups depending on the correction key which was prepared for this purpose. Score (1) was assigned to each correct answer and (0) for the wrong, blank and more than one option answers.

#### 2. Team working Scale:

The researcher corrected the student's answers on the scale and gave the alternatives (Never applies to me, rarely applies to me, sometimes applies to me, most of the time applies to me, always applies to me) the weights (1, 2, 3, 4, 5) respectively. T the students' score on the scale ranged between (40-200) degrees.



## 4. Data Analysis And Discussion

### 4.2 First Hypothesis

The First Null Hypothesis states: **"There is no statistically significant difference in the significance level (0.05) between the average degrees of the students in the experimental group which was taught according to the (PLTL) and the average degrees of the students of the control group which was taught according to the Usual Method in terms of the Academic Achievement"**.

To verify the validity of this hypothesis, the mean and the standard deviation of the students' scores of both experimental and control groups of the applied post-test of the Academic Achievement Test were calculated, and the t-test for two independent samples was used.

It is obvious that the calculated T- value (0.856) is less than the scheduled T- the value (2.021) at the significant level of (0.05) and (56) degrees of freedom. This means that there is no significant statistical difference between the average score of the experimental group students and the average score of the control group students. As such, the first null hypothesis is accepted and the alternative hypothesis is rejected. Consider table (4.1).

**Table 4.1**

**The arithmetic means, the standard deviations, and the calculated and scheduled T-values for the two research groups in the Academic Achievement posttest**

Group	Number of students	Arithmetic mean	Standard deviation	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	15.393	3.764	0.856	2.021	Not significant Statistically
Control	30	16.267	3.991			

This indicates that the experimental group which was taught according to the (PLTL)) benefited from its crucial effectiveness in the academic achievement in the science subject of seventh-grade students compared to the control group which was taught according to the usual method. This also evident from the grades of the students in the two groups, consider chart (4.1).

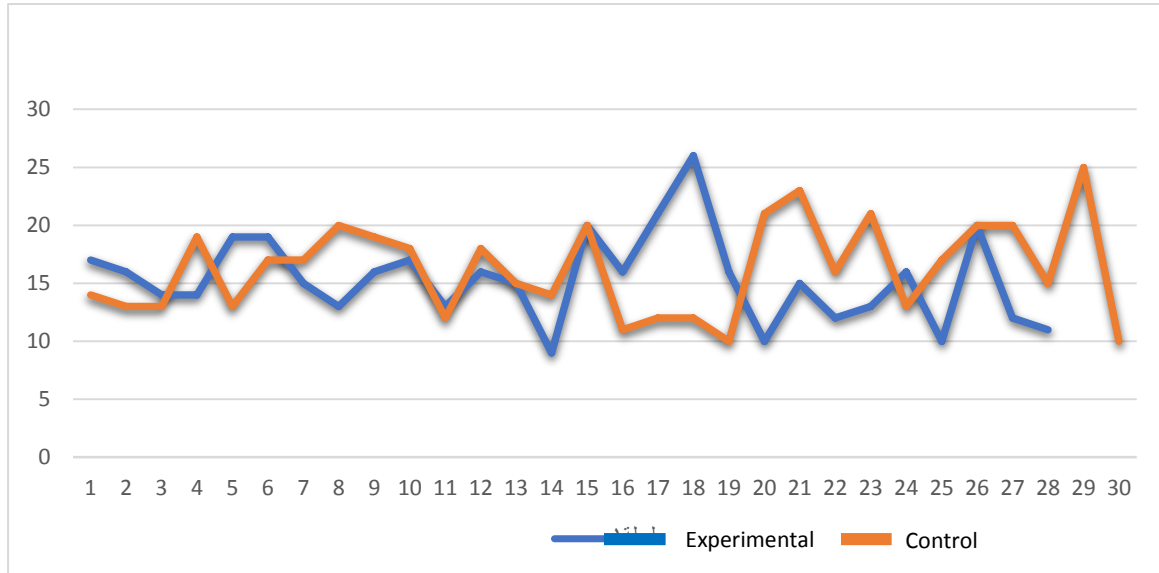


Chart 4.1

#### Degrees of students in the experimental and control groups in the academic achievement test

The researcher attributes the results of the first hypothesis to:

1. Inappropriate school environment for implementing new teaching methods represented by the lack of an appropriate teaching milieu especially in terms of the way students are organized and taught.
2. Lack of advanced information on subjects because of the delay in starting teaching due to effects of Covid 19 Corona).
3. Lack of competition between students to get high grades.
4. Some students feel ashamed when they take over the role of the leaders and in such a way that makes the obtained information incomplete.
5. No preparation of homework by some students. Notpreparing homework by a part of the students and their support to the other members of their group made the level of their grades in the exam low.
6. Students' anxiety during the exam leads to low academic achievement scores.
7. Lack of specific goals and necessary plans by students to prepare for the exam.

The results of this study vary from the findings of the study by Eren-şişman and Geban (2018) that there are no differences between the experimental group and the control group in the academic achievement test by using this method of teaching. This is on one hand, On the other hand, these results agree with those arrived at in the studies by Lamina (2020), Chan and Bauer (2015), Snyder (2012), Quit Adamo, and Crouch (2009). They further confirm the superiority of the experimental group over the control group in the academic achievement test, in terms of using peer-led team learning with another variable in teaching to increase the academic achievement.



### 4.3 Second Hypothesis

The Second Null Hypothesis states: **"There is no statistically significant difference at the significance level (0.05) between the average difference of the students' degrees of the experimental group which was taught according to the (PLTL) and the average difference of the students' degrees of the control group was taught according to the Usual Method in developing Team working skills"**.

To validate this hypothesis, the mean and the standard deviation of the scores of the two research groups in the pre and post-tests of the Team working Scale were found out. The results show that there is a difference between the average variations of growth in Team working among the students of the two research groups. To test the significance of this difference, the t-test is used for two independent samples. The results are as shown in table (4.2).

**Table 4.2**

**T-test results indicating the average variations between growth differences mean in Team working skills for both groups**

Group	Number of students	Mean of differences	Standard deviation of differences	T value		Significance level (0.05)
				Calculated	Scheduled	
Experimental	28	14.929	29.311	7,733	2.021	Statistically significant
Control	30	2,2	45,942			

It is clear from Table (4.2) that the calculated T value (7,733) is higher than the scheduled T- the value (2.021) at the significant level of (0.05) and (56) degrees of freedom. This means that there is a difference between the average degrees of development Team working between female students of the experimental group and students of the control group for the benefit of the students of the experimental group. This in turn means that the (PLTL) has more effectiveness in developing Team working skills with a significance in comparison with the usual Method. This rejects the second null hypothesis and the alternative hypothesis is accepted. See chart (4.2):



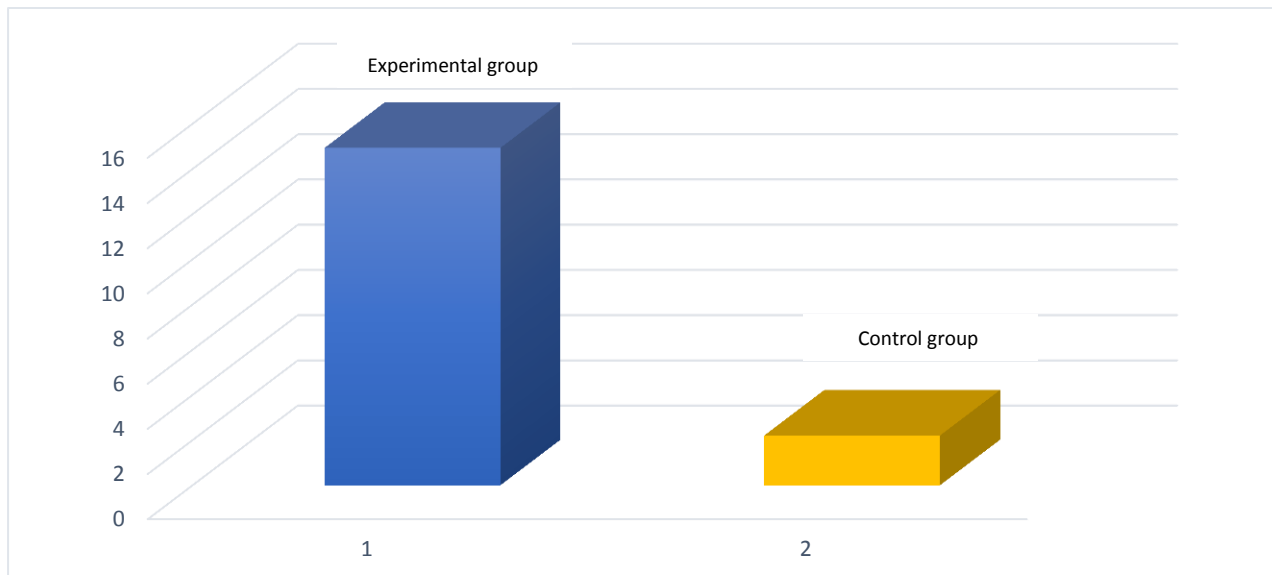


Chart 4.2

#### Comparison between the average difference between the degrees of female students of the experimental group and control group in the Team working Scale

The researcher attributes the experimental group students' better performance than the control group students to the influence of the independent variable used with the experimental group, which includes many activities that in turn helped in the development of Team working of the students of the experimental group. These activities are among the requirements of the development of students' team working side by side with the strategy used with the experimental group.

This result may also be attributed to the fact that the (PLTL) contributed easily to the development of students' collaboration, by making them focus on the thoughts and think about them, and also significantly to the development of Team working skills by making them look at the existed sources of information within the interactive environment of the reflected classroom, which is, in turn, helps more in developing students' cognitive awareness. Another reason for developing the skills of working together is due to students' desire to graduate on the basis of traditional teaching which focuses more on individual learning.

Moreover, this result may be attributed to the fact that the use of the PLTL model has led to the creation of communication between students to share information collectively. Also, students' participation in this teaching model has led to a decrease in students' feelings of self-desire, and an increase in feelings of cooperation between them. Added to that, learning in the light of the (PLTL) helps students use of team formation and question paper for any group in the PLTL model made students feel like working together to develop.

The result agreed with those arrived at in the studies by (Seymour, 2013), (Sulaiman and Abdul Latif, 2016), (Sanyal & Hisam, 2018) which all confirm the mastery of the



experimental group over the control group in the development of Team working skills due to the use of various programs, strategies and teaching methods so as to develop Team working skills.

## 5. Conclusions, Recommendations and Suggestions

### 5.1. Conclusions

In the light of the results of the study, the researcher could draw upon the following conclusions:

1. The (PLTL) showed that it has no significant impact on the increase in the achievement of seventh - grade students, yet it plays a key role in improving the working team of experimental group students.
2. The students of the experimental group showed motivation and enthusiasm in following up the implementation of the steps and the procedures of the (PLTL) as well as revitalizing the spirit of cooperation and team working.
3. The new situation which is created by the (PLTL) made the science lesson interesting and removed some misconceptions about the science subject as a difficult and boring subject in comparison to the rest of the subjects.
4. Using (PLTL) in science subjects has created perceptible interest and noticeable attention among the students.

### 5.2. Recommendations:

Based on the results, the researcher recommends the following:

1. Setting the theoretical framework and applied procedures for the (PLTL) within the topics of general teaching methods, and particularly in methods of teaching science at the colleges of education and basic education.
2. Encouraging science teachers to pay more attention to the development of Team working through teaching science, as it helps in developing the personality of the learner in its various aspects.
3. Undertake additional studies using the greater sample to verify the results of the study.
4. Repeat this study using other grade level or in another learning part to assess the usefulness of PLTL.

### 5.3. Suggestions for Further Research:

Complementing the current research, the researcher recommends the following future studies:

1. A study on the effect of (PLTL) on developing other dependent variables such as the habit of minds and tendencies towards science subjects.
2. A comparative study between male and female students in terms of the same independent variable and variables related to the current research.
3. Practicing a similar study on the biology subject at the preparatory stage.



4. Conducting similar studies in different environments and studying materials.
5. Replicating this study with a different grade level or in a different learning area to find out how well PLTL works.
6. Conduct more PLTL research studies on other subjects in the Literatures to get a better idea of how well PLTL works.

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