



The Impact of STAD Strategy on the Academic Achievement of Eighth-Grade Students in Sciences Subject and Developing their Scientific Trends

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ABSTRACT

This research aims to introduce “The Impact of the STAD Strategy on the Academic Achievement of Eighth-Grade Students in Science subjects and Develop their Scientific Trends”. The researcher has constructed two null hypotheses, to reach the objectives of the research. The research's population was limited to eighth-grade basic students at (Delzyan Basic School for Girls) in Soran District the academic year's second semester (2021 - 2022). The research sample has been purposefully chosen. The research included an experimental setup with two groups: an experimental group and a control group, as well as pretest and posttest for the variable (Scientific Trends) and posttest for the variable (Academic Achievement). As a result, the STAD method was used to instruct the experimental group, while, the traditional teaching techniques were used to instruct the control group. The sample of this research consists of (41) students, distributed between two groups; the experimental group includes (21) students, and (20) students in the control group. The equality between the two research groups was tested in a variety of ways. The researcher created two research tools, the first of which consisted of (30) multiple-choice question items to assess the student's academic achievement. The second instrument, which consists of 38 items, is used to assess students' attitudes about science. The tools' authenticity and dependability have been validated. The data was analyzed and the result was obtained using statistical software (SPSS version 25). The results revealed that neither group's students had substantial achievements. In light of the research's findings, the researcher came to the following conclusions: STAD strategy has not affected eighth-grade students' academic achievement in the experimental group according to science subject, at the other hand, it has been of great importance in changing the trends of female students toward science positively.

Keywords: STAD strategy, Scientific Trends, Academic Achievement, Science Subject, Multiple-choice.



Introduction

Science is not a new concept around the globe. It is man's intellectual legacy that has come down to us. Since man became aware of his surroundings and began to ponder the natural events in which he found himself immersed. This knowledge of the physical world changed not only his environment but also his viewpoint and response to the difficulties he faced in his daily existence. Up to the Middle Ages, science made rapid advances, owing primarily to the intellectual curiosity of bright individuals who worked largely alone in their specialties. Scientific knowledge had little influence on the common man back then, but with the turn of the century, even the man on the street has become aware of the impact of science on the new age of science and society (Islam Pitafi, Farooq Principal and Khadizai, 2012, p379).

Science progresses at a breakneck pace, and the growing number of researchers and scientific papers in a variety of fields reinforces this trend. We believe that this phenomenon of scientific evolution merits further investigation (Farber and Jatowt, 2019, p132). Models and simulations are frequently used in science to aid in the development of explanations for natural events (NGSS Lead States, 2013, p3).

Experiments are responsible for a lot of scientific development. Actively managing the stream of experiments has accounted for a significant portion of the tremendous progress in knowledge in the fields. The impact of any change in conditions will be illuminated through observations or measurements (Shabbir, Sarwar and Kausar, 2014, p46).

Education continues to play its essential role in generational education, and the means and methods of education may vary in the upbringing and social formation of human beings, and if education works for society, it works in the field of its cultural function through which human beings can be formed, through the subjects and activities it offers to make society mature and productive with concepts and perceptions, capabilities, values and directions. However, it has been found that schooling often does not establish meaningful practices, as it has been shown that knowledge of laws, information, and theories is mobilized in textbooks, where this information is provided in model knowledge units and hierarchical hierarchies that claim the truth and are separated from reality (Kabbaja, 2014, p204).

Education is the foundation for all progress, and one of the main objectives of education is to instill a scientific mindset in students. Science education purposes define the desired changes in student behavior that can be achieved through the teaching-learning process. it is vital to instill a scientific temperament in pupils to assist them to develop the habit of thinking in a specific way, acting on information received, and formulating claims with adequate proofs (MHRD, 1998, p6)

It's no secret that education is among the most crucial parts in any country's progress. Rather than the size of the people, the success of education determines a nation's progress. Today and in the future, via education, raise the standard of human



resources will be the biggest challenge in Indonesian education. Education is crucial in molding the quality of human resources, hence it's important to keep enhancing the quality of education to keep up with the times (Ida and Erianjoni, 2019, p328).

The teaching method is a communication way that teachers use to deliver the curriculum to students. The modern teaching method is a more active method that can encourage students to meaningful learning and helps students to express his or her opinions. Changing lifestyles and students' demands needed to use a different way to learn, for instance developing technology allows a teacher to use modern and effective teaching methods.

Direct instruction, lecture, cooperative learning, inquiry-based learning, seminar, and project-based learning are some fundamental teaching paradigms, while there are many others. Teaching strategies or underlying ideas that inform teaching strategies are known as teaching models. Research and theory in education applied to modern classroom techniques. Each model is the result of extensive research into teaching and learning (Bruce Joyce, Marsha Weil, 2011, p401-439).

A cooperative model of learning is one style of learning that incorporates students actively in the learning process (Trianasari *et al.*, 2019, p92). Many educational approaches employ cooperative learning as an umbrella word such as Teams Games Tournaments, jigsaw, and STAD. Collaboration at its finest occurs when students are taught in small groups and work together to enhance their own and each other's education. The group's education is based on clearly defined goals or difficulties (Ferina, 2018, p32).

One of the most fundamental techniques for group learning is the STAD strategy, emphasizing student interaction to motivate and assist one another in acquiring subject matter and achieving a common objective (Ghaith, 2001, p294; Slavin, 2006, p1).

Student Teams Achievement Division (STAD) was founded by instructional pedagogy (Richard M. Felder and Brent, 2005, p90). Which is a form of team learning consisting of (4 or 5) students who, in terms of their gender, and ethnicity, race, or academic performance, are a representative sample of the class (Chim, 2015, p30). In the STAD strategy, the teacher gives an experience, and then the students collaborate in groups to ensure that everyone has grasped it. Last but not least, all students take separate quizzes on the content, at which point they may not be able to support one another any longer (Slavin, 2006, p4). Scores are compared past averages to students', and depending on how much students improve or surpass their prior performance levels, points are given. These scores are then added up to create a team score, and teams who meet specific criteria may earn certificates or other awards. The group reward depends on each group member's learning progress. This means that a team's success depends on how well each member learns (Slavin, 2006, p5).

When it comes to science, it's a systematic technique to investigate and understand the fundamentally practical universe." Science has been characterized in a variety of ways over the centuries. In other words, it's a method of thinking and a way of looking at



the world. Scientific knowledge is based on observation and controlled experiments (Bhattacharjee, 2015).

Science is a vital element of our daily routines and lives. Rationally using science and scientific thinking is what scientific vision is. Scientific attitude can only be acquired by scientific vision. Incultation of scientific trends becomes the most crucial goal of our education' Curriculum, textbook content, and diverse instructional experiences are designed to achieve this goal (Messaoudene, 2010).

Academic achievement, in general, refers to a student's current level of learning. For ESSA accountability, academic achievement refers to the percentage of students at a school who are currently meeting or exceeding their grade-level standards. This achievement is measured through statewide math and reading tests. Science achievement is also measured through state assessments, but science assessments will not be used for accountability under ESSA (Minnesota Department of Education, 2017).

Academic achievement encompasses the communicative reading, writing, and oral, scientific, social science, mathematical, and cognitive capabilities and skills that help students flourish in school and in society. Most researchers have relied on a more restrictive definition that is mostly restricted to the results of standardized achievement tests because these sorts of achievement are challenging to evaluate. Academic attainment refers to achievement in content areas such as science (e.g., biology, chemistry, and physics). While standardized tests are used in many of the studies in this chapter to evaluate academic performance, some studies employ more broad measures of academic success, such as grade point average (GPA), high school dropout rates, and attitudes toward education and education-related topics (Kathryn Lindholm-Leary and Graciela Borsato, 2006).

Scientific trends are one of the main axes of the process of scientific and social development based on the principles of fruitful dialogue that pushes social forces to a dead end because of their inability to reach specific points of disagreement to develop central concepts by which the freezing of development situations allows for an exchange of views in different positions (Jalil, 2018).

Scientific trends are a strategic goal in scientific education (Najdi et al., 2003), where educational studies and research indicate the ability of science teachers to act a crucial role in the development of scientific trends among students, but the educational reality indicates the lack of interest of teachers in this emotional aspect, whether in the planning or implementation of classroom activities (Zeitun, 1988; Abdallah, 2006).

In today's scientific educational world, the necessity of conducting scientific attitude, scientific aptitude, and scientific understanding are critical characteristics in determining the learners' quality and also significant in masterminding the experimental research. The worth of learning science is even more vital in the situation of today's scientific society, as it enables learners to make substantial contributions to the nation's progress (Gehlawat & Gupta, 2013).



Problem of the Research

Science subject is difficult to learn because it contains many abstract concepts that must be clarified and rounded in the learner's mind for him to understand, and learn them. The science subjects are hierarchical, and they have not been learned thoroughly enough to be referred to and used to understand and learn new topics.

STAD is one of the main crucial and modern strategies of teaching in education, especially in science subjects which include, physics, chemistry, biology, geology, etc. So, the Ministry of Education in Kurdistan have to promote teachers to use modern method, model, strategy, and so on.

The problem with the current research is: -

- The researcher attempts to find out the impact of the STAD on the academic performance of the concepts of science.
- The methods used to teach this subject may not satisfy the requirements of the academic community.

The research tries to find the response to this query:

What is the impact of the Student Team -Achievement Division (STAD) on the academic achievement of eighth-grade basic students in the science subject and the development of their scientific trends?

Importance of the Research

There is some other importance of this study:

1. Try to highlight the students' level of understanding in Eight- grade.
2. It may help to improve educational models that lead to a more in-depth understanding of scientific knowledge rather than direct indoctrination.
3. This study could provide important information about STAD and its impact on teaching.
4. The significance of the intermediate stage, which occupies an important position on the educational ladder, as it represents the middle link between primary education on the one hand and preparatory education on the other.
5. The lack of a local study that examines the effect of the STAD on achievement and the development of understanding scientific attitude among students in middle school.

Objective of the Research

The objectives of this research are to identify “**The** impact of the Student Team - Achievement Division (STAD) in teaching the science subject according to eighth-grade basic students”, and to achieve the following objectives: Introduce the effect of exploitation (the STAD) strategy on the academic performance of 8th-grade basic students in the science subject. And also, introduce the effect of exploitation (the STAD) strategy on the developing scientific trends of 8th-grade basic students. Also, verification from the following hypothesis:



Hypothesis of the Research

First Null Hypothesis: There is no statistically significant difference at the level significance level (0.05) between mean marks students of the experimental group which is the study with the STAD strategy and mean marks students of the controlling group which is the study with the traditional method in academic achievement.

Second Null Hypothesis: There is no statistically significant difference at the level significance level (0.05) between the two mean marks students of the experimental group which is they study with STAD strategy in the (pre-post) test for scientific trends.

Third Null Hypothesis: There is no statistically significant difference at the level significance level (0.05) between mean marks students of the experimental group which is they study with STAD strategy and mean marks students of the controlling group which is the study with the traditional method in scientific trends.

Research Limits:

The following are the delimitation factors used in this study: The place where this research was conducted in the Directorate General of Education in Arbil, Soran Education Directorate. The research was conducted in the 8th-grade at Delzyan Basic School for Girls. Science was the field in which the approach and results were evaluated. The study was carried out in the second semester of the academic year 2021-2022.

Definition of the Research Terms:

Some terms need clarification within this research's argument of the STAD strategy. To grasp the links between the concepts and theories linked to the topic under examination, it is necessary to understand the definitions used in this study.

First: Strategy: 1. Jamel 2002: The instructor uses this system of practices and tools to help students take advantage of the intended educational experiences and accomplish their learning objectives.

2. Ibrahim 2010: Is the art of using the available capabilities and resources in an optimal way to achieve the desired goals.

3. Zair et al 2013: The range of methods, styles, and programs that are used in the class and using these concepts will be different according to the type of scientific materials to be taught.

Researcher definition of strategy: Is the development of a series of methods used in the classroom by the teacher to address the mental and cognitive to meet the aims of transmitting information to eighth-grade students.

Second: Student Teams Achievement Division (STAD):

1. Balfakih, 2003: The usage of diverse teams for practice and study. There are available subject-specific quizzes to earn team points. If they want their team to be



recognized, they must assist their classmates in learning the topic (Balfakih, 2003, p1).

2. Gray, 1918: Small groups of students are formed. A lesson is presented to the entire class, and the pupils are then tested on it. Individuals are evaluated based on their contribution to the success of the team. Even though the assessments are taken separately, students are urged to collaborate to boost the group's overall effectiveness (Gray, 1918, p204).

Researcher's definition: STAD is a kind of cooperative learning method, the researcher used this strategy to teach the experimental group regularly to facilitate the lesson and expand new ideas by using the steps of STAD strategy for Eight - graders by teaching science. According to the STAD strategy, the researcher: divided eight-grade students in the experimental group into five heterogeneous groups, each of which includes four or five students.

Third: Cooperative learning: 1. Zakaria and Iksan, 2007: is a training method in which students collaborate to attain a common objective. Many research has demonstrated that cooperative learning can increase the quality of the learning process. (Zakaria and Iksan, 2007, p36) .

2. Slavin, 2015: Teachers who use operative learning put their students within small groups and have them collaborate to study academic material (Slavin, 2015, p388).

Fourth: Academic Achievement

1. Spinath, 2012: Achievement in academics refers to a student's performance in intellectual domains taught in school, college, and university settings. Academic achievement is a measure of intellectual education (Spinath, 2012, p1).

2. Novo and Calixto, 2021: Academic achievement is defined as the quantitative and qualitative judgments of pupils' performance at school (Novo and Calixto, 2021, p8).

Researcher's Definition: Academic achievement is defined as a score that eight-grade students receive by selecting true answers to multiple-choice questions in a science subject, according it can evaluate students and decide about success or failure.

Fifth: Scientific trends

1. Gardner, 1975; Singh and Bai, 2017: Evidence-based thinking and debate, the desire for clarity and internal consistency, open-mindedness and skepticism, and the willingness to adapt when data contradicts their own opinions are all characteristics of a scientific mentality (Gardner, 1975, p13; Singh and Bai, 2017, p6231).

2. Reham-Shaker-Jalil, 2018: Defines the scientific trend as a state of individual mental structured readiness via students' previous experiences and led to certain guidance or influence in the individual's response to all things and attitudes. So, Rashid defines it as a set of mental preparations and preparations that form in the individual as a result of his previous experiences and make him engage in certain



behaviors of a special nature towards people, things, and opinions in terms of rejection or acceptance and the degree of such rejection or acceptance (Reham-Shaker-Jalil, 2018, p4).

Researcher definition of scientific trends: it is the result of the stated and measured responses to the degree that eighth-grade students receive the basis on the scale of the trend towards science, which was prepared by the researcher for this purpose, after studying the experimental group using (STAD) strategy compared to the students who studied with traditional method.

Theoretical Background and Previous Studies

First: Theoretical Background

2.1 Cooperative learning:

Cooperative learning (CL) is a type of pedagogy it is one of the most extensively explored educational techniques, models, and Short-term techniques that facilitate small-group learning. Because the majority of cooperative learning educators are also researchers, they have devised a variety of ways. All CL approaches, models, and procedures have one thing in common: they arrange students collaborate in groups to achieve common outcome or objectives. Share a similar problem or goal in this manner that they can just complete the work done interdependent behavior while keeping individuals accountable for their effort and contributions.

In a cooperative classroom, groups of students produce learning outcomes based on a general learning objective that represents each group member's unique contribution. Students are seated in pairs or small groups of three or four, and you can hear them helping one another study, sharing resources, and ideas, and preparing to carry out a learning assignment. Students benefit from the depth of achievement that comes from working together to learn when they are encouraged to collaborate on a major or minor assignment (Sharan, 2014, p802; Alijanian, 2012, p1971).

Rather than focusing on competition, cooperative learning emphasizes the necessity of working together. Most of what makes us human is our ability to work together, rather than compete. Love and collaboration are the ties that bind people together, and it is on this trait that humanity depends on its very existence (Singh and Agrawal, 2011, p1).

2.1.1 Type of cooperative learning

(Think-pair-share, Inside-outside circle, Jigsaw, STAD (Student-Teams-Achievement Divisions), Rally Table, Reciprocal teaching, and TGT (Team Game Tournament)).



2.1.2 According to Jonson, 2014 cooperative learning groups have the following features:

1. Positive Interdependence: To reach their goal, the team must rely on one another.
2. Student Responsibility: Each member of a group is responsible for his or her job.
3. Face-to-Face Promotive Interaction: Group assignments should be created in such a way that the task cannot easily be divided and done independently. There should be a lot of work that needs to be done in groups.
4. Skills for Effective Collaborative Work: Students are aided and encouraged to develop and practice interpersonal skills such as trust-building and decision-making.
5. Members of a team work together to define group goals, review their progress, and plan for the future.
6. Individuals get the most from working with people who are different from themselves (Mehta, 1998, p3).
7. Student achievement depends on constructive interdependence, in which students collaborate to attain their objectives

For a cooperative lesson to be successful, students must believe that they are "sink or swim" together. The students in co-operative learning scenarios are responsible for two things: To be successful, you must first master the content allocated to you, and then make sure that everyone in your group also masters the material. Positive interdependence is the scientific name for this dual obligation. Interdependence is a good thing if pupils believe that they cannot succeed without the help of others or that they must coordinate their efforts with the efforts of their group mates to accomplish a goal. To foster a climate of positive interdependence, educators must help students: 1) see the value of working with their peers; and 2) understand how their efforts benefit the entire group (De Jong & Hawley, 1995, p66-69; Y. P. Singh & Agrawal, 2011, p1-4).

2.1.3 STAD strategy as a type of cooperative learning (CL)

STAD was created at John Hopkins University by Robert Slavin and his colleagues. Every week, teachers that use the STAD strategy need to divide students into groups. Each group contains four or five variety students in terms of academic performance, gender, and race or ethnicity Members of the team finish the material using another learning aid or a work sheet and then assist one another in comprehension of the material of the lesson by quiz, conversations, or tutorials. Every week each student is individually given a quiz, after that, each student has their score individually and the teacher calculates the team's score. The teacher rewards the wine group (Mehta, 1998; Murdani et al., 2019, p42).



2.2. STAD (Student Teams Achievement Division) Strategy

2.2.1 STAD Theory, Conceptual Outline, and Recent Arguments on STAD

Kurt Koffka, the Gestalt School of Psychology's founder, proposed categorically in the early 1900s that group work is essential and unified, that students' levels of interdependence differ, and that Individual changes to the overall group and vice versa are triggered by interdependence among group members. Students are effectively motivated to achieve the expected and compromised collective goals as a result of group bonding and interaction (Johnson & Johnson, 2002, p2-30). The five basic aspects of a cooperative learning conceptual framework have been identified (Chim, 2015, p31).

STAD has been popular among many pedagogies as one of the most widely used CL techniques for three main reasons. **First**, several research has looked into and compared this teaching method to others. In terms of breadth, application, and generalization, most people believe STAD is more advantageous and prominent. **Second**, Various core theories in political science, economics, anthropology the social sciences, psychology, and sociology are all consistent with this technique (Chim, 2015, p30). Most teachers, including the author, see STAD as a more effective teaching method that is both practical and congruent with teaching principles and practices. In conclusion, STAD is theoretically based, research-based, pragmatic, and highly compatible with current practices (Chim, 2015, p30, 31).

2.2.2 Teaching stages according to the STAD Strategy

1. 4-5 students are selected from each class to form heterogeneous groups.
2. The teacher provides the students with a list of the topics they'll be studying, so they can research the information they'll need for the lesson (Prior to learning)
3. The teacher starts the lesson by presenting the subject matter to be covered. The offered information does not cover the entire issue and closes with a series of questions for the groups.
4. Students should be given ample time to complete the quiz or other assessments. Students should not be allowed to work together on the quiz; they must demonstrate what they have learned on their own at this point.
5. Once the students have finished working on and comprehending the worksheet, the teacher will collect it. The worksheet is provided by the teacher.
6. In a study group, students compare and contrast each other's responses to questions from the teacher.
7. The teacher acts as a facilitator in student-led discussion groups.
8. The teacher finished giving quizzes after group discussion activities to see how much students understood what had been discussed.
9. To keep students and groups motivated, the teacher reviews the quiz results and awards those who correctly answered, as well as commending all students and groups



for their efforts (Murdani et al., 2019, p42; Slavin, 2006; Sunarti and Rachman, 2018, p190-193).

2.2.3 Components of STAD Strategy

The five basic key components of STAD are: (Class presentation, Teams, Quizzes, Individual improvement scores, and Team recognition) (Akhrian Syahidi, Noor Asyikin and Asy'Ari, 2018, p2,3; Ferina, 2016, p33).

2.2.4 Advantages of Student Team- Achievement Division (STAD) Strategy

- 1) Enhance group abilities.
- 2) Commitment and optimism must be increased.
- 3) Respect for others.
- 4) There is no egotism among students.
- 5) Possessing the ability to cultivate healthy relationships.
- 6) Enhance individual mastery
- 7) Motivate students to learn.
- 8) Assist one another in solving challenges.
- 9) Work together to help each other understand the material to overcome challenges (Murdani et al., 2019, p43).

2.2.5 Disadvantages of Student Team- Achievement Division (STAD) Strategy

- 1) Some students, who are less intelligent and less dedicated, will have a gloomy view of their smarter classmates.
- 2) There is so much silence in the classroom that kids are unable to work in groups.
- 3) Invest a significant amount of time (Murdani et al., 2019, p43).

2.3 Trends

There is no specific agreement on the definition of direction and it can be adopted by specialized educators, and the best evidence of this is the list of definitions provided by Alport, in which he reviewed sixteen definitions of direction, but Alport himself defined the trend as "a state of mental and neurological readiness organized directed or dynamically in the response of students to all related situations and topics (Abu Jadu, 2012, p189).

Spencer was the first to use the term trend, and he was one of the first to write about trends in 1862 in his book Principles I, when he said, "Our access to correct judgments in matters that are controversial, largely depends on our mental direction, and we listen to this controversy and participate in it." (Abu Jadu, 2012, p189).

The concept of trends is expressed by mental orientation and followed by a large number of experimental psychologists such as Thomas, Zanki, and Jordan Porte in their research on psychological trends in 1935 and consider it one of the most crucial ideas of social psychology, and the trend is an emotional attitude characterized by acceptance or rejection of things, topics or issues, and direction that the individual



children do not have to pass through experience, which includes sufficient knowledge about the subject in relation (Muhammad, 2014).

2.3.1 Types of Trends

According to Gomes and Hainse's research, they agree with the concept of trends that Martino and Zane, when divided the trends into two parts:

According to (Nitko, 2001) a trend is a positive or negative feeling towards a subject, a person, a situation, or a thought with a point. While (Rodney & Price, 1980) confirm the existence of intellectual, and other emotional trends, that control the scientific direction of a student, the idea of it focuses on knowledge of a trending subject, but the extinguisher relates to an emotional reaction or my feeling towards the subject (Zan, 2008, p157-160).

First: The simple definition of a trend is the degree of positive or negative influence related to a particular topic or situation. According to this concept of attitude: the positive attitude toward mathematics.

Second: Identification of the dimensions that recognize the existence of three components of the trend: emotional reaction, beliefs related to the subject, and behavior towards consent or subject matter.

2.3.2 Components of Trend

Many educators and psychologists believe that trends consist of three domains:

- Cognitive component: It includes cognitive processes, beliefs, ideas, and opinions related to the subject of direction.
- Behavioral component: Includes a set of behavioral patterns or preparations for individuals to accept or reject (Objectives & Summary, 2010, p190-215).
- The emotional component (emotional): is inferred from the person's feelings and desires toward the subject, as well as his desire for it or aversion to it, and his love or hatred for him, and the emotional component of the trend is evident in what the subject of women's exit from work brings pleasure and disgust to some (Hsieh, 2002, p15-26).

2.3.3 Characteristics of Trends:

1. Trends are gained for individuals and learned.
2. Trends wish to have a relationship with an individual, a thing, a position, or a subject in the environment.
3. Trends reflect the type of relationship between the individual, the thing, the situation, or the subject (Ahmad Mohammed Awad, 2003, p15).
4. Trends may vary and vary for one individual depending on things, attitude, or subjects and their multiplicity.
5. Trends are more subjective than subjective to individuals.
6. Trends have relative stability and continuity, but they are changeable and developable under certain conditions and conditions.



7. Trends may be determined towards a position, subject, and maybe general towards a broader area of several topics, or something, accurately defined, things, or positions.

8. Directions fall over two parties, one representing acceptance, the other representing rejection, one positive, and the other negative. Or desirable, or other desirable (Hsieh, 2002, p15-26).

2.4 Scientific Trends

The scientific trend is the emotional aspect of the values of science and the spirit of science, so we can say that the scientific trend stems from the importance of science itself to society, and the fact that the educational system in any society is a mechanism used by society to achieve its goals, and it can be said that the educational system stems from the importance of society and culture to science, but the importance between science and society has become more complex over time. Science is no longer only a means of social progress, but also a means of advancing science itself, nor has the social role been a guarantee of the continuation of science as a permanent activity, but also a means of ensuring the progress of society itself (Mohammed, 2015, p27).

The systematic study of scientific trends began in the early 20th century, through various attempts to identify scientific trends and find appropriate means to measure them, and there are attempts to measure scientific trends, including the attempt (Noll) in 1935, to build a new way to measure scientific trends and identify six elements: accuracy in work and careful observation, mental openness, delay in governance, intellectual honesty, criticism, and consideration of the relationship between cause and effect (Al-Hasnaoui, 2003, p43).

At the local (Iraqi) level, the 1970s witnessed a significant development in measuring and identifying trends, and there was a measure of scientific trends among students of some universities and secondary schools in Iraq based on an earlier scale, known in the Arab Republic of Egypt in 1959, and after adapting this measure to the Iraqi environment was used successfully, as the scientific trend is interested in studying a phenomenon in its current reality and continuing its study over the next period of time, in order to see the evolution of trends in this phenomenon in order to predict what can be done. to happen to her in the future (Melhem, 2000, p330).

Through trends, we can explain all the life situations we are going through, and knowledge of trends is useful in many fields such as industry and commerce, and in the field of education, educational management is useful in knowing the attitudes of learners towards different subjects and towards their colleagues, books, teachers and education systems (Al-Saadi, 2011, p228).



Second: Previous studies

2.1 Previous studies Related to the STAD Strategy

Table 2. 1 Show the Previous Research Related to the STAD Strategy

No	Author/s	Year	Place	Grade	Subject	Title	Aim	Research Methods	Sample	Statistical Tools	Results
1	Khan	2011	Pakistan	Twelve grade students	Chemistry	“Effect of Student’s Team Achievement Division (STAD) on Academic Achievement of Students”.	They aimed to show the effects of one of the cooperative strategies, which is students’ team achievement division on students’ academic achievement.	Experimental and control group	30 students	t-test	There is no statistically significant difference between the mean marks of students of the control group and the experimental group
2	Asmawati	2011	Negeri	Eighth-grade students	Physics	“Effect of the cooperative strategies type Student’s Team Achievement Division (STAD) in physics sound concept”	is aimed to show the effects of one of the cooperative strategies, which is students’ team achievement division in physics at the sound concept	Two groups: Experimental and control group	36 students	t-test	Cooperative learning can be concluded, that the STAD type can have an impact on a student's understanding of physics concepts.
3	Wyk	2012	South Africa	Third-grade students	Economics Education	“The Effects of the STAD-Cooperative Learning Method on Student Achievement, Attitude and Motivation in Economics Education”	They aimed to see if there was a significant difference in achievement, attitude, and motivation between the STAD and control groups.	Two groups: Experimental and control group	109 Girls and 59 Boys	t-test	There were statistically significant differences between the experimental and control group in academic achievement



Previous studies Related to the scientific trends

Table 2. 2 Show the Previous Research Related to the Scientific Trends

No	Author/s	Year	Place	Grade	Subject	Research Title	Aim of study	Research methods	Sample	Statistical Tools	Results
1	Habib	2012	Palestine	Seven-grade	Science	"The Impact of Using Schuman's Model on the Academic Achievement, Scientific Thinking and Trends Among Students of the Basic Seventh-Grade".	They aimed to see how applying Schuman's paradigm affected academic success, scientific thinking, and trends among students in basic seventh grade.	Experimental with four groups: two experimental and two control in two schools	171 students	variance (ANCOVA)	On the scale of the scientific trend, there are substantial statistical disparities between the average mark of seventh-grade students.
2	Qabja	2014	Al Quds University (Palestine).	Sixth- grade of students	physical concepts	"The impact of using the meditative survey strategy in acquiring physical concepts and developing scientific trends among students of the sixth grade in Palestine"	They aimed to study the effect of adopting the reflective inquiry technique on the achievement of desirable physics ideas and the formation of scientific trends in sixth-grade pupils.	Experimental design with two groups: experimental and control groups.	146 students= 66 females and 80 males	ANOVA	Shows that there were no substantial differences between the experimental and control group in the progression of scientific trends conducted according to gender due to gender.
3	Mohamed	2015	Iraq	Six-Grade students	science subject	The effect of some theoretical strategy (TRIZ) in achievement and development of scientific trends in science subject of six-grade students in primary school). They used an experimental method with two groups.	They aimed to identify the effect of some theoretical strategy (TRIZ) in the achievement and development of scientific trends in science subjects of six-grade students in primary school.	Two groups: control and experimental	61 Girl students	t-test	The experimental outperformed the control group to develop the scientific trends of sixth-grade female students with a significant impact.



3. Methodology and procedures of the research

3.1 Overview

According to the research, the researcher had to follow several procedures needed to achieve the goals and verify the hypothesis. To analyze the research data, the following steps were taken:

- Choosing an experimental design.
- Specifying the research population.
- Selecting samples and comparing the two groups.
- Preparing research materials and tools.
- Using appropriate statistical equations and methods.

3.2 Methodology

To conduct this research, the researcher used the experimental method with (pre and post) test administered to two classes for implementing the research. According to (Singh, 2021) Experimental research adheres to a scientific research strategy. A hypothesis, a researcher-controllable variable, and variables that can be measured, calculated, and compared comprise it. Above all, experimental research is carried out in a controlled environment. The researcher collects data, and the results either support or disprove the theory. Hypothesis testing, often known as deductive research, is a research method (A. Singh, 2021, p1).

3.3 Experimental Design

Experimental design refers to the method of conducting research in a rigorous and controlled manner. The principles of experimental design are crucial in research that does not adhere to the stringent standards of hypothesis testing. This article will discuss how to plan research that will use experimental design to study and validate relationships between and among experimental variables. The number of variables is divided into two equal groups, and the researcher has chosen to use this experimental design because it corresponds to current research and accomplishes its objectives (Cohen et al, 2007, p147-156).

The design of this research was the (pre and post) test of scientific trends and academic achievement post-test for both research groups. The treatment was divided into two groups that were chosen at random. The two groups were given a pre-test on scientific trends and then each groups study with different method: an experimental group which is the study with STAD strategy, and the control group which is the study with the traditional method At the end of the experiment, the two groups were given a post-test of both scientific trends and academic achievement.



As shown in table (3.1).

Groups	Pre-test	Independent variable	Depended variable (Post-test)
Experimental	Scientific Trends	STAD strategy	▪ Academic achievement
Control		Traditional Method	▪ Scientific Trends

Figure 3. 1 show the design of the research

3.4 Identify the Population and Sample of the research

3.4.1 Research Population:

The population of this research is prepared of all eighth-grade students, and their number is (1811) female students, where, (714) students in the basic school and (1097) students in the Secondary schools of Soran district for the academic year 2021-2022.

3.4.2 The Research Sample:

The sample of this study was eighth-grade students in Delzyan Basic School for Girls, Delzyan village, Soran in the second semester of the academic year of 2021- 2022. The researcher had chosen (Delzyan Basic School for Girls) because she thought the school's principal and her staff are cooperative and loyal together and they work tirelessly to improve their students and schools, she thought that the teacher of science subject was so helpful, they were helped her in every field.

Table 3. 2 Show the sample of the research

Class eighth grade of basic education	Class	Groups	Teaching method	The total number of students before exclusion	The number of students excluded	The total number of students after exclusion
	A	Experimental	STAD Strategy	22	1	21
	B	Control	Traditional method	21	1	20

3.5 Equivalent Procedure of the Two Research Groups¹

The researcher visited the school in the first semester, from 1/11/2021 until 4/11/2021 to collect data about students' ages, the average of the previous year, degree of science subject in the previous year, and, academic level of students' parents.

¹ The researcher collected 30 and 40 as a degree of freedom and then divided 2 to get the T-value of the table because degree of freedom 39 is not in the table.



While the researcher used a random approach to choose the two research groups, she was anxious to ensure that they were equal in some of the aspects that she believes may influence the experiment's outcomes, for both experimental and control groups such as:

- 1)) Chronological age is computed in months.
- 2)) Parents achievement.
- 3)) Previous information about science subject.
- 4)) Scientific trends test.
- 5)) General achievement for last year.
- 6)) Marks of general science for seven grades.

Table 3. 3 The Equivalence Degree of the Two Research Group

No	Chronological age in months		IQ Degree		Science Degree for seventh grade		Average Degree for seventh grade		Previous Information		Scientific Trends Pre-test	
	Experim ental	Control	Experim ental	Control	Experim ental	Control	Experim ental	Control	Experim ental	Control	Experim ental	Control
1	162	159	23	30	74	62	80	74	27	18	180	137
2	162	156	29	30	50	40	54	66	19	19	118	158
3	169	168	34	22	85	51	85	53	20	23	165	169
4	169	154	33	27	64	78	74	80	18	22	164	169
5	156	178	24	24	57	57	74	66	20	20	127	153
6	198	157	24	28	50	73	59	80	16	19	136	171
7	189	163	24	30	40	73	52	79	17	19	156	128
8	156	163	29	28	69	53	69	66	14	22	150	167
9	165	180	20	35	78	67	89	78	19	18	141	132
10	166	157	22	32	50	79	55	86	21	22	170	143
11	168	168	31	23	51	92	60	91	19	19	108	114
12	194	203	15	26	69	59	83	54	18	17	112	136
13	157	166	30	30	40	57	56	60	18	16	140	127
14	156	160	32	32	56	62	76	71	18	20	170	143
15	156	206	30	15	68	66	72	70	15	23	139	82
16	177	167	20	33	66	56	70	64	19	23	160	95
17	163	158	22	18	50	50	59	69	20	16	159	164
18	158	173	24	28	50	40	65	56	17	10	190	169
19	164	163	17	29	53	59	76	66	17	19	151	177
20	164	166	30	15	71	48	80	59	22	17	110	131
21	169		31		74		86		20		78	
Mean	167.52	168.25	25.90	26.75	60.24	61.10	70.19	69.40	18.76	19.10	144.00	143.25
Standard derivation	12.319	14.231	5.458	5.674	12.637	13.230	11.591	11.591	2.700	3.127	27.592	26.163
T- Calculate d	0.175		0.486		0.213		0.226		0.371		0.89	
T- Schedule		2.0315										
Degree of freedom		39										



Educational Level of Parents

The researcher obtained information about the educational level of the parents of both groups of students directly from the students themselves; the researcher queried each student about their parents' educational level. After compiling data on the parents' educational attainment, the following results were obtained:

A. For Fathers:

The researcher did a statistical examination of the academic achievement of the students' fathers in both research groups using the Chi-square (χ^2) (Silva, 2016). The result indicated that the value of the calculated Chi-square reaches (7.351), which is less than Chi-square (χ^2) value of (9.488) at the level of significance (0.05), and the degree of freedom was (4), which means that the two groups are equal in the educational level of the parents, as shown in table (3.8).

Table 3. 4 illustrates the educational level of the fathers of both research groups'

Groups	Fathers' Academic Achievement Level					Chi-square value	
	Illiterate	Primary	Secondary	High School	Institute	Calculated	Schedule
Experimental	7	2	10	2	0	7.351	9.488
Control	7	5	6	1	1		

students, as well as the calculated and tabular Chi-square.

B. For Mothers:

The researcher did a statistical examination of the academic achievement of the students' fathers in both research groups using the Chi-square (χ^2) (Silva, 2016). The result indicated that the value of the calculated Chi-square reaches (3.4915), which is less than Chi-square (χ^2) value of (9.488) at the level of significance (0.05), and the degree of freedom was (4), The result means that the two groups are equal in the educational level of the parents as shown in table (3.9).

Table 3. 5 illustrates the educational level of the moms of both research groups'

Groups	Mothers' Academic Achievement Level					Chi-square value	
	Illiterate	Primary	Secondary	High School	Institute	Calculated	Schedule
Experimental	18	0	2	1	0	3.4915	9.488
Control	14	3	2	1	0		

students, as well as the calculated and tabular Chi-square.



3.6 Research Tools

The academic Achievement Test and the Scientific Trends Scale are two tools that must be constructed to achieve the research's objectives.

3.6.1 Academic Achievement Test:

The test, in its general sense, is an example of a behavior that is mentioned as a characteristic. But the academic achievement test is an example of a question or a teaching work that was created for this purpose, in a way that can measure the extent to which the specified object is achieved. From this point of view, it can be done as a group of questions to look at the test of your achievement to measure the extent of the planned educational goal.

Test preparation was a major component in completing the current research, which necessitated that a test is devised to gauge the academic achievement of students in both research groups, according to the following stages:

1. Test Items:

According to the three first levels of the classification of Bloom's taxonomy in the cognitive field (remembering, understanding, and applying), (30) items were identified by the researcher and formulated according to the weight of the importance of each of the content and behavioral goals, each item with four alternative responses, as well as instructions for students about how to respond to the test.

Validity of the Test:

To ensure that the test is measuring what it is supposed to measure. Experts' judgments on the level of test measurement were used by the researcher to appear to be honest.

Consequently, the exam was reviewed by a group of measurement and assessment experts, teaching techniques experts, scientific supervisors, and primary school science teachers. To learn what people think about the validity of the forming things, the logicity of the choices, and their attractiveness. Based on participant input, it was decided to rewrite and provide alternate answers to some of the questions. An item is deemed acceptable by the researcher if it receives at least an approval ratio of 80%. There are thirty (30) test items that can be used to measure the academic achievement of 8th-grade students in science, according to the equation (3.3).

$$\text{Validity of test item (\%)} = \frac{\text{Number of Experts that agree with this item}}{\sum \text{Number of Experts that reviewed the test}} * 100 \quad \text{Equation (3. 1)}$$



2. Analyzing the Test Items Statistically:

To determine the difficulty level, clarity of the test instructions, distinctive strength, and time consumed by the test items themselves. The test was administered to a random sample of (40) students from the (Badilian Mixed Basic School). In the course of the investigation, the following was discovered: After organizing the student's grades descending, 27% distinguishes the highest grades, 27% of the lower grades from the other grades (Hingorjo and Jaleel, 2012, p144). Students were separated into two groups which were the Upper group (11) and the lower group (11), according to this equation:

$$\text{Number of students in each group} = \frac{\sum \text{Number of students} * 27}{100} \quad \text{Equation (3. 2)}$$

The reason for determining the %27 rate is due to Kelly's opinion. Kelly says the best rate capable of separating the two groups is %27, and Anastasia says that any rate that falls between (25%, and 33%) is considered to be a good and acceptable rate (Coe *et al.*, 2008, p79).

Kelly proposed a standardization technique that could be used to “approximate a participant’s grade in a subject to that which would be obtained in the idealized situation in which all participants took all subjects, and all subjects were marked by the same examiners” (Kelly, A., 1976, p37-63).

A. The clarity of the items and the time required to respond:

The researcher discovered that the test items and directions for responding to them were clear and understandable to the students after administering the test. The average amount of time spent answering questions is therefore between 25 and 35 minutes (30), which is a normal and acceptable duration for this age group and stage of the study.

B. Difficulty and Ease Coefficient of Items:

By using the equation (3.5), (3.6), researchers found that the difficulty level of each test item was somewhere between (0.40) and (0.72) for all items. Since measurement scientists believe that the appropriate difficulty level for a given item is between (0.20 - 0.80), with an overall average of (0.50). A good test item and a sufficient coefficient of difficulty have been determined for the researcher.

$$\text{Diff} = \frac{\text{CAU} + \text{CAL}}{\text{TG}} \quad \text{Equation (3. 3)}$$

$$\text{Difficulty} + \text{Easy} = 1 \quad \text{Equation (3. 4)}$$

When, Diff = the value of the difficulty factor of the item. CAU= the number of correct answers in the upper group. ACL= the number of correct answers in the lower group. TG= the number of students of both groups



C. The discriminatory power of test items:

When the researcher assessed the test items' ability to discriminate, she discovered that it sorted between (0.36 – 0.64), and it was taken into account as distinct since the test items' discriminatory power was only regarded to be distinct if it reached (0.30) or above (McCowan *et al.*, 1999, p1-9) according to equation (3.5).

$$\text{Discr} = \frac{\text{CAU} - \text{CAL}}{\frac{1}{2} \text{ TG}} \quad \text{Equation (3. 5)}$$

D. Effectiveness of Wrong Alternatives:

To acquire a whole picture of a multiple-choice question, each response must be carefully considered. For the incorrect options to be appealing and legitimate, negative values must be attained. According to Odeh (2002, p. 354), the erroneous alternative is effective when the number of students drawn to it from the upper group is smaller than the number of people who select it from the lower group by at least a certain amount (0.5). After applying the algorithm to determine the efficacy of the incorrect option, it was discovered that all incorrect alternatives had negative coefficients of efficiency, making them all successful.

$$\text{Wrong Alternative} = \frac{\text{CAU} - \text{CAL}}{\frac{1}{2} \text{ TG}} \quad (\text{Hingorjo and Jaleel, 2012, 165-170})$$

Equation (3. 6)

E. Reliability of the Test Items:

The achievement test was applied on (31/3/2022) for the first time for eight-grade students from (Badilian Basic Mixed School) associated with the (40) student General Directorate of Education in Soran. The researcher used correlation coefficient (Alpha Cronbach) as a statistical tool to calculate the reliability of the test and the degree of each individual in the first application and a degree in the second application.

3.6.2 Scientific Trends Scale:

Because one of the objectives of this research is to determine the effect of using the Students Team Achievement Division (STAD) on the progress of scientific trends, the researcher devised a scientific trends scale which include (38) items, each item had five alternatives to answers and instructions on how to answer.

A. Validity of the Scale:

Some educational and psychological science measurement and evaluation experts and specialists were shown the scale to ensure its accuracy, and their observations and opinions on the scale's items were taken into consideration, as were any additional items that they saw as appropriate for measuring what was intended to be measured. In terms of the formulation's safety and the sample's suitability for it. Some items had to be reworked because the researcher decided to use an unanimously (80% or more)



favorable opinion rating as a criterion for whether or not they should be accepted. As a result, we were able to achieve scale reliability.

B. Initial execution for the test:

As a way to ensure that the scale's items and instructions were clear, as well as to gauge how long it took for students to answer them, the researcher used the scale on 52 students in (Shahin Basic School for Gils). The researcher used the scale only in elementary school, It was therefore evident that the questions and the guidelines for answering were simple enough for students to comprehend. For this age group and this stage of the study, the average time to answer the test questions was 30 minutes, which was considered a reasonable and acceptable amount of time.

C. Reliability of the Scale:

The researcher used the Alpha Cronbach equation to test the scale's stability, which is preferred when the answers to the scale's items are graded, rather than dual. There were (52) students who participated in the study, and the stability coefficient was found to be (0.938), which was careful an suitable stability factor (Koonce and Kelly, 2014, p34).

3.7 Preparing Teaching Plans:

Student Team Achievement Division (STAD) strategy was used to prepare the teaching plan for the second semester's educational subject, while the traditional method was used for the control. Arbitrators with expertise in teaching methods and their suitability for behavioral purposes were given a copy of all the plans.

3.8 Experiment Implementation Procedures

Every year, the second semester begins on January 25th, cause of the bad weather, the minister of education announced a week of holidays, at the other hand every year in Kurdistan has a general holiday from March, 10 to March, 24 On the occasion of Kurdish New Year's Eve, fortunately, this year the Minister of Education made only one week vacation from 17/3 to 24/3 as compensation for the first week of the second Semester.

Following the completion of the experiment's requirements, the researcher began the following steps: -

First: Starting on 1/2/2022 and lasting until 14/4/2022, a parity procedure was implemented between students of both research groups at (Delzyan Basic School for Girls). The researcher spent three days with the subject teacher to get acquainted with students' behavior and perform some of the research needs during this period such as previous information testing and IQ test as well as a pre-test for scientific trends and arranging the scheduled study for the researcher with the administrative staff of the school.



Second: The researcher relied on the subject teacher to distribute the experimental group students in a way that the subject teacher divided all students into five levels based on their academic achievements in a science subject.

Third: On Saturday, which corresponds to 5/2/2022, the two research groups' formal instruction began, and up to Thursday corresponding to 12/4/2022, with more than two months of the academic year (2021-2022), and the application persisted for more than (10) weeks.

3.9 Applying the Research Tools:

1. Academic Achievement Test

The academic achievement test was administered to the two groups of students based on the correction key that had been prepared for this purpose by the researcher. The correct answers are given a score of one, while incorrect or incomplete answers are given a score of zero.

2. Scientific Trends Scale

The scientific trends scale was administered to the students of both groups at the same time on April 13th, 2022, after appropriate notification had been provided.

3.10 Correcting the Research Tools

Once all the research tools had been applied, the researcher spent her time correcting the responses of students from the two groups:

1. The Academic Achievement Test

2. Scientific Trends Scale

The researcher corrected the students' answers on the scale, she gave the (Strongly Agree, Agree, somewhat agree, Disagree, strongly disagree), weights, (1, 2, 3, 4, 5) for negative items, and (5, 4, 3, 2, 1) for positive items respectively. The student's grades are in the range of (78-190).

3.11 Statistical Tools to Analyze Data²

1. T-test for two independent samples: the T-test was used to make sure that the two research groups were the same and to find out what the moral difference was between them on a scale of academic achievement and scientific trends (Helwig, 2020, p1,2).

2. T-test for two independent samples: The discriminatory strength of the scientific trends test items was determined using a T-test with two independent samples of equal size in each group (Helwig, 2020, p1,2).

² The researcher used statistical software (SPSS version 25) to analyze data and obtain the result.



3. T-test for two dependent samples: on the scale of scientific trends, the test of the difference between the mean of two dependent samples is used to find the difference between the degree of the students in the two groups, experimental and controlling (Helwig, 2020, p1,2).

4. Chi-Square equation: In the variable of parental educational level, it was used to find parity between the two research groups (Mindrila and Balentyne, 2013, p1-12; Silva, 2016, p385-389).

5. The Kodure _Richardson 20 KR Equation: The achievement test reliability coefficient is calculated using the Kodure _Richardson 20 KR Equation (Ryu, 2012, p5).

6. Item Difficulty: used to find the difficulty coefficient for the academic achievement items (Ryu, 2012, p11-13).

7. Effectiveness of the Wrong Alternatives: used to determine the effectiveness of incorrect test item alternatives (Allam, 2002, p165).

8. Discriminatory Coefficient: used to determine the achievement test items' discriminate strength and the reflective thinking scale's discriminate strength (Soraya *et al.*, 2021, p167,168).

9. The Alpha Cronbach equation: is used to find the correlation between two variables in science (Ritter, 2010, p6-8).

4. Data Analysis and Discussion

4.1 The First Null Hypothesis States That: "There is no statistically significant difference at the level significance (0.05) between mean marks students of the experimental group which is they study with STAD strategy and mean marks students of the controlling group which is they study with traditional method in academic achievement".

To evaluate the hypotheses, the arithmetic means and standard derivation of the student's scores on the applied post-test of the academic achievement test for both experimental and control groups were computed, and the t-test for two independent samples was used.

Table 4. 1 shows the result of post -test of the Academic Achievement for both research groups

Academic Achievement		Arithmetic Mean	Standard Deviation	Degree of freedom	T- value		Significance at level (0.05)
					Calculated	Schedule	Not statistically
Post	Experimental	21.10	3.910		1.945	2.0315	



-test	Control	18.85	3.453	39		Significant
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The table shows that at level of significance (0.05) and (39) degrees of freedom, the computed T-value reached (1.945), which is less than the schedule T-value of (2.0315). The initial null hypothesis is accepted and the alternative hypothesis is rejected since there is no statistically significant difference between the average score of the students in the experimental group and the average score of the students in the control group.

as indicated in the chart (4.1).

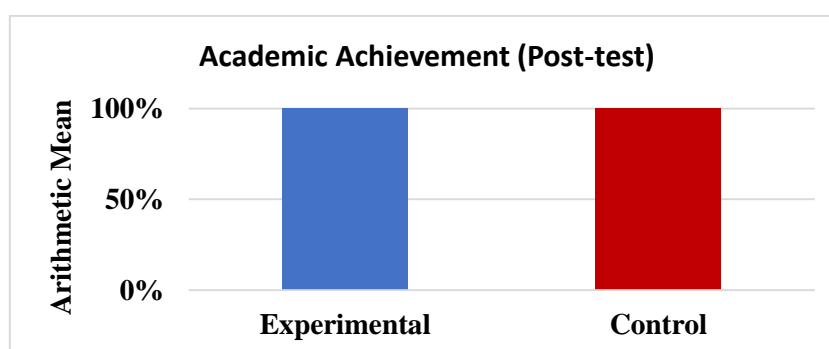


Chart 4. 1 Students' degree of the experimental and control group in academic achievement post-test.

This result agreed with the result of the This outcome was consistent with the findings of previous research (Khan, 2011).

The researcher attributes the lack of difference between research groups in academic achievement for the following reasons:

- **Area of the Classrooms:** In most of the Kurdistan Region's public schools, the area of the classrooms is inappropriate to implement the grouping style, because of the hall's incompatibility with student sessions in a way that they all face each other and the teacher.
- **Subject Curriculum:** Having a large curriculum for most subjects, particularly science subjects, teachers cannot offer the lessons as it needs, as the selected curriculum must be completed during the second semester.
- **Lesson Time:** In most public schools has not had appropriate time to complete lessons, because the STAD strategy has many activities, such as a presentation by the teacher and student participation, giving worksheets to groups, giving appropriate time to respond, then discussing answers and clarifying the topic further, then take a quiz and performing the appropriate time to do it, then evaluating students and giving homework.

4.2 The Result of the Second Null Hypothesis: states that "There is no statistically significant difference at the significance level (0. 05) between two mean marks students of the experimental group which is they study with STAD strategy in the



(pre-post) test for scientific trends”. The standard deviation and mean the student's scores on the applied (pre-post) test of the scale of the scientific trend was calculated to verify the hypotheses, and the results revealed that among the students' experimental group, there was a difference in the average variation of development in scientific trends, (before and after teaching with STAD strategy). For two dependent samples, a t-test was employed to determine the difference's relevance, table (4.2) shows the results.

Table 4. 2 shows the result of (pre and post) test of Scientific Trends scale for experimental group.

Experimental Group		Arithmetic Mean	Standard Deviation	Degree of freedom	T- value		Significance at level (0.05)
					Calculated	Schedule	Not statistically Significant
Scientific Trends	Pre-test	141.95	15.852	20	3.433	2.086	
	Post-test	165.90	26.540				

The table showed that the calculated T -value (3.433) at the level of significant (0.05) and the freedom degree (20) is larger than the t-table value of (2.086), meaning that There are statistically significant differences between the experimental group's pre- and post-tests, and the arithmetic mean differences indicate that the difference is in favor of the post-test, as shown in the chart (4.2)

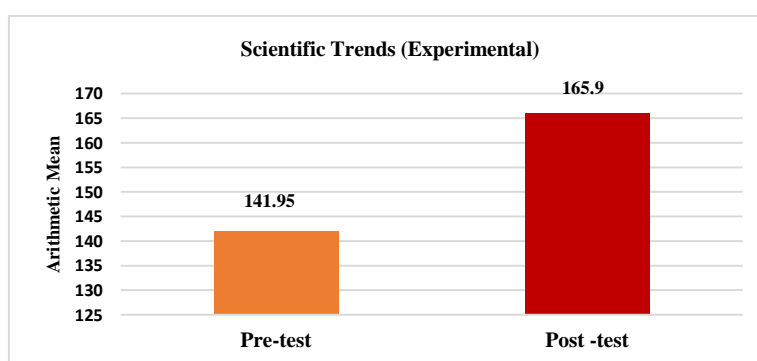


Chart 4. 2 shows the Comparison result of (pre and post) test of Scientific Trends scale for experimental group.

The researcher attributes this result to the fact that the method used by (STAD) also, has a role in the development of the scientific trends members of the experimental group towards the subject of science, because of the teacher's attention to her students during teaching science according to the steps of the STAD, with the participation of students, then do the quiz, and then awarding the successful students, these are the main reasons that make the students compete with their classmates to win and win the prize.



4.3 The result of the third null hypothesis: states that “There is no statistically significant difference at the significance level (0. 05) between mean marks students of the experimental group which is they study with STAD strategy and mean marks students of the controlling group which is the study with the traditional method in scientific trends.”

Table 4. 3 shows the result of post- test of Scientific Trends scale for both research groups.

Scientific Trends		Arithmetic Mean	Standard Deviation	Degree of freedom	T- value		Significance at level (0.05)
					Calculated	Schedule	
Pos t- test	Experimental	165.90	15.852	39	2.685	0.021	Not statistically Significant
	Control	147.05	27.790				

The table showed that the calculated T -value (2.685) at the significant level (0.05) and the degree of freedom (39) is greater than the t-table value of (0.021). According to differences in arithmetic mean, there are statistically significant variations between the experimental group's (Pre and Post) tests, shows that the difference is in the interest of the post-test, as shown in the chart (4.3)

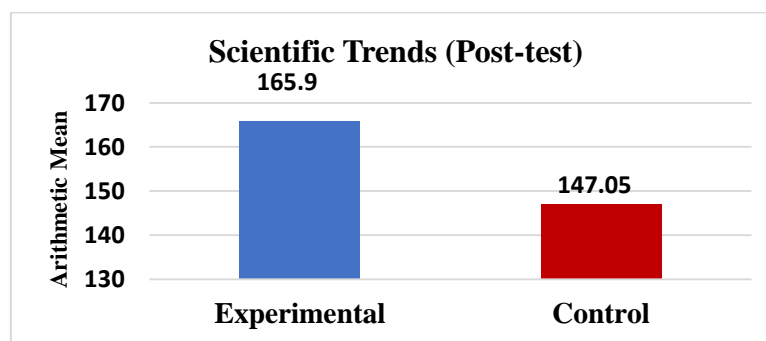


Chart 4. 3 shows the result of post- test of Scientific Trends scale for both research groups

The independent variable that was used with the experimental group, which included many activities that in turn assisted in the development of Scientific Trends of students in the experimental group, was credited by the researcher as having a significant impact on the experimental group's superior performance over the students in the control group. The STAD technique, which was applied with the experimental group, met one of the requirements for the students' development of Scientific Trends by providing these activities.

The findings demonstrated that there were statistically significant differences in favor of the experimental group between the study groups employing STAD techniques and the control group using the conventional methodology. In the scale of scientific



trends and (Pre and Post) tests of two groups, this may be due to the effect of the experimental factor (STAD strategies) in the development of scientific trends in the students of the experimental group. This result means that the method of teaching science according to the strategies of the STAD positively affects scientific trends in eighth-grade students, meaning that there is an impact on the use of STAD strategies. This outcome could be explained by the fact that the Student Team Achievement Division (STAD) strategy contributed easily to the development of students' trends.

This result agreed with the results of the following previous research's; (Mohamed, 2015), (Habib, 2012). These studies' findings supported the experimental group's superior performance over the control group in developing scientific trends as a result of applying a variety of initiatives, plans, and instructional tactics.

5. Conclusion, Recommendation, and Suggestion

5.1 Overview:

This chapter offers the research's conclusion, recommendations based on the findings, and proposals for future research to supplement the current study.

5.2 Conclusions:

In light of the researcher's findings, she concluded:

- ❖ This indicates that the STAD strategy was not affected by students' achievement.
- ❖ STAD strategy plays a vital role in the experimental group students' scientific trends and collaborative work.
- ❖ STAD strategy has been of great importance in changing the trends of female students toward science positively.
- ❖ The experimental group that used the STAD strategy outperformed the control group that used the traditional method to develop the scientific trends of eighth-grade female students with a significant impact.

5.3 Recommendations:

In light of the results of the research, the researcher recommends the following:

1. The need to pay attention to the development of trends in general and scientific trends in particular, through the use of the STAD strategy.
2. The need to inform science teachers about modern methods and strategies that help develop the fields of scientific trends, and stay away from the usual learning in teaching science and training female students on the creative solution to problems in our schools today.
3. The need to pay attention to minimizing the curriculum of science subjects to be appropriate for school time.
4. Paying attention to the laboratory, especially for a science subject to students to understand and avoid learning with ought understanding.



5. Increasing the area of classrooms in a way that fits with the grouping style.

5.4 Suggestions for Future Work:

Through the results of the current study, and the recommendations of the research, the researcher makes several suggestions for future research:

1. Similar research to find out the effect of STAD on other variables for instance, life skills or creative thinking, problem-solving skills, and scientific thinking in a science subject.
2. Investigating similar research for the current research at other stages of study, such as primary or preparatory school.
3. Conducting similar research with comparative between male and female students.
4. Conducting similar research on other subjects such as biology, physics, and chemistry at the preparatory stage.
5. Conducting related studies in various settings.

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