EFFECT OF STUDENTS TEAM ACHIEVEMENT DIVISION MODEL ON ACADEMIC ACHIEVEMENT IN THE SUBJECT OF GENERAL SCIENCE AT ELEMENTARY LEVEL

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SUPERVISOR'S CERTIFICATE

The thesis titled "EFFECT OF STUDENTS TEAM ACHIEVEMENT DIVISION MODEL ON ACADEMIC ACHIEVEMENT IN THE SUBJECT OF GENERAL SCIENCE AT ELEMENTARY LEVEL" submitted by Mr. Zafar Iqbal Reg. No. 182-FSS/PHDEDU/F20 in partial fulfillment of Ph.D. degree in Education has been completed under my guidance and supervision. I am satisfied with the quality of the student's research work and allow him to submit this for further processing as per IIUI rules and regulations.

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APPROVAL SHEET

EFFECT OF STUDENTS TEAM ACHIEVEMENT DIVISION MODEL ON ACADEMIC ACHIEVEMENT IN THE SUBJECT OF GENERAL SCIENCE AT ELEMENTARY LEVEL

By

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AUTHOR'S DECLARATION

I, Mr. Zafar Iqbal Reg. No. 182-FSS/PHDEDU/F20 as a student of Ph.D. in Education at International Islamic University, Islamabad do hereby declare that the thesis entitled "EFFECT OF STUDENTS TEAM ACHIEVEMENT DIVISION MODEL ON ACADEMIC ACHIEVEMENT IN THE SUBJECT OF GENERAL SCIENCE AT ELEMENTARY LEVEL" submitted for the partial fulfillment of Ph.D. Education is my original work, except where otherwise acknowledged in the text, and has not been submitted or published earlier and shall not in the future, be submitted by the researcher for obtaining any degree from this or any other university or institution.

_____

Zafar Iqbal

DEDICATION

To all my teachers,

Whose wisdom and kindness have guided,

To explore, refine, and expand my knowledge.

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In the name of Allah, the most Beneficent, the most Merciful, the Creator of the World. It is the grace of Allah, Love of Prophet Muhammad (Peace be upon him) and prayers of my mother whose gracious favors enabled me to complete such a hard research work successfully.

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ABSTRACT

This study investigates the effect of Student Team Achievement Division model on the academic achievement of elementary-level students in General Science. The major objectives were to: (i) examine the effect of the students' team achievement division method on academic achievement, (ii) determine the effect of the lecture method on academic achievement, (iii) compare the effect of the student team achievement division method and lecture method, (iv) analyze the effect of the student team achievement division method on the academic performance of lower, medium and higher achievers (v) investigate the effect of the lecture method on lower, medium, and higher achievers, (vi) compare the effect of the student team achievement division method and lecture method on lower, medium, and higher achievers. The true experimental design was used for the study. Islamabad Model School for Boys was selected as the sample frame. Using the simple random sampling technique, 60 students were chosen as the study sample. The students' academic achievement test was administered as a pretest, and based on the pretest scores, the students were divided into two equivalent groups: a control group (30 students) and an experimental group (30 students). The control group was taught using the lecture method, while the experimental group with the student team achievement division method. After seven weeks of treatment, a posttest was administered. Descriptive statistics Mean and Standard Deviation were used to evaluate the student's academic achievement. The inferential statistics t-test was applied to compare the effect of the students' team achievement division and lecture method. The results revealed that the students' team achievement division method significantly improved students' academic achievement in General Science compared to the lecture method. It is recommended that educators adopt the students' team achievement division method for teaching General Science to enhance students' performance rather than rely solely on the traditional lecture method.

Keywords: Students Team Achievements, Control Group, Experimental Group, Lecture Method, General Science,

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LIST OF ABBREVIATIONS

STAD	Students Team Achievement Division Model
APS	Army Public Schools
AVA	Audio Visual Aids
LT	Learning Together
TGT	Teams- Games-Tournaments
GI	Group Investigation
TAI	Team Accelerated Instruction
VTE	Vocational Technical Education
CL	Cooperative Learning
HOTS	Higher Order Thinking Skills
ZPD	Zone of Proximal Development
PBL	Problem-Based Learning
TPS	Think-Pair-Share

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Collaborative learning is very focused on students by using group work to allow students to work together and achieve common goals and achievements in the form of groups. Team based Learning is a learning strategy that enables students to collaborate on structured assignments. In team based learning situations, students must coordinate their efforts to complete tasks. Student Team Achievement Divisions are one type of team based learning. According to Millis (2023), it is one of the most straightforward team based learning methods and has been extensively researched by earlier scholars. It is frequently employed to teach diverse subjects and educational levels. The five essential components of the Students Team Achievement Division model include class presentations, teams, quizzes, individual improvement scores, and team recognition. Regarding class presentations, materials will be delivered in class, encompassing lecture discussions, direct instruction on tasks, and audiovisual presentations. Students must concentrate on the presentations to fully grasp the lesson. By doing so, they are anticipated to perform well on quizzes (Kreng, 2020).

In the Students Team Achievement Division model, each group comprises four to five members, mixed in gender, race, ethnicity, and academic ability, and they are accountable for their team's learning and for preparing for quizzes. Since it enables students to assist one another, members of each group will engage in activities such as discussions, comparing answers, and correcting one another's mistakes, which aids their collective success. Following class presentations and team preparations, students will take the individual quiz and must work independently. This approach allows students to utilize their knowledge based on what they have studied. The scores are determined by the improvement of the student from earlier quizzes. Points will be awarded to the group that exhibits noticeable progress from prior assessments. Team recognition will then be conferred

upon the group that meets the specified criteria. This recognition may take the form of badges, certificates, or suitable rewards (Elpisah, 2020)

This approach for learning is a cooperative strategy where small groups of students, representing diverse abilities, collaborate to reach shared educational objectives. Numerous studies in this area have demonstrated this technique enhances students' educational results. With the STAD technique, learners join in small clusters and assist one another in their studies. They also collaborate to tackle assignments provided by the instructor during class. The Students Team Achievement Division model framework comprises five principal elements: class presentations, team studies, quizzes, personal improvement scores, and team recognition. In team studies, each group is made up of four to five students with differing levels of performance, genders, and ethnic backgrounds. Known as the Student Team Achievement Division, the STAD technique stands out among various team based methods. Most research in this domain suggests that the Students Team Achievement Division model technique significantly boosts students' educational results because it is centered on students and promotes collaborative learning (Rosfiani, 2020).

1.2 Rational of the Study

The collaborative learning Model, known as Student Teams-Achievement Divisions (STAD), involves small groups of students with varying levels of skill working in unison to achieve a common educational objective (Kreng, 2014). Students Team Achievement Division model stands out as one of the most extensively studied, simplest, and most direct forms of cooperative learning. It was developed based on the principles of effective teaching methods (Fatima, 2020). This strategy is employed to fulfill clearly defined instructional targets, as it involves small teams of students with diverse competencies, who unite to reach a shared learning aim (Hasmyati, 2018).

Team based learning emphasizes student-centered group work, enabling learners to collaborate toward shared objectives. Cooperative learning, a structured form of this approach, involves students working together on organized tasks, necessitating coordinated efforts to achieve common goals. One prominent cooperative learning strategy is the Student Teams-Achievement Divisions model,

which has been empirically shown to enhance student motivation and learning outcomes. In this model, students are organized into diverse teams to master academic content collectively. Furthermore, this model has been utilized as a tool for peer-assisted cooperative learning in disciplines such as anatomy, demonstrating its versatility and effectiveness in enhancing educational outcomes across different fields.

Conventional lecture-centric education, followed by traditional self-study, remains the predominant teaching approach in higher education globally, enjoying wide acceptance and praise from a multitude of faculty members and students. Historically, it has been regarded as the most efficient means of delivering knowledge directly to learners. However, the efficacy of this method is progressively being questioned, as didactic instruction is a passive and superficial strategy that elicits minimal student engagement in their educational journey. This approach often fails to encourage student initiative and does not foster innovation within the classroom. In contrast, active learning engages students' enthusiasm for learning, promotes participation, and solidifies understanding. Cooperative learning, facilitated through peer-assisted learning, is a prominent active learning strategy. (Atradinal, 2024).

Team-based learning involves dividing a classroom of students into smaller groups, allowing them to collaboratively explore a new concept and assist each other in enhancing their understanding. Although the concept of cooperative learning has existed for many years, it has not achieved the same level of recognition as blended learning or differentiated instruction. The Students Team Achievement Division model includes elements such as class presentations, teams, quizzes, individual improvement scores, and team recognition. Educational models that fail to emphasize student participation tend to lead to decreased student activity, lack of independence, and diminished confidence in articulating their viewpoints, ultimately failing to foster creative thinking, which results in low academic performance. Students often remain passive, merely listening, writing, sitting quietly, and following the teacher's instructions instead of being actively engaged in their learning (Elpisah, 2020).

Furthermore, the American Association for the Advancement of Science has proposed teaching strategies aimed at enhancing and optimizing student learning by utilizing general principles of education. According to research planning, the researcher instructed the students in the experimental groups. Several factors were taken into account: it poses a risk for the researcher if the school teacher instructs the experimental group, as school teachers may be unfamiliar with the Student Team Achievement Division Model. The fundamental principle of the Students Team Achievement Division model is to encourage students to support and assist each other in mastering the material. If the students desire rewards for their teams, they must collaborate and thoroughly understand the content. They encourage their peers to perform their best. They work together to ensure they comprehend the lessons or instructional materials. Active interaction and positive relationships among students during the learning process can enhance motivation and inspire critical thinking (Yulini, 2019).

1.3 Problem Statement

Team based learning has been used to promote learning in a few schools in Pakistan, such as the city and APS school systems, but traditional teaching methods are still used in public and private sector schools. Experts and teachers agree that the best way for students to learn is through active learning such as team-based and cooperative approaches. Student-Team Achievement Divisions are a form of team-based cooperative learning model that uses multi-ability teams to teach facts, concepts, and skills and the Students Team Achievement Division model is an effective method that can be used in the classroom. As a result, this study is designed to examine and describe any shift from current teaching and learning methods to those possible within a team-based cooperative learning framework (Slavin, 2005).

Furthermore, aim of this study is to determine the impact of Students Team Achievement Division model, team based learning approach on students' academic performance in general science at the elementary school level. National Education Policies Pakistan (2009, 2017) acknowledges the importance of quality education, according to the Constitution article 25-A, every child has a right to quality education. In the same way, the National Qualification Framework 2015 focuses on

the learning of students through cooperative and collaborative skills (Sudijono, 2014).

In this regard, there is crucial research on student-team achievement division for instruction and education in Pakistan. Similarly, no initiatives have been undertaken in educational institutions to promote the team-oriented learning process in education. The implementation of the Students Team Achievement Division model in schools is justified through a strong link between the objectives of citizenship education and academic learning skills, which can be enhanced by this educational strategy (Mukmin, 2019).

Student-Team Achievement Divisions is a form of cooperative learning model that uses multi-ability teams to teach facts, concepts, and skills. Elementary-level general science is important because this provides the foundation of science to the students and a lot of the students face problems understanding these basic concepts for several reasons. The advantage of this method is that with the help of their partner in the group, they will understand the concept better. This method is more effective in improving achievement, attitude, motivation, social skills, and science concepts. The study aims to determine the effectiveness of this model in developing learning skills in general science through its teaching methods by comparing it with conventional teaching methods at the elementary level.

1.4 Significance of the Study

This study can be helpful to fulfil the gap between the effective involvement of Students Team Achievement Division model in schools and the improvement of literature. It may enhance the literature about team based learning on its teaching and learning process through pre-service and in-service professional development of teachers. This experimental study provided the actual situation of science classrooms and how the students develop the ability for team based learning at the elementary level.

This study explains how to adapt the intervention in the classroom to develop cooperative learning and quality education. This study is helpful to curriculum planners, teachers, and education experts in developing, applying, and evaluating instructional intervention in general science education. This study can help the students and teachers to be aware of the teaching-learning process to create

cooperative learning abilities at the classroom level in the Pakistani context. This study may also contribute to educational research to validate the literature and research design on cooperative learning. The teaching of content based on this model may develop the student's abilities to learn by team formulation. With this intention, this study can contribute to investigating the effect of this model to enhance cooperative learning strategies among students at the elementary level. The significance of this model in cooperative learning lies in its ability to transform classrooms into inclusive, engaging, and effective learning environments. Its adaptability and alignment with educational goals make it a valuable strategy for educators striving to achieve holistic student development.

1.5 Objectives of the Study

The Objectives of the Study were:

1. To examine the effect of the Students' Team Achievement Division Method on the academic achievement of elementary-level students in general science.
2. To determine the effect of Lecture Method on the academic achievement of elementary-level students in general science
3. To compare the effect of the Students' Team Achievement Division Method and Lecture Method on the academic achievement of elementary-level students in general science
4. To investigate the effect of the Students' Team Achievement Division Method and the academic achievement of lower medium and higher achievers.
5. To investigate the effect of Lecture Method on the academic achievement of lower, medium and higher achievers in general science
6. To compare the effect of Students' Team Achievement Division Method and Lecture Method on the academic achievements of lower, medium and higher achievers in general science.

1.6 Hypotheses

Following were the research hypotheses of the study;

H_{01}. The Students' Team Achievement Division (STAD) method has no significant effect on the academic achievement of elementary-level students.

H_{02}. The Lecture Method has no significant effect on the academic achievement of elementary-level students.

H_{03}. There is no significant effect of the Students Team Achievement Division Method on the academic achievement of lower achievers in General Science.

H_{04}. The Students' Team Achievement Division (STAD) method has no significant effect on the academic achievement of medium-achiever students in General Science.

H_{05}. The Students' Team Achievement Division (STAD) method has no significant effect on the academic achievement of higher-achiever students in General Science.

H_{06}. The Lecture Method has no significant effect on the academic achievement of lower-achiever students in General Science.

H_{07}. The Lecture Method has no significant effect on the academic achievement of medium-achiever students in General Science.

H_{08}. The Lecture Method has no significant effect on the academic achievement of higher-achiever students in General Science.

H_{09}.There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of lower-achiever students in General Science.

H_{010}.There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of medium-achiever students in General Science

$H_{011.}$ There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of higher-achiever students in General Science.

$H_{012.}$ There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of elementary-level students in General Science.

1.7 Delimitations of the Study

The study was delimited to:

District Islamabad, Islamabad Model School for Boys, Grade-8 General Science textbook published by federal board 2022.

The study was further delimited into the following four chapters, Unit 4 (pollutants and their effects on the environment) Unit 5(chemical reactions), Unit 6(acids, bases/alkalis and salts), and Unit 7 (force and pressure)

1.8 Operational Definitions

A. Presentations: A structured way of sharing information where individuals or groups verbally explain a topic using visual aids like slides, charts, or props to communicate their ideas effectively (Smith & Brown, 2020).

B. Teams Practice: A collaborative training session where team members work together to enhance their skills, coordination, and understanding of tasks to improve overall performance (Johnson & Lee, 2019).

C. Quizzes: Short assessments used to evaluate knowledge, understanding, or progress on a specific subject, typically consisting of multiple-choice, true/false, or short-answer questions (Anderson & Krathwohl, 2001).

D. Individual Improvement Scores: A numerical measure of a person's progress over time, based on performance in tasks, assessments, or skill development activities (Dweck, 2006).

E. Team Recognition: Acknowledging and appreciating a group's efforts, achievements, or contributions through awards, certificates, or verbal praise (Katzenbach & Smith, 1993).

1.9 Conceptual framework

In educational research, a conceptual framework serves as a foundational structure that guides the investigation by linking theoretical concepts to empirical observations. It assists researchers in identifying relevant variables, formulating research questions, and interpreting findings within a coherent theoretical context. For example, applying constructivist theories in education can help researchers understand how learners actively construct knowledge based on their experiences and interactions. The importance of a conceptual framework lies in its ability to provide clarity and focus, ensuring that the research process is systematic and aligned with established theories, thereby enhancing the validity and reliability of the study's outcomes. Another significant application is seen in the constructivist approach to learning, which posits that learners actively construct knowledge through their experiences and interactions. This perspective has led to the development of various subtypes, such as social constructivism and communal constructivism, each offering unique insights into the learning process (Bjorklund, D. 2018).

A conceptual framework in educational research serves as a guiding structure that defines and organizes key concepts, theories, and relationships within a study. It provides clarity, coherence, and direction by linking theoretical perspectives with empirical research. A conceptual framework establishes a theoretical basis for a study by drawing from existing theories, models, and literature. It helps researchers position their study within a broader academic context. One of the primary roles of a conceptual framework is to identify and define key variables in a study. It helps differentiate between independent, dependent, and mediating/moderating variables. A conceptual framework prevents research from being too broad or unfocused. By outlining the scope and boundaries of a study, it helps researchers stay on track. Without a clear framework, studies may lack coherence and struggle to produce meaningful conclusions.

In summary, a conceptual framework plays a pivotal role in educational research by providing theoretical grounding, which helps establish a strong foundation based on existing theories and literature. It also defines key variables, clarifying relationships between different factors in a study. By shaping research

design, the framework guides methodology, ensuring that the study follows a structured approach. Additionally, it aids data interpretation, helping researchers analyze findings within a meaningful theoretical context. A well-structured conceptual framework ensures coherence and focus, preventing research from becoming too broad or fragmented. Furthermore, it informs educational policies, contributing to evidence-based decision-making and improvements in teaching and learning practices. Lastly, it encourages critical thinking and innovation, allowing researchers to identify gaps, refine existing theories, and propose new models to enhance educational outcomes.

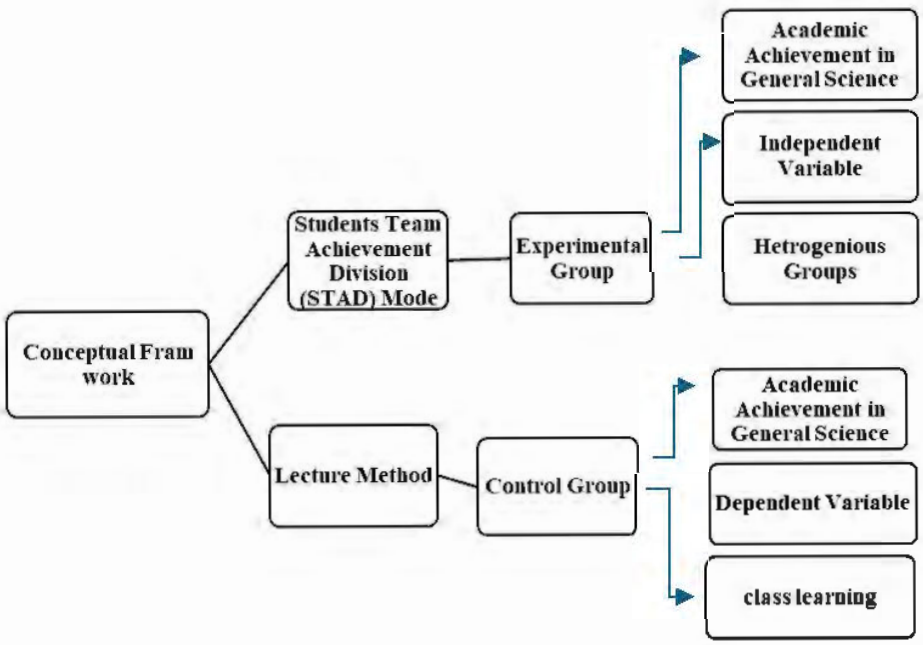

Figure: 1.1

Constructivist Learning Theory: Knowledge is constructed actively by learners Through experiences and interactions. Students collaboratively engage with peers to explore, discuss, and understand new concepts. This interaction promotes deeper

learning as students build on their prior knowledge while integrating new information. Constructivist Learning Theory is a framework that emphasizes the active role of learners in constructing their understanding of the world through experience and reflection. The theory suggests that knowledge is not passively received but actively built by the individual.

It emphasized the importance of discovery learning, where learners actively engage in problem-solving and exploration to construct new ideas based on their current knowledge. Highlighted the role of scaffolding: temporary support provided by teachers or peers to help learners achieve tasks they cannot complete independently. Both theories underpin constructivist approaches in classrooms, encouraging active participation, inquiry-based learning, and hands-on experiences. Constructivism supports frameworks like the Students Team Achievement Division model, where learners actively construct knowledge in collaboration with peers. Social Interdependence Theory: Positive interdependence enhances group dynamics, motivation, and outcomes, where members perceive that their success is linked to the success of the group. In Students Team Achievement Division model teams are rewarded based on collective improvement, encouraging students to work together, share knowledge, and support each other's learning.

Motivational Theory: Motivation drives engagement, and learning is most effective when tasks are meaningful, and rewards are aligned with efforts. In Students Team Achievement Division model individual accountability (quizzes) and group rewards (recognition) combine intrinsic and extrinsic motivators to sustain effort and participation.

Vygotsky’s Sociocultural Theory: Social interaction plays a fundamental role in cognitive development, especially within the Zone of Proximal Development (ZPD). In Students Team Achievement Division model peer tutoring and collaboration enable students to perform tasks beyond their capabilities, facilitating scaffolding and shared learning experiences.

Behaviorist Theory: Positive reinforcement strengthens desired behaviors, in the Students Team Achievement Division model group rewards for improved performance act as reinforcements, encouraging collaboration and consistent effort.

The theoretical framework is a configuration that offers direction to the researchers by relying on recognized theory. The researchers can use it as a good connection for the constructs of the study. According to the founder of this model, Slavin's (1994) Student team achievement division model is applicable in all academic areas to enhance learning outcomes. In this continuity, he suggested teaching strategies to improve learning through teamwork, which structured the basis for the conceptual framework of this study. Introducing the founders of this model by the foundation for cooperative learning, the movement of cooperative learning and worked as research director at the Center for Learning Together and by doing teamwork (Munawaroh, 2013).

As the elements of thoughts are applied for the best delivery of content, the intellectual standards follow it by using clarity to identify the purpose, gathering accurate and precise information, and deciding the relevance of information related to the questions while including logic and fairness concerned content (Danebath, 2023). Slavin suggests that the Student Teams Achievement Division type of learning model emphasizes the activities and interactions between students and other students, motivating each other and helping in understanding a subject matter, it also integrates the application of lecture, discussion, and questioning methods as well as creating an active learning process through patterns of student and teacher interaction to foster togetherness and openness during the teaching and learning process in the classroom teaching and learning. Therefore, this is observed to promote effective interaction among students, increase positive attitudes towards the course, enhance self-esteem, improve academic outcomes, and develop the interpersonal skills of learners. This study is based on the social constructivist theory, which describes the importance of significant others in the learning process. Slavin (1994) argued that it is one cooperative learning approach that enhances not only collaboration but also autonomous learning simultaneously. This method is highly applicable and flexible to various levels of students since classes are organized based on diverse groupings. It is also ensured that students experience accelerated learning as it emphasizes the principle that students collaborate to learn while also being accountable for their own education. (Widhyastika, 2017).

CHAPTER 2

REVIEW OF LITERATURE

The core idea of the STAD method is to encourage students to support and assist one another in mastering the subject matter. When students aim for their team to earn rewards, they must cooperate, provide mutual support, and thoroughly learn the material. They help their teammates perform to the best of their abilities by working collaboratively and ensuring everyone understands the lessons or instructional content. Through intensive interaction and the development of positive interpersonal relationships during the learning process, students' motivation is heightened, stimulating their cognitive engagement (Yulini, 2023).

According to Luzyawati, (2024), this approach proves to be advantageous for long-term education, particularly in achieving optimal learning outcomes. High levels of motivation, self-confidence in one's ability to think critically, and strong inquiry skills significantly contribute to improving students' academic achievements. Team-based learning strategies are widely implemented due to their foundation in research-validated theories, making them adaptable for almost any teacher to apply in alignment with their teaching philosophies.

Cooperative learning strategies, such as the STAD model, are particularly effective in producing positive learning outcomes. Studies on cooperative learning consistently demonstrate that these practices enhance student learning compared to traditional methods. The well-structured cooperative learning approaches, ensure active participation from all group members. Motivation plays a vital role in any teaching strategy, and it can integrate this by fostering both intrinsic and extrinsic motivation, rewarding top-performing teams. Working collaboratively allows students to achieve shared goals and solve problems collectively, promoting teamwork and providing additional opportunities to apply learning in practical contexts (Alijanian, 2022).

2.1 Components of STAD

The first component (1) is Submission of Material, which involves instruction delivered by the teacher to the class in a traditional manner. Teaching in STAD does not significantly differ from conventional instruction, except that the

lessons must concentrate on the concepts of the material being examined. After the teacher presents the material one or two times, students then work in groups to tackle the assigned questions.

The second component (2) is the Groups; in Students Team Achievement Division model, groups consist of 4-6 students of varying abilities and genders. The purpose of forming groups is to ensure that all members collaborate in learning and, more specifically, to prepare each member for strong individual testing. The group plays a crucial role, as it fosters cooperative work among peers to achieve the desired academic level. To determine group membership, students' report card rankings are organized, and students can also be grouped based on their final test scores. From this ranking list, grouping is conducted. Each group includes one student from the upper tier, one from the lower tier, and two students with average skills. The teacher arranges students according to this composition. Teachers need to avoid significant conflict among group members, although students are not allowed to choose their friends.

The third component (3) is the Test or Quiz; after approximately one or two instructional sessions and collaborative work in groups, students receive individual tests. This is where each student attempts to perform their best as a result of their learning. Students also recognize that their efforts and achievements will significantly contribute to the overall success of the group.

The fourth component (4) involves Individual Improvement Scores which aim to provide students with attainable goals if they exert effort and achieve better results than those obtained previously. The management of student achievement scores follows this order: initial score, test score, improvement score, and group score.

The fifth component (5) is Group Scores; to evaluate group performance, individual scores from each member are collected, recorded, and totaled to arrive at each group's scores. From these group scores, one can see which groups achieved the highest scores, thus deserving the promised rewards. The variables assessed in this study include learning motivation. Learning motivation is the comprehensive psychological drive within students that propels them into learning activities, ensures the persistence of those activities, and directs them toward achieving a goal.

2.1.1 Cooperative learning

This concept pertains to instructional strategies where students collaborate in small groups to assist each other in learning and enhance their academic results. Cooperative Learning is frequently defined by five fundamental components: i. positive interdependence, ii. Individual accountability, iii. Promotive interaction, iv. Social skills, and v. group processing. The advantageous effects of CL have been thoroughly documented. The quality of its implementation, primarily influenced by the application of the five fundamental components has been proven to have a significant correlation with the effectiveness of these methods. Nevertheless, the intricate demands of organizing sequences for educators raise the question of how and why they execute these methods, which is not a simple matter. Qualitative analysis of teacher interviews, assessed through thematic coding, revealed distinctions between educators with high and low implementation quality in terms of their beliefs. Educators demonstrating high implementation quality recognize greater value in social learning processes and feel more accountable for the success of cooperative learning (Adl-Amini, 2024).

Grounded in theories of social interdependence and social constructivism, this study's authors explored the impacts of a cooperative learning pedagogical framework on the involvement and outcomes of undergraduate students in an Ethiopian university classroom. The evidence from this study suggests that reforming courses with a CL pedagogical design could lead to enhanced student involvement and learning outcomes when compared to traditional lecture-based approaches. By incorporating this strategies, higher education professionals and institutions can cultivate more engaging and effective learning environments for students (Tadesse, 2024).

Cooperative learning possesses the potential to boost students' political efficacy, primarily by offering them chances to practice democratic skills and by having peers serve as political role models. Nonetheless, students' feedback highlights tensions within the student group and between viewing the classroom as a collective learning unit versus the expectations of the classroom as a space for individuality and assessment. These significant contradictions may obstruct the

establishment of cooperative learning classrooms and restrict the practice space that could be beneficial for political efficacy (Kosberg, 2024).

Enhancing Motivation, Engagement, and Social Studies Learning Outcomes Through the Jigsaw Type Cooperative Learning Model for Fifth Grade Students. This study seeks to bolster motivation, engagement, and social studies learning outcomes using the Type Jigsaw Cooperative learning model for fifth-grade students. This research is categorized as Classroom Action Research. The findings indicated that the Jigsaw Type Cooperative Learning model can increase motivation for learning. Utilizing the Cooperative Type Jigsaw learning model can enhance student engagement. Furthermore, learning through the Jigsaw Type Cooperative learning model can improve academic outcomes (Soares, 2024).

2.1.2 Cooperative Learning Technology

This study examines the significance of cooperative learning technology in primary education and methods for enhancing its approach. Collaborative learning encourages teamwork, critical analysis, and social skill development among students, making it vital in primary classrooms. Incorporating innovation into cooperative learning approaches provides numerous advantages, such as access to digital materials, increased engagement, and expanded connectivity. To maximize the effectiveness of cooperative learning technology, educators can carry out techniques such as choosing suitable technology tools, offering training and assistance, creating interactive activities, promoting digital citizenship, inspiring peer feedback, evaluating learning outcomes, and encouraging collaboration beyond the classroom. By utilizing technology efficiently, educators can develop vibrant learning environments that equip students for success in the 21st century (Abdullaevna, 2024).

2.1.3 STAD for Skill Development

It underscores Serota (2023) the significance of pedagogical approaches that prioritize skill development over a sole reliance on theoretical knowledge. Numerous innovations and models, notably cooperative learning, have been formulated to address these educational demands. Cooperative learning frameworks emphasize collaborative engagement among students in small groups to achieve shared academic objectives. Among these frameworks, the Student Teams

Achievement Division model has demonstrated notable efficacy. This model represents an educational strategy that has markedly transformed in the 21st century. While the foundational principles of cooperative learning have been established for an extended period, the implementation of this model within contemporary contexts has yielded substantial advantages in enhancing student collaboration and academic performance. This model emphasizes group-oriented learning, wherein students collaborate within teams to attain collective goals (Kamid, 2022).

2.1.4 STAD in 21 Century

This model organizes students into heterogeneous groups, enabling them to assist one another in completing academic assignments while preparing for individual assessments. This methodology emphasizes small-group collaborative learning and has demonstrated effectiveness across a variety of educational settings. Numerous studies have underscored the advantages of this model in bolstering student collaboration and achievement. Within these groups, students collectively engage in addressing diverse tasks and challenges. Through the meticulous application of this learning model, various strategies can be implemented to enhance student academic performance by actively involving students in discussions, analyses, and problem-solving endeavors (Mahadi et al., 2023).

According to Rejeki, (2023) merits of the STAD model lie in its capacity to elevate student participation, cultivate social skills, and foster an inclusive learning environment. This theoretical framework promotes engagement among learners in the exchange of insights and experiences pertaining to the subject matter being imparted, thereby facilitating the enhancement of students' comprehension of the instructional content. However, Juliansih, 2023 discussed that notwithstanding the numerous advantages this model provides, its execution does not consistently proceed without complications. The educational hurdles posed by the Industrial Revolution 4.0 and the requisites of the 21st century represent pressing concerns within contemporary education). A principal challenge confronting modern education is the incorporation of 21st-century competencies into the existing curriculum and pedagogical strategies to adequately prepare students for an unpredictable and evolving future (Yerizon, 2020).

2.1.5 STAD with Dynamic Settings

According to Nazari (2023) inadequacies in technological infrastructure, particularly concerning restricted access to digital devices, constitute considerable impediments. It is indicated that educational institutions lack sufficient digital devices, thereby presenting notable challenges to the execution of STAD. Furthermore, inconsistent teacher training emerges as a critical issue in the application of this model. Adequate support and training are imperative to ensure that educators possess the requisite skills and knowledge to facilitate student collaboration and attain optimal learning outcomes. Additional challenges encompass difficulties in managing group dynamics, particularly within large classes characterized by diverse student competencies. Effective classroom management necessitates specific strategies to guarantee that each learner is actively engaged and contributes meaningfully to their respective groups (Sholikhah et al., 2024).

In the contemporary educational landscape, wherein 21st-century competencies are heavily prioritized, the STAD model possesses substantial potential to assist learners in acquiring skills pertinent to today's demands. Consequently, it is vital to investigate further the modalities through which this model can be effectively operationalized. Educators play a pivotal role in devising tasks and activities that align with student capabilities, ensuring heterogeneous group formations, and delivering constructive feedback. Through the sharing of knowledge within groups, students cultivate a heightened sense of accountability regarding learning outcomes. Concerning process skills, the dialogue and shared comprehension represent critical components in enhancing student engagement in learning activities (Misbah et al., 2023).

Moreover, this approach serves to motivate them to engage actively in the learning process. By employing the STAD learning model, educators can bolster students' academic performance while fostering critical thinking, communication, teamwork, and problem-solving abilities. This methodology aids students in becoming autonomous learners, equipped to confront a variety of challenges in life. Numerous studies have underscored the advantages of this model in promoting student collaboration and achievement. It facilitates collaborative work

among students in small teams with varying abilities, thereby enhancing academic performance (Kamid, 2023).

This model also exerts a favorable influence on the social and emotional dimensions of students, which includes the augmentation of student cooperation. Other scholarly investigations underscore the significance of educator support in promoting student collaboration. Educator support can enhance the capacity of students to cooperate effectively and realize optimal educational outcomes. Furthermore, empirical evidence indicates this model can be proficiently implemented within online educational contexts, thereby augmenting student motivation for learning. Nevertheless, there exist several challenges that must be addressed in the application of this model, including the management of expansive classrooms and constraints related to available resources. The adaptation of the STAD model for project-based learning contexts and the mitigation of disparities in student performance are also focal points of scholarly inquiry (Hamidi Rad, et al., 2023).

2.1.6 STAD with Educators

Moreover, Qureshi (2023) discussed effective teacher training constitutes a pivotal element in the successful execution of the STAD model, as well-trained educators are better equipped to manage group dynamics and ensure that each student derives maximum benefit from this pedagogical approach. Expected learning refers to an educational transformation from a traditional one-way format, predominantly characterized by teacher instruction, to an interactive model that promotes multi-directional engagement among educators, learners, and the surrounding community, as well as various resources. This form of learning encourages a process orchestrated by the instructor aimed at fostering innovative thinking to enhance students' cognitive abilities (Yunita, 2023)

2.1.7 STAD Implication for Education

According to Amalia (2024), Vygotsky's theory presents two significant implications for education. Firstly, it advocates for classroom dynamics to foster cooperative learning among diverse groups of students, enabling them to engage collaboratively in tackling complex tasks and cultivating effective problem-solving techniques within each individual's zone of proximal development. Secondly,

Vygotsky's educational framework places a strong emphasis on scaffolding. This method allows students to gradually assume greater responsibility for their own learning processes. Models of learning that fulfill effective criteria will create an efficient and productive learning process.

Conversely, if the learning model fails to meet these criteria, several issues will arise in the educational process. A learning model is a framework that outlines a systematic approach to structuring learning experiences and acts as a reference in the planning and execution of educational activities. The learning model refers to a technique or strategy employed by an educator to conduct teaching and learning processes (Said, 2023).

In the argumentation of Sutiyono (2024) numerous cooperative learning models, such as the Student Team Achievement Division cooperative learning model, can be utilized. This model engages students actively, allowing all students to participate in discussions or dialogues to exchange ideas and information about a subject or issue or to seek potential facts and evidence that can assist in solving a problem. Consistent with the notion that learning model emphasizes the active involvement of students in study groups (Sari, 2023).

According to Febriani & Frasandy (2024) implementing the Student Team Achievement Division model necessitates that student become more proactive, self-reliant, innovative, and collaborative across teams, fostering beneficial interactions within a group. This educational approach not only aids students in grasping the material but also cultivates collaboration skills among peers as they communicate and assist each other in completing tasks. Collaboration skills are essential social skills for students.

2.1.8 STAD with Positive Effects

Zahro (2024) supported that it is essential to develop innovative learning models and innovations suitable for the subject matter that can enhance communication between students and between students and teachers to foster collaboration skills and improve learning outcomes for students. It is considered an effective cooperative learning model that emphasizes interaction and student engagement, encouraging mutual support in mastering lessons, which positively impacts learning outcomes. Learning outcomes refer to the skills children develop

after participating in educational activities. These outcomes represent the level of competence a student achieves following a learning experience.

Septian (2024) indicated positive effects of learning outcomes are evident when students demonstrate new skills in completing tasks and answering test questions accurately and appropriately, adhering to the given instructions and time constraints. In the context of teaching and learning, outcomes are goals that students are expected to meet, and teachers must understand these outcomes to effectively plan instructional activities. Rahayu (2024) perceived it as a cooperative learning model; thus, the grouping of students' needs to take student achievement into account. Another factor considered is how effectively students can practice and learn information in smaller groups. The fundamental concept is to inspire students within groups, allowing them to support and assist each other in grasping the material presented, while also cultivating an understanding that learning is essential, meaningful, and enjoyable.

2.1.9 Transformation through Education

It is incorporated by Xu, (2023) that education constitutes one of the fundamental pillars essential for the cultivation of high-quality human resources. The advent of the Fourth Industrial Revolution has accompanied in profound transformations across various facets of life, encompassing both employment and communication. Advancements in technology, including artificial intelligence, robotics, and digitalization, have engendered new requirements that necessitate the education sector to align with these progressive developments. In contemporary society, education extends beyond mere academic knowledge, focusing on equipping students with competencies pertinent to the current epoch. Within the framework of globalization and rapid technological progress, the educational infrastructure must not only impart academic knowledge but also foster critical thinking, communication, and collaborative skills. The exigencies of the 21st century necessitate that individuals possess robust critical thinking capabilities to confront intricate challenges along with the capacity to collaborate effectively in team settings, practical communication skills adaptable to diverse contexts, and digital literacy. This scenario facilitates students' ability to acclimate to the continuously evolving technological landscape (Widyastuti, 2023).

2.2. Different CL Strategies

Selecting the most suitable strategy is essential for achieving educational goals. Effective teaching requires instructors to adapt their approaches to match the needs of their learners, which involves familiarity with various instructional methods and the ability to implement them efficiently. A key objective of educators is to use instructional techniques that enhance both the cognitive and affective outcomes of students. In recent years, cooperative learning methods, a subset of student-centered strategies, have gained global recognition as a significant area of social science research. Numerous studies conducted in diverse educational contexts have examined various cooperative learning techniques. These include Learning Together (LT), Jigsaw Grouping, Teams-Games-Tournaments (TGT), Group Investigation (GI), Student Teams Achievement Division (STAD), and Team Accelerated Instruction (TAI). Research consistently shows a strong correlation between cooperative learning approaches and improved cognitive and affective outcomes (Tran, 2021).

However, according to Faramarz, (2023) successful cooperative learning requires that all group members actively study and understand their assignments, working collaboratively to address problems within their teams. Practical applications of cooperative learning incorporate several distinct methods. Cooper identifies approaches such as STAD, Jigsaw, Constructive Controversy, and Group Investigation. Within the Student Team Achievement Division model, students work in groups of 4-5 members after the teacher's presentation. Each student completes individual quizzes to assess their understanding of the material, and the results contribute to the team's overall score. Teams, composed of students with varied academic abilities, gender, and intelligence levels, are rewarded based on their performance. Typically, Student Team Achievement Division model activities, including teacher presentations and team quizzes, span 3-5 class periods.

In response to an emerging world, education must transform, and project-based learning (PBL) is gaining traction for its effectiveness. PBL is a dynamic educational method that allows learners to acquire knowledge through hands-on projects. This approach is widely utilized across various fields, from K-12 to higher education, including mathematics, science, medicine, and social sciences, and it is

becoming increasingly recognized in both academic research and practical applications.

Baran et al (2023) indicate that PBL enhances students' deep learning by immersing them in educational activities, thereby facilitating the connection of knowledge to real-life scenarios and fostering advanced skill sets. Nonetheless, the successful execution of this faces challenges and doubts. Research indicates that student interest and motivation are crucial for effective engagement. A lack of enjoyable design in PBL could lead to diminished student focus and time wasted during projects. Here is a demand for more quantitative and individualized assessment techniques and tools. Consequently, gamified learning presents fresh perspectives for addressing these challenges by boosting motivation and outcomes. This approach incorporates game-like elements such as reward systems to encourage participants to engage in tasks they initially found uninteresting.

Furthermore, the Innovating Pedagogy (2019) report from the British Open University ranks it as a leading innovative teaching strategy. Research suggests that gamified learning significantly enhances motivation, academic performance, cognitive development, and social-emotional learning experiences. Therefore, numerous studies have started to investigate the combination of gamified learning and PBL, giving rise to an innovative approach known as gamified. GPBL involves integrating games, game elements, or mechanics into project-based learning to optimize learning outcomes. Markham posited that incorporating game elements into PBL can engage students and maximize their skills and creativity, as these elements provide 'ambitious' tasks, clear objectives, desirable tools, comprehensive feedback, a collaborative atmosphere, and meaningful rewards.

It has also been discovered that it encourages profound learning through learner-centered methodologies, fosters interactions among peers, offers authentic tasks, and promotes metacognitive strategies. Comprehending the subject matter collectively the Student Team Achievement Division approach renders education more impactful as learners will organically link their acquired knowledge to everyday experiences, whereas its framework serves as a general method for classroom organization rather than an exhaustive educational approach for specific subjects; educators incorporate their unique lessons and resources.

As stated by Pambudi (2016) "Collaborative learning is a pedagogical strategy focused on collective inquiry within smaller groups to tackle challenges with peers, enabling resolution of more complex issues." The cooperative educational method comprises two models Student Teams Achievement Division and Team Games Tournament. In educational settings, various methods, techniques, and approaches are utilized. One of these is cooperative learning. Collaborative learning provides a leadership style that actively engages participants in their own learning. Thus, teachers assume the role of facilitators while learners are fully involved in the learning process. The cooperative learning approach enhances students' critical thinking skills, motivates them to think critically, and plays an active role in fostering student responsibility for their own learning. Cooperative learning offers significant educational advantages, such as intrinsic motivation, positive attitudes toward the subject matter, enhanced self-esteem, social support, group cohesion, and participation (Lipowski, 2021).

In Tanzania, Cooperative learning promotes cognitive growth along with constructivist methods that prioritize students in the learning process. University educators must foster an atmosphere that supports effective team learning. This necessitates effort, interest, and recognition of the fact that the successful functioning of teams and the achievement of learning goals rely on the teacher's involvement, as well as student satisfaction with group activities. Cooperative learning is useful in addressing a lack of motivation for learning among students and it is regarded as an advantageous educational approach with the potential to inspire students within higher education environments. Lie (2023) carried out research in China, remarking that collaborative learning fosters students' advanced cognitive skills. Collaborative learning represents one of the most significant and fruitful domains of educational theory, research, and practice.

Additionally, Vitalice (2018) undertook a study in Kisi, Kenya, to examine the impacts of the collaborative learning technique on students' performance and attitudes toward oral literature genres in selected secondary schools, concluding that this approach enhances learners' achievement and perspectives regarding oral literature genres. Broadly speaking, cooperative learning environments are often more dynamic, enticing, and enjoyable, allowing student's greater responsibility and

authority over their learning, which boosts their sense of autonomy and competence while substantially contributing to the enhancement of learning objectives (Amin, 2020). Learning objectives, often referred to as mastery objectives and task-focused aims, relate to the understanding and enjoyment of a task undertaken by students eager to learn and refine their abilities. In contrast, performance objectives, also known as execution goals or ego-involvement aims, pertain to maintaining one's image, accomplishing a goal, or showcasing one's skills.

Altun (2023) conducted a study in Turkey, stating that cooperative learning fosters effective teaching and learning and that when appropriately applied, it provides superior opportunities for students to cultivate skills in group interactions and collaborative efforts in analyzing, synthesizing, and discussing diverse tasks. Cooperative learning embodies a participatory educational method characterized by shared ideas, teamwork, interaction, brainstorming, community, and discourse. Consequently, learning activities should be integrated into the instructional process utilizing one of the educational methodologies, with the cooperative learning model being ideally suited for this challenge. Cooperative learning stands out as one of the most effective methods to enhance student engagement in learning. In educational practice, the application of various instructional strategies is crucial to ensure successful knowledge transfer. Educators employ different teaching methodologies, including lectures, discussions, and demonstrations, to reach this goal. Traditional approaches, such as lectures that position educators as the principal focus of learning while students merely listen, take notes, and solve problems, have been criticized. Many researchers suggest that such methods do not facilitate a profound comprehension of concepts. Consequently, there is an increased focus on employing a variety of teaching methods to bolster understanding and learning outcomes. Among these, the cooperative learning method is recognized as a student-centered teaching strategy that encourages learners of varying abilities to collaborate in small groups to enhance their grasp of the subject matter and motivates them to interact and cooperate towards a collective goal (Chan, 2020).

Facilitating student interaction and collaboration not only fosters peer learning but also promotes accountability for the tasks they must complete and the decisions they face. To operate as a team, which is vital in all life aspects, one must

strive for solutions benefiting everyone involved. Cooperative learning proves effective in achieving knowledge acquisition and cultivating students' skills in mutual support, cooperation, and communication. Compared to individualistic or competitive learning styles, the cooperative learning method more effectively advances social interaction, learner independence, and educational success (Shih, 2020).

To develop social and communication skills such as active listening, cooperative questioning, and respectful negotiation, it is essential to instruct students to collaborate effectively in groups. Various studies regarding cooperative learning in primary and secondary education, including a meta-analysis by Slavin (1989) that reviewed 60 studies across both levels comparing cooperative learning to control groups studying identical material, underline this necessity. Therefore, it is crucial to integrate learning activities into the educational process via a suitable method (Pasrija, 2023).

Addressing the aforementioned challenges, it is necessary to devise an appropriate solution to resolve these issues, as it is anticipated that the Student Team Achievement Division method can enhance motivation to learn about Islamic cultural history by fostering a pleasant learning environment and nurturing the spirit of cooperation and respect among students. The resolution to tackle these challenges lies in applying the cooperative learning model. The Student Team Achievement Division is a specific learning approach within the framework of cooperative learning, focusing on group-based learning processes. Group activities thrive on engaging interaction in discussions, one of which serves to unearth solutions or resolve issues encountered.

2.2.1 Learning Process

The learning process begins with the teacher presenting new material to the class. Team members then collaborate to learn and practice the material within their groups, often working in pairs. During this stage, they complete worksheets, pose questions to one another, discuss problems, and engage in exercises. Each group member must master the assigned tasks. Finally, the teacher administers a quiz that students must complete individually. Student independence in learning is often observed to be low, as indicated by minimal active participation in activities like

asking questions or engaging in group discussions. Students tend to focus on memorizing the material rather than understanding it deeply. The Student Team Achievement Division method addresses this challenge, as it is one of the simplest cooperative learning strategies to implement. Developed by Johns Hopkins University after extensive research on cooperative learning, it fosters active student participation, with every contribution enhancing the overall learning process and outcomes (Wonk. L, 2022).

According to Doe (2023), students can evolve into effective communicators and collaborators across cultural and global boundaries. Educators play a pivotal role in empowering students to adapt, thrive, and succeed by fostering an environment that emphasizes these skills, equipping them to meet future challenges and opportunities.

2.2.2 Collaborative and Cooperative Learning

Collaborative and cooperative learning are distinct yet related educational approaches. Both emerged as independent methodologies in the 1960s and 1970s, sharing similar goals of promoting interaction and engagement among learners. Collaborative learning emphasizes group work, active participation, and shared responsibility among students, requiring active communication and discussion to achieve common objectives. Cooperative learning, in contrast, is structured with specific roles assigned to group members, fostering positive interdependence and individual accountability. Through collaborative activities, students work together to construct knowledge, develop critical thinking skills, and gain a deeper understanding of various concepts. In social studies, for example, collaborative learning encourages knowledge construction through discussions and group activities, while cooperative learning builds a sense of community, fostering respect for diverse perspectives and positive interdependence (Johnson, 2022).

2.2.3 Problem-Based Learning

Research indicates that cooperative learning models, particularly Student Teams Achievement Divisions and Problem-Based Learning, are highly effective in fostering sustainable development within e-learning environments in higher education. These methods enhance student engagement, critical thinking, collaborative problem-solving, and knowledge acquisition, especially on sustainable

development topics. Both models emphasize student-centered learning, empowering students to take charge of their education, strengthen their problem-solving abilities, and deepen their understanding of sustainability concepts. One effective method for improving students' grasp of mathematical concepts is the cooperative learning model. This approach is renowned for its structured process, which facilitates students' conceptual understanding at every stage of learning (Nasution, 2020).

Similarly, research on the Home Science Student Team Achievement Division model has demonstrated its value in guiding teachers to incorporate higher-order thinking Skills into their lessons. The findings underline the significance of cooperative techniques like STAD in fostering HOTS among students. Future research may explore the application of these techniques in varied educational contexts to further advance development (Takko et al., 2020).

2.2.4 STAD Positively Influences

The STAD cooperative learning model has a significant positive effect on classroom dynamics and the overall learning experience. The interaction and collaboration fostered by it contribute to improved student comprehension and performance within the classroom environment. It is particularly effective in enhancing teacher activity, student engagement, and learning outcomes (Pardiyana, 2023).

The development and application of STAD-based learning tools can yield high-quality resources that meet essential educational criteria while also being practical and effective. The success of these tools is demonstrated through factors such as efficient teacher management, active student participation, positive student feedback, and the attainment of learning objectives (Ciancarini et al., 2022).

The Student Teams Achievement Division method, when combined with flipped learning, significantly enhances students' expository writing skills and their overall learning perceptions. This blended approach enables students to receive expository writing instruction aligned with its principles. Analysis has shown that students in flipped learning groups have favorable perceptions and experiences related to its methodology, the support provided by instructors, teamwork, and personal engagement with the course material (Shafiee, 2022).

2.2.5 Crossword Puzzles

Another study explored the integration of the cooperative model with crossword puzzles to improve students' biology learning outcomes, focusing on the topic of Development and Growth from a cognitive perspective. Students in the experimental group were taught using Student Team Achievement Division method combined with crossword puzzle worksheets, while the control group followed conventional teaching methods. The findings indicate that incorporating it with crossword puzzles positively influences cognitive learning outcomes, particularly in the area of biology (Mensah, 2022).

2.2.6 Social Interaction

Cooperative Learning is a group-based educational activity that highlights social interaction among students, individual accountability, and mutual encouragement to enhance each other's learning. Methods like Student Teams Achievement Divisions foster active student involvement, collaboration, and shared responsibility for learning within group settings. Research has shown a positive impact of this method on mathematics learning outcomes, although the effectiveness of any instructional approach may vary based on factors like context, student characteristics, and how the teacher implements the method (Arnas, 2022).

Despite differences in students' backgrounds and abilities, the Student Team Achievement Division method has proven effective in achieving shared goals, such as improving graduation rates, enhancing understanding, and raising the overall quality of teaching and learning. It underscores the concept that the learning process is fundamentally an interaction between teachers and students, aimed at achieving intended learning outcomes.

2.2.7 Efficient Strategies

To enhance student learning effectively, teachers must adopt strategies that are both efficient and impactful. A study comparing traditional teaching methods with the Student Team Achievement Division method, discussions, and fostering interest in learning concluded that it is more effective for improving social studies outcomes in elementary school students. The research found that the cooperative learning model, combined with discussion and learning interest, significantly influences social studies learning outcomes (Marajo & Syahbuddin, 2022).

2.2.8 Peer-Assisted Learning

Research has highlighted the potential of the STAD cooperative learning model as an effective tool for facilitating peer-assisted learning in subjects such as Anatomy. The study also explored diverse assessment techniques for evaluating students' learning in Akidah Akhlaq, including written tests, assignments, projects, portfolios, observations, self-assessments, peer evaluations, and teacher journals. These integrated assessments provided a comprehensive understanding of students' knowledge and application of the subject matter. The Madrasah education system incorporates authentic assessments that evaluate cognitive, affective, and psychomotor aspects throughout the learning process of Akidah Akhlaq (Zebua et al., 2022).

2.2.9 Stimulates Students' Enthusiasm

The Student Team Achievement Division method is a cooperative approach designed to boost student interaction and engagement. A key feature of this model is the incorporation of games and classroom activities to make learning enjoyable. By integrating games into the learning process, the Student Team Achievement Division method fosters students' enthusiasm and participation. Research has demonstrated that this model significantly improves science learning outcomes by increasing students' motivation, engagement, and enthusiasm. By creating a collaborative and enjoyable environment, it promotes active participation and a deeper understanding of the content (Rorimpandey, 2022).

2.2.10 STAD Increased Student Activity

Research has demonstrated that the implementation of action research combined with the Student Teams Achievement Division model significantly increased student activity and improved learning outcomes in the classroom. Students showed higher levels of engagement and understanding, with a marked improvement in their mastery of the presented material. Moreover, studies indicate that the Cooperative Learning Model has a significant positive influence on the learning outcomes of students compared to traditional methods. This reinforces the conclusion that it enhances the quality of academic activities and promotes better learning during school sessions (Lestari & Armita, 2022).

2.2.11 Analytical Thinking Abilities

A study investigated the relationship between analytical thinking and process skills using the Jigsaw and Student Team Achievement Division method. The results indicated a strong relationship between analytical thinking and process skills when employing both models. Notably, there were observable differences in students' analytical thinking and process skills between the two learning approaches. Specifically, the study confirmed that higher levels of analytical thinking are associated with enhanced process skills in students, particularly when the Jigsaw learning model is used in junior classes. Similar patterns were observed for both the Jigsaw and STAD models, affirming their efficacy in developing students' cognitive abilities (Winarni, 2022).

2.2.12 STAD Improve Motivation

The application of the STAD cooperative learning model has been shown to improve learning outcomes in social studies for fifth-grade students. During the 2018–2019 academic year, the use of this enhanced the engagement and participation of Class V students in social studies subjects. Additionally, implementing this model improved the learning motivation of fourth-grade students studying economic activities. To maintain and further enhance motivation, teachers are encouraged to integrate elements of creativity, innovation, fun, and meaningful content in the learning process. These strategies can make cooperative learning more effective and engaging (Rini, 2022).

2.2.13 Think Pair Share

Think Pair Share and Student Team Achievement Division learning methods revealed notable differences in students' problem-solving abilities. Students taught using this model achieved significantly higher average scores in problem-solving than those taught using this model. This suggested that the instructional strategies employed in this model were more effective in enhancing students' problem-solving skills within the given context (Siahaan, 2022).

2.2.14 Science Education

Although it was discussed by Vijayalakshmi (2022) cooperative learning theory is widely recognized, further application is needed to explore its potential for

fostering higher-order cognitive skills and problem-solving abilities, particularly in science education. Future studies should focus on advancing cooperative learning practices to support the development of these critical skills. A study evaluating the impact of the cooperative learning model on the academic performance of senior secondary school students in Biology found significant differences in achievement scores between students taught using this and those taught through traditional lecture methods. The findings indicate that students who received STAD-based instruction outperformed their peers in the lecture-based group. Furthermore, the study highlighted that the impact of this model on academic achievement was consistent across both male and female students, demonstrating its universal effectiveness (Ibrahim, 2022).

2.2.15 Different Factors

A meta-analysis was conducted to evaluate the impact of cooperative learning on mathematics learning outcomes among vocational high school students compared to conventional teaching methods. The findings indicated that the effectiveness of cooperative learning varied based on certain factors. Teachers can leverage these insights to implement cooperative learning strategies tailored to the specific grade level and student demographics in their classrooms, ultimately enhancing mathematics learning outcomes for vocational high school students (Ridwan, 2022).

2.2.16 Sense of Belonging

Research on the implementation of the Student Team Achievement Division cooperative learning model revealed a significant improvement in students' motivation to learn. Cooperative learning strategies effectively enhance both motivation and achievement by fostering active student engagement, collaboration, and the development of critical social and cognitive skills. Through teamwork and shared responsibilities, students experience a sense of belonging and are more inclined to participate actively in the learning process. This model emphasizes creating diverse teams in which each member has a distinct role, contributing to the overall team's success. This structure promotes active participation and a cooperative spirit among students (Rasanti, N. et al., 2022).

2.2.17 STAD Improves Competencies

A study addressing low grammatical competence among students investigated the effects of cooperative learning model. The findings confirmed that Student Team Achievement Division method significantly improved students' grammatical competence while positively influencing the classroom atmosphere. Students became more engaged, felt valued, and gained confidence in expressing their opinions and asking questions. This research underscores the potential of cooperative learning methods to enhance students' grammatical skills and language proficiency. By actively involving students and fostering a supportive environment, it boosts engagement and confidence, making it an effective pedagogical approach (Sirod, 2022).

2.2.18 STAD for EFL

According to the Tabatabaei (2022) Student Team Achievement Division method has been shown to positively impact overall achievement and creativity among Iranian secondary school learners of English as a Foreign Language. Studies demonstrate that incorporating cooperative learning significantly enhances both academic performance and creative abilities in EFL learners. Additionally, comparisons between the Team-Assisted Individualization and STAD methods revealed that while both approaches positively influenced mathematics achievement, the TAI method showed a slightly greater impact. However, no significant differences were observed in students' attitudes toward mathematics when comparing these instructional methods (Tarim, 2008).

2.2.19 STAD Promotes Engagement

The success of the STAD model lies in its blend of group and individual accountability, with diverse teams of students sharing responsibility for learning. Research indicates that STAD encourages student engagement and active participation in classroom discussions, making it more effective than traditional teaching methods in certain contexts, such as teaching a two-variable linear equation system. For cooperative learning in online environments, the study identified factors that influence its effectiveness, including the tools used to facilitate collaboration and communication. (Ramadhan et al., 2022).

Aslamiyah (2022) discussed the application of this also demonstrated a positive impact on increasing student activity and achievement in physics. However, certain areas, such as oral, drawing, and mental activities, require further attention to meet the expected performance standards. Further, it was highlighted the effectiveness of this method in improving students' English communicative competence. The findings showed that the method enhanced students' ability to master reading and communicative skills compared to other teaching approaches (Farizawati et al., 2022).

2.2.20 STAD Scientific Approach

The effectiveness of the Scientific Approach integrated with the Student Teams Achievement Divisions cooperative learning model has been assessed as a strategy to boost student achievement and motivation. A study comparing the Scientific Approach alone to its integration within the STAD cooperative setting provided positive evidence supporting the latter. This integrated approach appeared to be more readily adopted by teachers, facilitating effective material delivery. The steps of this integrated approach included presenting real-world problems for observation, grouping students to encourage questioning and guidance, monitoring group discussions to gather insights, evaluating individual quizzes, and sharing results to recognize group achievements. This process showed that the cooperative Scientific Approach in the STAD framework successfully enhances learning outcomes. Teachers can leverage this strategy to improve student performance and motivation while promoting effective and efficient knowledge-building (Rosnawati, 2022).

2.2.21 Pedagogical Competencies

Research has highlighted the impact of cooperative learning on enhancing teachers' professional and pedagogical competencies, which in turn positively affects student engagement and learning outcomes in science. The study found that cooperative learning methods fostered authentic student engagement and led to better academic results compared to traditional lecture-based methods. Significant improvements were observed in the baseline, midline, and end-line measurements, underscoring the role of professional learning practices in enhancing teachers' skills. Additionally, cooperative learning accommodated diverse student backgrounds,

ensuring active participation and inclusive engagement in the classroom. The Student Team Achievement Division cooperative learning model also demonstrated its effectiveness in reducing language errors, particularly in English, among students. Both teachers and students expressed positive perceptions of the STAD method, highlighting its potential to improve language mastery and skills. This finding supports the use of STAD as a viable teaching approach for language development (Geletu & Arum, 2022).

2.2.22 Effectiveness

According to Usmaedi (2022) the effectiveness of the Cooperative Learning (CL) method, particularly the "listening team" strategy, revealed notable improvements in student engagement and academic performance in social science subjects. Teachers and students exhibited increased participation and activity during lessons, with learning mastery levels improving for the study. It was also explored the impact of various cooperative learning strategies, including Team Game Tournament, Jigsaw, Think-Pair-Share and STAD, on oral communication skills in 9th-grade students. The research demonstrated improvements in class participation, English interaction, teamwork, and comprehension skills. Students also showed increased confidence, focus, and reduced misbehavior. These outcomes indicate that cooperative learning strategies are effective in fostering social interaction, enhancing communication skills, and improving overall classroom dynamics (Mahecha, 2022).

Further research investigated the effect of STAD-type cooperative learning, combined with specific learning tools, on critical thinking skills and psychomotor and affective learning outcomes. Results from the quasi-experimental design indicated that this method significantly enhanced critical thinking skills, independent of students' academic abilities. This highlights the value of STAD-based learning tools in promoting higher-order thinking skills (Ghufron, 2023).

Ismail, (2023) focused in Brunei Darussalam the effectiveness of the Think-Pair-Share cooperative learning model in improving student participation and performance in the subject of building quantities within Vocational and Technical Education (VTE). TPS was found to develop critical soft skills, such as teamwork,

problem-solving, and critical thinking, which are crucial for this. While the outcomes were positive. The study provided recommendations to overcome these barriers, emphasizing the potential of TPS to enhance essential skills and performance in technical education contexts.

2.2.23 Metacognition

It was explored the combination of the IDEAL-type metacognitive learning strategy with the Student Teams Achievement Divisions cooperative learning model to enhance students' self-efficacy and problem-solving skills in thermochemistry. The findings revealed that this combination significantly improved problem-solving abilities compared to using this alone, though it was not as effective in boosting self-efficacy. However, students with high levels of learning motivation exhibited improvements in both self-efficacy and problem-solving skills when taught using the combined approach. This suggests that integrating the IDEAL-type metacognitive learning strategy with STAD can effectively enhance problem-solving abilities, particularly when students are motivated to learn (Ardianty, 2023).

Rasyid (2023) also assessed the impact of an online media-based STAD-type cooperative learning model on students' understanding of physics concepts. The study demonstrated significant differences in comprehension between students taught with this model and those taught via conventional online methods. The variance analysis confirmed the effectiveness of the STAD model in improving concept comprehension. Another study examined the influence of the Virtual Laboratory-assisted model on students' learning activities and outcomes. Results indicated that integrating virtual laboratories with this model positively impacted learning processes and outcomes (Mustapa, 2023).

It is explored that effect of the Think-Pair-Share Cooperative Learning Model on speaking skills among students in a Language and Arts program. Analysis using a variance-pooled t-test revealed a significant improvement in speaking skills compared to conventional teaching methods, emphasizing the effectiveness of it in enhancing oral communication. In the context of mathematics, the Student Team Achievement Division model was employed to improve student engagement and achievement. A pretest-posttest design was used to evaluate its impact, showing notable improvement in students' mathematical performance, especially in

geometry. The study highlighted the potential of Student Team Achievement Division method to address the learning challenges of students with mathematical difficulties. The findings underscore the value of integrating cooperative learning strategies into education to prepare students for workforce demands, emphasizing critical thinking as a key skill (Sukra, 2023)

2.2.24 STAD and Jigsaw

The impact of STAD and Jigsaw Cooperative Learning Models on English reading comprehension was also studied. Both methods significantly enhanced students' reading skills, underscoring the importance of cooperative learning in English language instruction. Teachers are encouraged to incorporate these models to improve language proficiency. Additionally, the Remap-STAD model was recommended for improving creative thinking, learning motivation, and academic outcomes. This model was shown to support these elements effectively, contributing to overall student development. A trend analysis of the Jigsaw learning model in economics education revealed growing interest and increased publication activity. The study identified connections between research themes and keywords, such as "student activity," "achievement," and "cooperative learning." This analysis provides valuable insights for educators and researchers, highlighting the relevance of the Jigsaw model in fostering student engagement and learning outcomes in economics (Triansyah & Adawiyah, 2023).

2.3 STAD and Skills

To address students' need for improved collaboration skills, the research evaluated the STAD model, supported by scientific worksheets, on elementary students' learning outcomes and teamwork abilities. The results indicated significant improvements in both academic achievements and collaborative skills, demonstrating the model's effectiveness in promoting teamwork and academic success. Cooperative learning emphasizes positive interdependence, where students work in small groups to achieve shared goals. This approach fosters active participation, collaboration, and mutual support, enhancing cognitive and social skills. As a globally recognized teaching method, cooperative learning is applied across diverse educational systems and disciplines to build essential skills such as communication, problem-solving, and teamwork (Gillis, 2023).

2.3.1 Inclusive Education

Incorporating cooperative learning into inclusive education creates a supportive environment that values diversity and fosters collaboration among students with varying abilities and backgrounds. This method enables students to leverage individual strengths, work collectively, and develop critical skills like leadership, self-regulation, and teamwork. By engaging in cooperative learning, students acquire tools to become lifelong learners and contribute actively to society (Gillies, 2023).

2.3.2 STAD Organizing Students

Team based learning is an educational method where students are grouped into small teams to collaborate and support each other's learning. This approach is grounded in the concept that social interdependence and active interaction within the learning environment significantly influence learning outcomes. The development of interpersonal skills is regarded as equally important as acquiring knowledge in team based learning. Teachers can integrate various strategies to facilitate team based learning in everyday language instruction, providing a platform for students to voice their ideas, ask questions, and clarify their understanding. This collaborative atmosphere helps students deepen their comprehension of the language being taught.

2.3.3 Language Teaching

While team based learning can significantly improve student engagement and learning outcomes in language instruction, it also presents certain challenges. One major issue is ensuring that all students contribute equally to the group. Some students may dominate discussions, while others may remain passive, which can disrupt the balance of collaboration within the group. To overcome this, teachers must provide clear guidelines and monitor group dynamics closely to ensure that every student participates actively. When these challenges are addressed, cooperative learning can create a dynamic, interactive learning environment that promotes language skills development and the growth of essential interpersonal abilities. However, effective management of time and equitable participation is crucial to maximizing its benefits (Yusuf, 2023).

2.3.4 STAD in Mathematics

Khusna & Acho (2023) discussed through the Student Teams Achievement Divisions model, positive results can be found. The research indicated a marked improvement in student activity and learning outcomes in mathematics. This model effectively enhanced students' understanding of the topic, particularly among fourth-grade elementary school students. The findings highlight the importance of using engaging and interactive teaching methods like this to optimize learning outcomes in subjects like mathematics. Further, it examined the impact of cooperative learning strategies on critical thinking skills in History education at the secondary and high school levels. The Jigsaw Technique also facilitated enhanced learning, promoting peer exchange of ideas. These strategies were also observed to improve performance, though barriers to their successful implementation, such as students' resistance or difficulties with group dynamics, were noted.

2.3.5 Reading Comprehension

Evaluating the effect of Student Team Achievement Division method, it is discussed students' reading comprehension showed that the model is highly effective in improving comprehension skills. The study compared an experimental class using STAD with a control class using the lecture method. After statistical analysis, the findings supported the use of STAD as an effective method for enhancing reading comprehension among tenth-grade students. A comparative study on digital cooperative learning versus digital lectures found that digital CL significantly improved students' psychosocial outcomes, including a sense of belonging, science confidence, and perceived generic skills. The study revealed that the effects of digital cooperative learning were comparable to those seen in physical classroom settings. These findings suggest that cooperative learning, even in digital environments, can address challenges in online education and foster a positive learning atmosphere for students in biology courses (Sopiyah & Mogelvang, 2023).

2.3.6 Impact on Science Education

According to Kuswandi (2023) impact of cooperative learning in science education was also explored. Cooperative learning approaches positively influenced students' attitudes, beliefs, and behaviors, promoting greater engagement and active participation. This approach supported the goals of historical education by

cultivating a deeper understanding of scientific principles. Data was collected through tests and direct observations, revealing that cooperative learning strategies enhance both the cognitive and affective dimensions of students' educational experiences.

2.3.7 Jigsaw vs STAD

A comparison of the Jigsaw and STAD techniques in improving students' reading comprehension in descriptive texts indicated that the Jigsaw method was more effective in enhancing reading skills. This suggests that the Jigsaw technique may be more suited for teaching descriptive texts and improving students' comprehension in this context (Ramdhani, D. R., 2023).

2.3.8 Academic Achievement

Agwu, (2023) expressed the effectiveness of interactive engagement pedagogy, specifically cooperative learning, in improving academic achievement and self-concept in chemistry. The study found a positive relationship between academic achievement and self-concept, highlighting the benefits of cooperative learning in fostering academic success. Barriers to implementing innovative pedagogies, particularly in developing nations, were identified, and potential solutions were suggested.

2.3.9 Reactive Positive Behavior

Studies on reactive-positive behavior in university students Miguel & Garcia (2023) revealed that those with more experience in the academic environment were more likely to engage positively in group settings. This finding suggests that familiarity with the academic environment and processes can foster better collaboration and interaction among students. Additionally, students with higher academic qualifications tended to exhibit greater motivation and commitment in collaborative learning activities. Another study revealed that students exposed to a highly structured cooperative learning framework at a younger age showed significant improvements in various cooperative learning variables, such as empathy, social relations, and leadership. In contrast, students exposed to a low-structured framework did not demonstrate these improvements, particularly as they grew older. This highlights the importance of structured cooperative learning environments that promote positive interactions and skill development.

Cooperative learning promotes teamwork, collaboration, and a sense of shared responsibility among students. It encourages them to work together towards a common goal, providing opportunities for peer interaction, exchange of ideas, and clarification of concepts. This approach helps students build confidence by recognizing each other's strengths and accomplishments. In addition to academic benefits, cooperative learning enhances social skills such as communication, cooperation, and conflict resolution. It also fosters personal skills like leadership, empathy, and respect for others, preparing students for future collaborative endeavors (Anijah, 2023).

2.3.10 Constructivism Theory

The study is rooted in constructivism, a theory that asserts that knowledge is built through understanding. In this view, learning is an active process, where students develop meaning based on their experiences, interactions, and reflections. The study supports the idea that cooperative learning plays a key role in knowledge construction, highlighting the importance of social relationships in shaping learning outcomes. Additionally, the study connects to three other relevant theories: interdependence theory, social learning theory, and cognitive social learning theory.

2.3.11 Interdependence Theory

This theory emphasizes the interconnectedness and mutual reliance of individuals within a social context. In cooperative learning, students depend on each other to accomplish shared objectives, fostering interdependence and collaboration. The study likely demonstrates the positive impact of this interdependence on student engagement and academic performance.

2.3.12 Social Learning Theory

Social learning theory suggests that individuals learn by observing and imitating others. Within cooperative learning, students have the opportunity to observe their peers' strategies, approaches, and perspectives. Engaging in discussions and collaborative tasks allows students to broaden their knowledge and skills. The study likely supports the role of social learning in enhancing student involvement and achievement.

2.3.13 Cognitive Social Learning Theory

Cognitive social learning theory integrates cognitive and social learning theories, emphasizing how cognitive processes and social interactions interact. It posits that students' cognitive development and learning outcomes are influenced by both individual thought processes and social interactions with others. Further research has explored the impact of developing emotional intelligence through social-emotional learning, relationship-building, and collaborative learning on students' academic achievement. This highlights the critical role of mental health and emotional well-being in overall academic performance ((Pudjiarti & Simpson, 2023).

In addition, the study of the Student Teams Achievement Divisions learning model shows that its implementation fosters cooperation among students, enabling them to solve problems together and increasing social awareness. The application of this in geography classes has positively impacted student engagement, ability development, and social dynamics, transforming a previously dull subject into an engaging one. This model was also employed in fifth-grade mathematics education through a classroom action research approach, consisting of three cycles: planning, implementation, observation, and reflection. The results showed that the STAD model can be an effective and engaging learning approach to enhance students' understanding of fifth-grade mathematics (Fauziah & Rusi, 2023).

A study exploring cross-cultural online collaborative learning revealed that high-performance groups demonstrated superior cognitive, social, and regulatory processes compared to low-performance groups. The research highlights the role of metacognition in socially shared regulation during collaborative activities and offers strategies for fostering productive learning environments. In the context of visual impairment, a study found that cooperative learning strategies like Jigsaw and Team-Pair Solo had a significant positive impact on the interest levels of students with visual impairments in Basic Science. These strategies proved more effective than conventional lecture-based teaching (Fosua & Nnamani, 2023).

Additionally, another study investigated the role of teacher support in collaborative learning. The findings suggest that students can provide mutual support within collaborative settings, even without direct teacher involvement.

Supporting student autonomy and competence during collaborative learning was found to be positively correlated with performance, emphasizing the importance of balancing social interactions with task-focused efforts for optimal outcomes. The research further emphasized the positive effects of collaborative learning on student autonomy and self-organization, leading to a more positive attitude toward learning. The study suggests that collaborative teaching practices not only promote democratic values but also enhance social and civic competencies, preparing students to be responsible citizens (Van & Malazonia, 2023).

Research on teacher-student relationships in senior high schools highlighted that cooperative learning strategies, students' perceptions of mathematics, and their self-efficacy partially mediated the connection between teacher-student relationships and mathematics achievement. This indicates that teachers should incorporate collaborative learning techniques to boost students' performance in mathematics. A study comparing cooperative learning to traditional lecture methods found that students engaged in cooperative learning exhibited better academic progress. The research concluded that cooperative learning positively impacts students' academic performance (Aporbo, 2023).

Interest plays a key role in motivation, and active learning strategies have been shown to generate interest by making learning more interactive. The study suggests that using motivational frameworks can enhance student engagement and achievement in science classrooms. Finally, the study explored the impact of Collaborative Strategic Reading on reading comprehension, with results indicating that CSR is an effective method for improving students' reading skills. This approach holds promise for enhancing literacy instruction. The Jigsaw method's impact on physical education teachers' practices was also investigated, showing that it influences educators' teaching perspectives. The study suggested that Jigsaw could be a valuable tool for improving teaching practices in physical education by promoting student-centered learning (Riswanto, 2023).

2.3.14 Conventional Teaching Method

In our schools, it is a common reality that teachers primarily use conventional teaching methods. One of the most widely recognized forms of this approach is the lecture method. Teachers often rely on this method to deliver content

across various subjects at nearly every educational level. The conventional teaching method is typically teacher-centered, where the instructor directs the learning process and authoritatively imparts knowledge. This method places significant emphasis on the listening ability of students, as it encourages them to absorb information through passive listening, aiding in rote memorization. Such an approach leads to the development of surface-level knowledge, where students merely replicate the content, they were taught.

The conventional method tends to follow a reward-punishment framework, where physical punishment may be used to instill discipline, and grades serve as rewards. The classroom environment often operates under a strict command-obey structure, where students are not typically encouraged to question, debate, or apply what they have learned due to the one-way nature of communication. In this setting, students remain passive, while the teacher remains the active source of knowledge, writing key points on the board, which students then copy.

2.3.15 improving student learning motivation

Insani (2023) analyzed the effectiveness of sharing the achievements of student teams in improving student learning motivation in the history subject. The researcher noticed that the method of sharing the achievements of student teams was effective and successful in improving student motivation. For a comprehensive understanding of the study and its findings, it would be best to refer to the original research document or contact the researchers directly.

2.3.16 Explanation Texts

The use of conventional learning methods by teachers has intrigued the writer to try applying the Student Teams Achievement Division (STAD) Learning Model in teaching reading explanation texts. The cooperative learning method introduced in this research is not just about group work, but it emphasizes structured group work. The STAD learning model incorporates five main elements: positive interdependence, individual responsibility, personal interaction, cooperative skills, and group processes. Upon analyzing the data, it was found that students' ability to read explanation texts increased from cycle I to cycle II. The study concludes that the implementation of the STAD Learning Model has a positive impact on enhancing students' ability to read explanation texts (Ibrahim, 2023).

2.3.17 Intellectual and Soft Skills

The passage describes a research study aimed at assisting teachers in vocational institutions who are struggling with the new curriculum structure implemented in 2012. The focus is on creating lesson plans using cooperative learning as a strategy. The researchers anticipate that the development of such guidelines will enhance the practice of teaching and learning, elevating it to a higher level. By incorporating cooperative learning strategies and focusing on the identified components, teachers will be better equipped to improve student performance both intellectually and in acquiring soft skills. (Kamal, 2023).

2.3.18 Matching Card Media

The role of English is vital nowadays in various factors of life. Reading awareness is also very important in understanding each concept and the essence of the significance of English is crucial today across various aspects of life. Consciousness of reading is also essential for grasping each concept and the core of the learning design plan. The approach employed is a Cooperative Learning Strategy along with Matching Card Media, which is deemed more appropriate for junior high school students as this educational level necessitates greater interaction between teachers and students and fosters student creativity. Utilizing Cooperative Learning and Matching Cards addresses students' challenges in reading. The findings indicated that the application of Matching Cards in teaching reading skills includes three phases of activities: pre-activity, main activity, and post-activity, all of which enhance learner performance (Asriyani, 2024)

2.3.19 Social Behavior

This research investigates the effect of collaborative learning on students' intellectual success and social behavior. It presents an extensive review of current literature concerning the influence of cooperative learning on students' academic outcomes and social engagements. Based on empirical studies, theoretical models, and meta-analyses, this document explores the impacts of cooperative learning. The present research aims to investigate the impact of cooperative learning on students' academic performance and social communications, synthesizing evidence from empirical studies and theoretical perspectives. The findings suggest that cooperative learning positively influences both academic achievement and social behavior,

providing valuable insights for educators and policymakers seeking to implement effective instructional strategies (Khan, 2024).

2.3.20 Application of Think, Pair, Share

The use of the Think Pair Share educational model can enhance students' self-esteem. This study aims to illustrate the utilization of the Picture and Picture Cooperative Learning Model and boost student academic performance following the adoption of this model. Findings reveal that applying the Picture and Picture Cooperative Learning Model has successfully elevated the engagement levels of both teachers and students (Nasrulloh & Suleman, 2024).

2.3.21 Social Competences

Such flexibility indicates that schools must instruct essential social skills, such as communication, teamwork, and problem-solving. Research has consistently identified a gender disparity in this field, with boys exhibiting lower social competencies compared to girls. A large-scale nationwide multilevel longitudinal study, known as the profane project, was executed in France among over 10,000 vocational high school students. The primary objective was to design and assess an intervention aimed at fostering various psychological and psychosocial factors in vocational high schools, encompassing social competencies. This two-year longitudinal field experiment assessed the impacts of a cooperative learning technique, the jigsaw classroom, which promotes positive goals and resource interdependence, against two control scenarios: one involving cooperation with resource independence, and another that follows a traditional approach. This article concentrates on the differing development of perceived social skills in adolescent boys and girls over time, comparing the three teaching methodologies. The results from longitudinal multilevel analysis affirm the existence of a gender gap in perceived social skills and indicate that this gap expands over time. However, most significantly, the findings illustrated that the increase in the gender gap was more pronounced in the two control scenarios than in the jigsaw condition, where the evolution of boys' and girls' perceptions of social competencies remained relatively consistent over time. The article discusses contributions toward understanding the growth and education of social competencies in academic settings (Rudman, 2024).

Cooperative learning in physical education not only fosters the holistic development of students but also establishes a basis for lifelong learning and sustainable advancement from the viewpoints of cultural integration and social responsibility. This research explored students' physical, social, emotional, and cognitive outcomes on one hand, while also examining the potential of cooperative learning to enhance cultural diversity and personal accountability. At the micro level, emphasis was placed on physical and social dimensions, whereas cognitive aspects received less focus. It was discovered that cooperative learning benefited motor skills in students across various ages, mitigated negative emotions while fostering social abilities and teamwork, and enhanced cognitive skills and memory in younger students. At the macro level, cooperative learning can aid students in enhancing self-reflection, diminishing negative behaviors, and elevating personal responsibility and cultural integration. The perspectives of researchers from various nations reflect different educational philosophies and cultural variations, thus increasing the adaptability and applicability of cooperative learning (Zhou, T. 2024).

The purpose of this research is to identify research trends and delineate pertinent findings concerning cooperative learning models' impact on junior high school students' mathematical representation skills. The findings related to cooperative learning models on representational skills indicate that they effectively enhance students' mathematical representation capabilities. The cooperative learning model can be integrated with suitable media, strategies, and approaches to improve students' mathematical representation skills (Nur’aini, 2024).

2.4 Theoretical Review

Cooperative learning has gained significant attention due to the wealth of positive research findings it has garnered. Numerous experimental studies have compared the effects of cooperative learning with traditional teaching methods across various academic fields, including social studies, geography, psychology, management, mathematics, science, biological sciences, chemical bonding, educational theory, economics, and accounting. These studies consistently point to the effectiveness of cooperative learning. The impact of the Student Teams Achievement Divisions method on students' academic performance in Pakistan,

finding that students in the STAD group outperformed those in the traditional teaching group.

Constructivist Theory: The STAD model is rooted in constructivist principles, which suggest that learners construct knowledge actively through interaction with peers and their environment. By working in teams, students share diverse perspectives, enhancing their understanding and cognitive development.

Social Interdependence Theory: This theory emphasizes positive interdependence among group members, where individual success is tied to the group's success. STAD promotes this by structuring activities where each member's contribution is crucial.

Motivational Theory: STAD leverages group rewards and individual accountability, motivating students to perform better. This aligns with expectancy-value theory, where students are motivated when they value the outcome and believe their efforts will lead to success.

2.5 Empirical Review

The Student Teams-Achievement Divisions model is a cooperative learning model designed to enhance student engagement and academic performance. Empirical studies have investigated its effectiveness across various educational contexts. Here are some notable findings:

Implementation in Grade 9 Biology: A study conducted in Bhutan applied the STAD model in a 9th-grade biology class. Over a month, students engaged in group activities such as discussions, quizzes, and presentations. The results showed a significant increase in post-test scores compared to pre-test scores, indicating improved learning achievement. Additionally, students reported heightened motivation, collaboration, and self-confidence in learning (Chophel, 2023).

Enhancing Mathematics Learning Outcomes: Research focusing on 3rd-grade elementary students examined the impact of the STAD model on mathematics learning. The study found that implementing STAD led to improved mathematics learning outcomes, suggesting its effectiveness in early education settings. (Hermawan, C. 2020).

Motivating Math Learning in Addition and Subtraction: A study aimed at determining the effect of the STAD cooperative learning model on 2nd-grade

students' motivation in learning addition and subtraction found that the model positively influenced students' learning motivation (Tania, R et al, 2024).

Application in Computer Programming Courses: An investigation into the use of the STAD technique through the Modular Object-Oriented Dynamic Learning Environment in a computer programming course revealed that students' post-test scores were significantly higher than their pre-test scores. This suggests that STAD can be effectively integrated into online learning platforms to enhance academic achievement (Tiantong, 2023).

A study comparing the Student Team Achievement Division method with classical learning methods found that students taught using STAD demonstrated better mathematics understanding. This highlights the model's potential to enhance comprehension in mathematical subjects. Effect on Academic Performance in Nigeria: Research conducted in Nigeria assessed the impact of the Student Team Achievement Division method on students' academic performance. The study concluded that it was effective in improving students' learning outcomes, suggesting its applicability in diverse educational settings. These empirical studies demonstrate the versatility and effectiveness of cooperative learning model in enhancing student achievement across various subjects and educational levels (Tiwow, 2020).

2.6 Critical Summary of Literature Review

The Student Team Achievement Divisions model has been thoroughly examined within the field of cooperative learning, and research has revealed both its advantages and obstacles. Below is a critical overview of the literature, emphasizing the model’s theoretical contributions, practical implementations, and limitations. Numerous studies highlight STAD's positive influence on academic performance across subjects, including mathematics, science, and language arts. It encourages mastery learning through peer engagement and personal accountability.

Research by Slavin (1995) shows that cooperative learning frameworks, particularly STAD, improve knowledge retention and comprehension. Evidence indicates that lower-performing students gain significantly from peer tutoring and collaborative problem-solving. Some studies imply that the benefits may be less significant for high-achieving students, who might not perceive group work as demanding or fulfilling. It cultivates interpersonal skills, such as teamwork,

communication, and conflict resolution, which are essential for comprehensive development. By participating in structured group activities, students learn to appreciate diverse viewpoints. Research has emphasized the model's capacity to diminish social barriers, fostering inclusivity.

It focuses on group rewards, and individual responsibility enhances student motivation. The blend of intrinsic and extrinsic motivation creates a positive educational atmosphere. Studies have indicated that acknowledgment of team achievements promotes consistent effort from all participants. Excessive dependence on rewards may result in superficial engagement, where students concentrate on completing tasks rather than gaining a profound understanding. Successful application of STAD requires strategic group formation, diligent monitoring, and effective feedback mechanisms. Teachers play a crucial role in facilitating group interactions and ensuring equitable involvement. Literature underscores the necessity for professional development to prepare educators with the competencies needed for cooperative learning. Some teachers find the model challenging, as it demands considerable time for planning, supervising, and evaluating group activities. In collaborative cultures, it aligns effectively with existing educational practices, boosting its success. Conversely, in individualistic cultures, students may resist group-centric tasks, viewing them as unfair or unproductive. Institutional limitations, such as large class sizes or inflexible curricula, may restrict the model's usefulness.

2.7 Theoretical Critiques

While social interdependence is central to STAD, critics argue that it oversimplifies the complexity of group interactions, particularly in diverse classrooms. The assumption that all students will contribute equally or benefit similarly ignores individual differences in motivation and ability. While STAD emphasizes collaborative learning, some scholars point out that it lacks explicit strategies for fostering higher-order thinking skills. Critics suggest integrating metacognitive elements to enhance its cognitive rigor. The reliance on quizzes to measure individual accountability has been criticized for not fully capturing the depth of learning achieved through collaboration. Alternative assessments, such as

portfolios or reflective journals, have been suggested to complement existing methods.

Challenges and Gaps in Research: Most studies focus on short-term impacts, with limited research on the long-term effects of STAD on academic and social outcomes. While the model claims inclusivity, more research is needed to explore its effectiveness for students with special needs, gifted learners, or those from underrepresented backgrounds. There is limited research on how STAD can be adapted to digital or hybrid learning environments, which are increasingly prevalent in modern education.

2.8 Conclusion

The literature on the STAD model highlights its strengths in promoting academic achievement, social skill development, and motivation. However, challenges such as uneven participation, cultural resistance, and implementation barriers must be addressed to optimize its effectiveness. Future research should focus on long-term impacts, adaptations for diverse learners, and integration with technology to ensure the model's relevance in evolving educational contexts. The STAD model has been shown to enhance students' interpersonal skills. It encourages active participation from students during lessons and promotes communication and interaction, allowing students to discuss and understand the material in their own words. This collaborative approach leads to improved performance among individual group members.

A study by Irawan (2020) demonstrated that students in the experimental group taught using STAD, exhibited significantly better problem-solving skills than those in the control group who were taught using traditional methods. Research also suggests that it positively affects students' attitudes toward science. Initially, students exhibited a neutral attitude toward the subject, but after experiencing it, their attitudes improved. (Justina, 2019).

CHAPTER 3

RESEARCH METHODOLOGY

This research study was conducted to find out the effect of students' team achievement division model on academic achievement in the subject of general science at the elementary level. The following procedure was adopted for the study.

3.1 Research Design

The study was true experimental, pre-test, post-test control group design was applied. It consisted on two groups that were experimental group and the control group, which were equated based on marks achieved by the students in the pre-test from grade 8th General Science, published by National Book Foundation (2023). Experimental group was taught by the Students Team Achievement Division (STAD) method whereas control group was taught by the Lecture Method. At the end of the experiment post-test was administered from both groups. The symbolic representation of the research design was:

Table 3.1

Research Design

Groups	Pre-test	Treatment	Post-test
RE	O1	T1	O2
RC	O3	T2	O4

Here:

RE and RC= randomly selected experimental and control group

O1 and O3 = pre-test

T1= Treatment group with STAD Method

T2= Treatment group with Lecture Method

O2 and O4= post-test

3.2 Population

Population has been defined in such a way that it is the target group which is the group of interest of the researcher and the result of the research study can be generalized. Population by its characteristics needs to be accessible or available in terms of time and cost. Thus, the population is a realistic choice, not an idealistic one (Gay, et al, 2012). In this study, the target population consisted of all the general science students at the elementary level in Islamabad Model Schools for Boys. It was not possible to reach the targeted population. Therefore, the researcher defined the accessible population of this study. In this connection, the 8th class general science students in Islamabad Model School for Boys Islamabad were considered as an accessible population.

3.3 Sample and Sampling of the Study

The sample is a small group of individuals, things, or events representing the characteristics of the large group from which the sample is drawn. The researcher initially selected 60 subjects from accessible population of (130) students in Islamabad Model School for Boys Nai Abadi, through simple random sampling technique. The researcher divided and equated the sample into experimental and control groups on the base of pairing the School Examination Scores (SES). The scores of the students were ranked accordingly and the match pair was formed according to the marks. Students were divided to experimental and control groups through matched pair members.

Table 3.2

Sample of the study

Group Type	General Science students(8th Grade Boys)
Experimental	30
Control	30
Total	60

3.4 Selection of Chapters

Before the selection of text to experiment, the researcher considered the specific text on the following basis. Meeting to discuss the syllabus covered by the working teachers of concerned 8th classes. Course outline of 8th grade general science proposed by Federal Board of Intermediate and Secondary Education Islamabad. Four units of class 8th General Science were planned for intervention, General Science textbook, published by National Book Foundation (2023) was used for the purpose. The details of these four chapters are as follow:

- Biotechnology
- Chemical Reactions
- Acids, Bases/alkalis, and Salts
- Force and pressure

Chapter 3 Biotechnology includes the sub topics, How DNA is replicated, the relationship between DNA, Genes and chromosomes bacterium, How genes are introduced into a bacterium, the biotechnological products used in daily life, How genetic modification in different foods. Chapter 5 "Chemical Reactions" includes the sub topics, Define chemical reactions and give examples, explain the rearrangement of atoms in chemical reactions, explain the balancing of a chemical equation, Identify the nature of chemical changes in various reactions. Chapter 6 "Acids, Bases/alkalis, and Salts" includes, Define the terms acid, alkali, and salt, Describe the properties of acids, alkalis, and salts, Explain the uses of acids, alkalis, and salts in daily life, Use indicators to identify acids, alkalis, and neutral substances. Chapter 7 "Force and pressure" includes the sub-topics Define the term pressure, Identify the units of pressure, Explain how gases behave under pressure, Describe the causes of gas pressure in a container.

3.5 Development of Lesson Plans

The researcher developed a total of 32 lesson plans, of which 16 lesson plans were related to the experimental group and 16 lesson plans for the control group. All the lesson plans were developed from the sub-topics of the already selected four Chapters of 8th grade General Science. Same sub-topics were selected for teaching both groups. Lesson plans of experimental groups were planned implying five components of the student's team achievement division method. Whereas, the lesson

plans of the control group were based on the Lecture Method which consisted on the steps introduction, presentation (description), evaluation and homework. The researcher had taught classes for both the experimental and control groups according to the developed lesson plans for each group.

3.5.1 Lesson plans of experimental group

The researcher developed 16 lesson plans for the experimental group, based on STAD model, which consisted 5 steps, the format of these steps was applied to develop the lesson plans, here are five steps used in this model:

i. Presentation

It involves instructions delivered by the teacher to the class in a traditional manner. Teaching in STAD does not significantly differ from conventional instruction, except that the lessons must concentrate on the concepts of the material being examined. After the teacher presents the material one or two times, students then work in groups to tackle the assigned questions.

ii. Groups

In the Students Team Achievement Division model process, groups consist of 4-6 students of varying abilities. The purpose of forming groups is to ensure that all members collaborate in learning, more specifically, to prepare each member for strong individual testing. The group plays a crucial role, as it fosters cooperative work among peers to achieve the desired academic level. To determine group membership, students' report card rankings are organized, and students can also be grouped based on their final test scores. From this ranking list, grouping is conducted. Each group includes one student from the upper tier, one from the lower tier, and two students with average skills. The teacher arranges students according to this composition. Teachers need to avoid significant conflict among group members, although students are not allowed to choose their friends.

iii. Test or Quiz

After one or two instructional sessions and collaborative work in groups, students receive individual tests. This is where each student attempts to perform their best as a result of their learning. Students also recognize that their efforts and achievements will significantly contribute to the overall success of the group.

iv. Individual Improvement Scores

The aim of this is to provide students with attainable goals if they exert effort and achieve better results than those obtained previously. The management of student achievement scores follows this order: initial score, test score, improvement score, and group score.

v. Group Scores

To evaluate group performance, individual scores from each member are collected, recorded, and totaled to arrive at each group's scores. From these group scores, one can see which groups achieved the highest scores, thus deserving the promised rewards. The variables assessed in this study include learning motivation. Learning motivation is the comprehensive psychological drive within students that propels them into learning activities, ensures the persistence of those activities, and directs them toward achieving a goal.

3.5.3 Lesson Plans for the Control Group

The researcher developed 16 lesson plans based on the Lecture Method for the control group. These lesson plans followed a structured approach consisting of introduction, presentation (description), evaluation, and homework. This method relies on rote memorization, which helps students retain factual information. The Lecture Method follows these steps:

i. Introduction

The researcher created a conducive learning environment for the students. To engage them, the researcher asked questions related to their prior knowledge on the topic.

ii. Presentation (Description)

This step involved providing explanations of the related topics. To enhance understanding, a question-and-answer technique was used, and models or examples were provided when necessary.

iii. Evaluation

The researcher assessed students' learning by asking questions based on the delivered lecture. This also allowed the researcher to evaluate the effectiveness of their teaching.

iv. Homework

After completing all steps, the researcher assigned homework tasks related to the delivered lecture to reinforce learning.

3.6 Research Instrument

The researcher developed the research instrument named the Students' Academic Achievement Test with the help of the supervisor.

3.6.1 Pre-test

A pre-test was designed using selected units from the 8th-grade General Science textbook. It was administered to categorize the sample of the study into experimental and control groups before giving the treatment. The scores obtained in the pre-test were used as the basis for the experimental and control group formulation. Based on the pre-test scores, the students were divided into two equal groups, Experimental and Control group. The pre-test was developed under the supervision of a supervisor. It was validated by subject specialists, academicians, and assessment experts. The test consisted of 40 multiple-choice questions (MCQs), containing 80 marks.

3.6.2 Post-test

After completing the seven week experiment, a post-test was conducted. This test was an equivalent version of the pre-test, but the order and sequence of the questions, correct answers, and distractors were modified. In terms of content and question types, the post-test was identical to the pre-test. However, the arrangement of test items was changed

3.6.3 Construction of test items

For the purpose of pre-test multiple-choice questions (MCQs) construction, the researcher selected four chapters from the 8th-grade General Science textbook**,** published by the National Book Foundation, Federal Textbook Board, Islamabad (2023)**.**The test carried 80 marks and consisted of 40 multiple-choice questions**.** The total duration of the test was fifty minutes. The ten MCQs from Chapter No.3, ten MCQs from Chapter No.5, and ten MCQs from Chapter No.6, ten MCQs were developed.

3.6.4 Validity of the Instrument

All the test items were improved by expert opinions because a good instrument must not only be reliable but also valid. (Creswell, 2014).

The research instrument, was designed and discussed with experts and after instructions the required changes were made, it was discussed with the experts.

3.6.5 Reliability of the Instrument

Reliability refers to the consistency and dependability of a system, method, or measurement over time. It indicates how stable and accurate results remain under the same conditions. Split-half method was applied to test the reliability of the test items. For the split-half method, the Students' Academic Achievement Test was applied for pilot testing. In this connection, twenty students of class 8th were selected randomly from each class. This method is used to test the correlation among the even and odd number of test items in the instrument for its reliability through coefficient alpha. So the reliability coefficient alpha of both classes reflected that the research instrument was reliable because the coefficient alpha of test items used for pilot testing in school remained 0.80 and 0.77 respectively.

3.6.6 Marking of test items

The researcher opted the international standard for marking multiple-choice test items. According to that two mark are allocated to each correct multiple-choice test item. To maintain standard errors like cutting, overwriting, and picking of more than one option were not allocated any marks. All multiple test items were marked by the researcher according to the developed marking key.

3.7 Variables

The variables which were used in the current study are described below:

3.7.1 Independent variable

The treatment variables were considered as independent variables.

Treatment variable

The teaching methods were used as treatment variables in the current study. The treatment variables were comprised of STAD method and Lecture method.

3.7.2 Dependent variable

The academic achievement of students was considered as dependent variable.

3.7.3 Extraneous variables

In the current study, different types of situational variables were used, e.g., time, duration of treatment, age of students, teacher, subject to being taught, use of teaching aids, condition of teaching, sample size, the language of teaching, selection of the sample, equating of time, equating the groups through pretesting and through equal environment etc.

3.8 Explanation of the experiment

The experiment was conducted by the researcher in Islamabad Model School for Boys Nai Abadi Islamabad. The school is administered under the management of the Federal Directorate of Education, Department of Education, Federal Government of Pakistan, and Islamabad Model School for Boys was selected for completing the experiment. The researcher received written permission from the Federal Directorate of Education. Researcher performed the experiment from January 5, to February 28, 2024. According to the time table of the selected school, 40 minutes per day were specified for intervention in experimental and control groups. In this way experiments prolonged for seven weeks.

3.8.1 Duration of the Experiment

The research was conducted from January to February 2024, as final exams were scheduled to begin at the end of February in Islamabad. Therefore, postponing the experiments at the school was not feasible. The school's administration allocated the 4th period at the Islamabad Model School for Boys, from 11:10 am to 11:50 am, and the 5th period from 11:50 am to 12:30 pm, without altering the school schedule. However, they arranged a separate classroom for the experimental group. The researcher provided the same number of lesson plans (16) for the control group.

3.8.2 Equal Educational Opportunities

The experimental and control groups were provided the equivalent educational opportunities in the current experiment by the researcher. Therefore, to fulfill the requirements of the experiment, the researcher took the following steps:

i. Equal time duration (40 minutes) of teaching to each group

ii. Same units and sub-topics selected for both groups to teach

iii. Same number of lesson plans for both groups

iv. Same time was allocated for both groups during pre-test and post-test

3.9 Execution of Experiment

The following steps were taken by the researcher to execute the experiment.

3.9.1 Ethical Consideration

The researcher signed the permission forms, from the principal of the experimental school and also from the teacher of the grade 8th students before the start of the experiment, which were selected for the experiment. For the conduction of the experimental research in Islamabad Model School for Boys Islamabad, the researcher already took a permission letter from the Federal Directorate of Education (FDE), Islamabad. The Students of the experimental research were properly updated about the experiment. The main purpose of the study was to improve the concepts of General Science selected topics in a logical way and also develop a sense of cooperative learning among the students by using Student Team Achievement Division Model.

3.9.2 Administration of pre-test

Before starting the treatment, a pre-test was held on January 05, 2024. The scores collected from the pre-test were used to assess the academic ability of students in specific Chapters of General Science.

3.9.3 Teaching-learning sessions

Teaching-learning sessions were conducted from January 06 to February 28, 2024. The intervention of a total of 32 lesson plans was implemented with the help of Students Team Achievement Division model and Lecture Method for the experimental and control groups respectively. The experimental period was comprised of seven weeks.

3.10 Variables' control in the study

This experiment was held in Islamabad Model School for Boys, Nai Abadi, Islamabad. The following steps were taken by the researcher to minimize the effect of internal and external threats.

3.10.1 Internal validity of the experiment

The researcher took the following steps to control the internal threats of the experiment.

i. **History**: History is a threat that occurs when participants' responses change due to unexpected events during the experimentation process. To

control this threat, the study was conducted under well-planned and controlled conditions. Moreover, no such case was observed during the study that may affect the students' achievement. Hence, this threat was controlled.

ii. **Testing**: Another threat is testing that occurs if the students' results in their post-test are improved due to pre-test taken from the same group of members. To overcome this threat, time of one and half month was given between the pre-test and the post-test, which was enough to forget the test items in the pre-test. Therefore, this threat was also controlled logically.

iii. **Instrumentation**: The pre-test was validated with the help of experts' opinion and its reliability was checked through pilot testing before administering it on the experimental and control groups to avoid this threat. Therefore, this threat was also controlled.

iv. **Maturation**: This threat occurs if the results of the post-test are better not due to the treatment but due to the time period between the pre-test and post-test. Therefore, to control this issue, time duration for the experiment consisted of only seven weeks; which was sufficient to develop the students to improve their post-test. Hence, this threat was also controlled.

v. **Implementation**: The experimental group and control group were treated with Student Team Achievement Division model and Lecture method respectively. To control this threat, the researcher taught both groups himself. Therefore, this threat was also controlled in a logical manner.

vi. **Location**: The meaning of this threat is having dissimilar results due to the subject being treated at different locations. One school was selected and the selected students belong to the same locality. Furthermore, experimental and control groups were treated in their regular classrooms. Therefore, this threat was also controlled.

vii. **Mortality**: The experimental study was limited to only seven weeks, which is not a long duration. Due to the support and management of the

school and also the attentiveness of the selected students made it possible for student not to miss the sessions and make sure their presence fully.

3.10.2 External validity of the experiment

The researcher took the following steps to control the external threats:

i. **Interference of multiple treatments**: There is a possibility of taking extra tuition classes as an extra treatment by the subjects instead of the researcher or subjects already involved in any related research study which may distort the actual results of the experiment. The public school teachers in Islamabad were not aware of the Student Team Achievement model, so there was no risk of treatment being affected. In addition, the researcher applied a similar treatment in both groups (experimental and control).

ii. **Specificity of variables**: All technical steps have been taken to prevent external threats. Lesson plans have been verified; the pre-test was pilot-tested and randomly administered. Because of these specifics, he tried to avoid this threat. There was no gap between the end of the experiment and the post-test. All criteria of the experiment were well defined, such as pre-test, post-test, application of the STAD model through Students Team Achievement Division methods, and duration of the intervention.

iii. **Experimenter Effects**: The awareness of the STAD model of team based learning learning is not present in our education system, and our school teachers were not aware of this model. It could remain a gap in training and implementation if school teachers were trained in the STAD model to facilitate the teaching of the experimental group. The researcher studied this model for about two years and gained a deep understanding of this model through a respected supervisor, literature, and interactions with cooperative learning experts. To avoid any gap in the experiment, the researcher planned to teach both groups himself by using the STAD model and Lecture method. In addition, various variables were controlled by comparing their effects in experimental and control groups, such as time and place of intervention, lesson length, number of lesson plans,

teaching material, students with mixed abilities, and timing of pre-test and post-test.

3.11 Conduction of post-test

After the completion of treatment, the post-test was managed to the next day on February 29, 2024. Furthermore, the achievement scores of all the students were calculated by subtracting the pre-test scores from post-test scores.

3.12 High, Lower and Medium Achievers

The students of experimental and control groups were also analyzed into higher, lower and medium achievers. First 25% of the students were considered as high achievers and last 25% were lower and middle 50% were taken as medium achievers on the basis of their academic achievement.

3.13 Data Analysis

After scoring the responses of students on pre-test, post-test, SPSS, version-25 (Statistical Package for the Social Sciences) was used. After collecting data from the students, the data were analyzed. The descriptive analysis was used to calculate the measures of central tendency (Mean) and measures of dispersion (Standard Deviation). The researcher applied a dependent *t*-test to compare the achievement of students of the same group in the pre-test and post-test. Another inferential statistic test was used called the independent sample *t*-test, which is a statistical test to compare the achievements of experimental and control groups and to determine the significant difference in both groups.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATIONS

This chapter comprises the use of descriptive statistics (means and standard deviations) and inferential statistics (independent samples t-test, paired samples t-test) to analyze, interpret, and represent the data.

4.1 Academic Achievements of the Students before Treatment

Table 4.1

Academic achievements of the Control and Experimental Group (pre-test)

Group	N	M	SD	SEM
Control	30	32.25	9.589	2.369
Experimental	30	31.23	8.325	1.764

Note. Descriptive statistics (Mean and Standard Deviation) were used to determine the academic achievement of students in General Science before the treatment.

Table 4.1 shows that, the pretest marks of the control group were: N=30, M=32.25, SD=9.589, SEM= 2.369 and pretest marks of experimental group were; N=30, M=31.23, SD=8.325, SEM= 1.764. The pretest results indicate that both the control and experimental groups have similar initial performance levels, as reflected in their mean scores (M = 32.25 for the control group and M = 31.23 for the experimental group). The slight difference in means suggests minimal variation between the groups before any intervention. Additionally, the standard deviation (SD = 9.589 for the control group and SD = 8.325 for the experimental group) shows that the scores in the control group were slightly more spread out, indicating greater variability compared to the experimental group. Furthermore, the standard error of the mean (SEM), which measures how precisely the sample mean represents the population mean, is lower for the experimental group (SEM = 1.764) compared to the control group (SEM = 2.369), suggesting that the experimental group's mean score is a more stable. Overall, the statistical values suggest that both groups started at comparable levels before any experimental intervention

4.2 Academic Achievements of the Students after Treatment

Table 4.2

Academic achievements of Control and Experimental Group (post-test)

Group	N	M	SD	SEM
Control	30	59.70	29.358	1.864
Experimental	30	78.70	10.478	2.589

Descriptive statistics (Mean and Standard Deviation) were used to calculate the academic achievements of students in General Science after the treatment. The posttest marks of control group were: N=30, M=59.70, SD=29.358, SEM= 1.864 and the posttest marks of experimental group were; N=30, M=78.70, SD=10.478, SEM= 2.589. Table 4.2 shows that the posttest marks of the experimental group were significantly more than the posttest marks of the control group. Additionally, the standard error of the mean (SEM), is smaller for the control group (SEM = 1.864) compared to the experimental group (SEM = 2.589). However, the larger SEM in the experimental group, suggests a strong effect of the intervention. Overall, these results indicate that the experimental group outperformed over the control group after the intervention.

4.3 Comparison between the marks of the pretest

Table 4.3

Comparison between marks of pretest of control and experimental group

Pre-test	N	Mean	SD	*Df*	*t*	*p*
Control Group	30	32.25	10.444	58	.235	.856
Experimental Group	30	31.23	8.325			

Independent sample t-test was used to compare the pretest marks of the control and experimental groups. The pretest marks of control group were; N= 30, M= 32.25, SD=10.444, and pretest of experimental group were; N=30, M= 31.23, SD= 8.325. t= (58) .235 and p=.856 > 0.05. Table 4.3 shows that there was no significant difference between the pretest marks of the control and experimental

group. There was no significant difference between the academic achievement of the control and experimental group before the treatment.

4.4 Analysis Related to Hypothesis (H_{01})

Table 4.4

Comparison between pretest and posttest marks of experimental group

Experimental Group	N	Mean	SD	*Df*	*t*	*p*
Post test	30	78.70	10.478	29	19.635	.000
Pre-test	30	31.23	8.325			

Paired sample t-test was used to find out the difference between pretest and posttest marks of experimental group. The posttest marks experimental group were; N= 30, M= 78.70, SD=10.478, and marks of pretest of experimental group were; N=30, M= 31.23, SD= 8.325. t= (29) 19.635, p=.000 < 0. Table 4.4 indicates a significant difference between the posttest and pretest marks of the experimental group. Hence, the Students Team Achievement Division Model has a significant effect on the academic achievement of the elementary level students in General Science. Therefore, the null Hypothesis "The Students' Team Achievement Division (STAD) method has no significant effect on the academic achievement of elementary-level students" was rejected.

4.5 Analysis Related to Hypothesis (H_{02})

Table 4.5

Comparison between marks of pretest and posttest of control group

Control Group	N	Mean	SD	*Df*	*t*	*p*
Post test	30	59.70	29.358	29	5.360	.000
Pre-test	30	44.83	14.258			

Paired sample t-test was used to find out the difference between the pretest and posttest marks of the control group, The posttest marks of the control group were; N= 30, M= 78.70, SD=10.478, and pretest marks were; N=30, M= 31.23, SD= 8.325. t= (29) 19.635, p=.000 < 0.05. Table 4.4 shows a significant difference between the posttest and pretest marks of the control group in General science.

Hence, there was a significant difference pretest and posttest marks of the control group. Henceforth, the null hypothesis, "The Lecture Method has no significant effect on the academic achievement of elementary-level students" was rejected.

4.6 Analysis Related to Hypothesis (H_{03})

Table 4.6

Comparison between pretest and posttest results of lower achievers in the experimental group

Group	Lower Achievers	N	Mean	Mean	*df*	*t*	*p*
Experimental	Post test	8	63.25	6.446	7	38.160	.000
	Pre-test	8	115.25	4.979			

Paired-sample t-test was used to determine the difference between the pretest and posttest marks of lower achievers treated through the STAD Method. The posttest marks of the lower achievers in the experimental group were: N= 8, M= 63.25, SD=6.446 whereas their pretest marks were; N=8, M= 115.25, SD= 4.979. t= (7) 38.160 and p=.000 < 0.05. Table 4.6 indicates that, there was a significant difference between the pretest and posttest marks of the lower achievers in the experimental group. Hence, the Students Team Achievement Division Model had a significant effect on the academic achievement of lower achievers in General Science. Therefore, the null hypothesis "There is no significant effect of the Students Team Achievement Division Method on the academic achievement of lower achievers in General Science" was rejected.

4.7 Analysis Related to Hypothesis (H_{04})

Table 4.7

Comparison between pretest and posttest results of medium achievers in the experimental group

Group	Medium Achievers	N	Mean	SD	*df*	*t*	*p*
Experimental	Post test	14	79.85	6.383	13	60.845	.000
	Pre-test	14	33.79	4.388			

A paired-sample t-test was used to determine the difference between the pretest and post-test marks of medium achievers treated through the STAD Method. The posttest marks of the medium achievers in the experimental group were: N= 14, M= 79.85, SD=6.383 whereas their pretest marks were: N=14, M= 33.79, SD= 4.388. t= (13) 60.845, p=.000 < 0. Table 4.7 indicates that there was a significant difference between the pretest and posttest marks of the medium achievers in the experimental group. Hence, the Students Team Achievement Division Model had a significant effect on the academic achievement of medium achievers in General Science. Therefore, the null hypothesis "The Students' Team Achievement Division (STAD) method has no significant effect on the academic achievement of medium-achievers students in General Science" was rejected.

4.4 Analysis Related to Hypothesis (H_{05})

Table 4.8

Comparison b/w pretest and posttest marks of higher achievers in the experimental group

Group	Higher Achievers	N	Mean	SD	*df*	*t*	*p*
Experimental	Post test	8	90.28	1.389	7	149.687	.000
	Pre-test	8	42.12	1.356			

A paired-sample t-test was used to determine the difference between the pretest and post-test marks of higher achievers treated through the STAD Method. The posttest marks were; N= 8, M= 90.28, SD=1.389; whereas the pretest marks were: N=8, M= 42.12, SD= 1.356. t= (7) 149.687, p=.000 < 0.05. Table 4.8 indicates that there was a significant difference between the pretest and posttest marks of the higher achievers in the experimental group. Hence, the Students Team Achievement Division Model had a significant effect on the academic achievement of higher achievers in General Science. Therefore, the null hypothesis "The Students' Team Achievement Division (STAD) method has no significant effect on the academic achievement of higher-achiever students in General Science" was rejected.

4.9 Analysis Related to Hypothesis (H_{06})

Table 4.9

Comparison b/w pretest and posttest marks of lower achievers in the control group

Group	Lower Achievers	N	Mean	SD	*df*	*t*	*p*
Control	Post-test	8	48.25	3.059	7	33.991	.000
	Pre-test	8	20.25	5.148			

Paired-sample t-test was used to determine the difference between the pretest and post-test marks of lower achievers treated through the Lecture Method. The posttest marks of the lower achievers in the experimental group were: N=8, M= 48.25, SD=3.059 whereas their marks in the pretest were; N=8, M= 20.25, SD= 5.148. t= (7) 33.991, p=.000 < 0.05. Table 4.9 indicates that there was a significant difference between the pretest and posttest marks of the lower achievers in the control group. Hence, the Lecture Method had a significant effect on the academic achievement of lower achievers in General Science. Therefore, the null hypothesis "The Lecture Method has no significant effect on the academic achievement of lower-achiever students in General Science" was rejected.

4.10 Analysis Related to Hypothesis (H_{07})

Table 4.10

Comparison of pretest and posttest results for Medium achievers in the control group

Group	Medium Achievers	N	Mean	SD	df	t	P
Control	Post test	14	56.98	4.438	13	56.591	.000
	Pre-test	14	33.93	4.269			

Paired-sample t-test was used to determine the difference between the pretest and post-test marks of medium achievers treated through the Lecture Method. The posttest marks of the medium achievers in the control group were: N= 14, M= 56.98, SD=4.438, whereas their marks in the pretest were; N=14, M= 33.93, SD= 3.512. t= (13) 15.831, p=.000 < 0.05. Table 4.10 indicates that there was a significant difference between the pretest and posttest marks of the medium achievers in the

control group. Hence, the Lecture Method had a significant effect on the academic achievement of medium achievers in General Science. Therefore, the null hypothesis "The Lecture Method has no significant effect on the academic achievement of medium-achiever students in General Science" was rejected.

4.11 Analysis Related to Hypothesis (H_{08})

Table 4.11

Comparison of pretest and posttest results for higher achievers in the control group

Group	Higher Achievers	N	Mean	SD	*df*	*t*	*p*
Control	Post test	8	87.32	2.748	7	92.891	.000
	Pre-test	8	45.12	1.553			

Paired-sample t-test was used to determine the difference between the pretest and posttest marks of higher achievers treated through the Lecture Method. The posttest marks of the medium achievers in the control group were: N= 8, M= 87.32, SD=2.748, while their pretest scores were: N=8, M= 45.12, SD= 1.553. t= (7) 92.891, p=.000 < 0.05. Table 4.11 indicates that, there was a significant difference between the pretest and posttest marks of the higher achievers in the control group. Hence, the Lecture Method had a significant effect on the academic achievement of higher achievers in General Science. Therefore, the null hypothesis "The Lecture Method has no significant effect on the academic achievement of higher-achiever students in General Science" was rejected.

4.12 Analysis Related to Hypothesis (H_{09})

Table 4.12

Comparison between the results of posttest of lower achievers in control and experimental group

Test	Lower achievers	N	Mean	SD	*df*	*T*	*P*
Posttest	Experimental Group	8	63.25	8.446	7	11.544	.000
	Control Group	8	48.25	3.059			

Paired Samples t-test was conducted to examine the difference between the post-test scores of lower achievers in the control group and the experimental group.

For the lower achievers in the experimental group, the posttest scores were; N= 8, M= 63.25, SD=8.446, while their pretest scores were: N=8, M= 48.25, SD=3.059. t= (7) 11.544, p=.002 < 0.05. Table 4.12 indicates that the effect of the Students Team Achievement Division Model on the lower achievers is greater than the effect of the Lecture Method. There was a significant difference between the marks of lower achievers of the control and experimental group in the post-test. So the null hypothesis "There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of lower-achiever students in General Science" was rejected.

4.13 Analysis Related to Hypothesis (H_{010})

Table 4.13

Comparison between the marks of the posttest of medium achievers in the control and experimental group

Test	Medium achievers	N	Mean	SD	*df*	*T*	*P*
Posttest	Experimental Group	14	79.85	6.383	13	33.702	.000
	Control Group	14	56.98	9.811			

Paired Samples t-test was conducted to examine the difference between the posttest scores of lower achievers in the control group and the experimental group. For the lower achievers in the experimental group, the posttest scores were; N= 14, M= 79.85, SD=6.383, while their pretest scores were; N=8, M=56.98, SD=9.811. t= (13) 33.702, p=.000 < 0.05. Table 4.13 indicates that, the effect of Students Team Achievement Division Model on the medium achievers is greater than the effect of the Lecture Method. There was a significant difference between the marks of medium achievers of the control and experimental group in the posttest. So the null hypothesis "There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of medium-achiever students in General Science" was rejected.

4.14 Analysis Related to Hypothesis (H_{011})

Table 4.14

Comparison between the results of the posttest of higher achievers in the control and experimental group

Test	Higher achievers	N	Mean	SD	*df*	*t*	*p*
Posttest	Experimental Group	8	90.25	1.389	7	4.583	.254
	Control Group	8	87.32	2.748			

A paired Samples t-test was conducted to examine the difference between the post-test scores of lower achievers in the control group and the experimental group. For the lower achievers in the experimental group, the posttest scores were; N=8, M=87.32, SD=2.748. t= (7) 4.583, p=.254 < 0.05. Table 4.14 indicates that there was no significant difference between the marks of higher achievers of the control and experimental groups in the posttest. Hence, the effect of the Students Team Achievement Division Model on the higher achievers is greater than the effect of the Lecture Method. So the null hypothesis "There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of higher-achiever students in General Science" was accepted.

4.15 Analysis Related to Hypothesis (H_{012})

Table 4.15

Comparison between the results of the posttest of control and experimental group

Test	Group	N	Mean	SD	*df*	*t*	*P*
Posttest	Experimental	30	78.70	10.478	29	8.594	.000
	Control	30	59.70	29.358			

Paired Sample t-test was applied to find out the difference between the marks of the experimental and control group in the post-test. The marks of the posttest of the experimental group were; N= 30, M= 78.70, SD=10.478, and marks of the pretest of the control group were; N=30, M= 59.70, SD= 29.358. t= (58) 8.594, p=.000 < 0.05. Table 4.15 shows that the effect of the Students Team

Achievement Division Model is greater than the effect of the Lecture Method on the academic achievement of elementary-level students in General Science. So the null hypothesis “There is no significant difference between the effect of the Students' Team Achievement Division (STAD) method and the Lecture Method on the academic achievement of elementary-level students in General Science” was rejected

CHAPTER 5
SUMMARY, FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The focus of the study was to investigate the effect of the student team achievement division model on academic achievement in the subject of general science at the elementary level. The objectives of the study were: (i) to examine the effect of the STAD method on the academic achievement of elementary-level students in general science. (ii)To determine the effect of the lecture method on the academic achievement of elementary-level students in general science. (iii).To compare the effect of the STAD method and lecture method on the academic achievement of elementary-level students in general science. (iv)To investigate the effect of the STAD method and the academic achievement of lower medium and higher achievers. (v) To investigate the effect of the lecture method on the academic achievement of lower medium and higher achievers in general science. (vi)To compare the effect of the STAD method and lecture method on the academic achievements of lower-medium and higher achievers in general science.

The design of the study was truly experimental. Sixty (60) students of grade 8, studying in Islamabad Model School for boys, nai abadi khana kaak Islamabad, were the population of the study. A simple Random sampling technique was used to select sixty (60) students of grade 8 as a sample of the study. A pretest was conducted, and based on the marks of the pretest, the students were divided into two equivalent groups. Thirty (30) students were placed in the control group and 30 were placed in the experimental group. The students of the control group were treated though the Lecture Method (LM) whereas the students of experimental group were instructed through the STAD Method. The posttest was administered after the treatment of seven weeks. The data were analyzed by using the SPSS 25 version. Descriptive Statistics (Mean and Standard Deviation) were used to evaluate the academic achievements of the students in General Science.

5.2 Findings

It was found that;

1. The average marks of the control group were slightly higher than that of the experimental group. The marks of the control group were: N=30, M=32.25, SD=9.589, SEM= 2.369 and pretest marks of experimental group were; N=30, M=31.23, SD=8.325, SEM= 1.764. (Table 4.1).
2. The average marks of the experimental group in General Science are significantly more than the average marks in General Science of the control group. The marks of control group were: N=30, M=59.70, SD=29.358, SEM= 1.864 and the posttest marks of experimental group were; N=30, M=78.70, SD=10.478, SEM= 2.589. (Table 4.2).
3. There was no significant difference between the pretest marks of the control and experimental group. The marks of pretest of control group were; N= 30, M= 32.25, SD=10.444, and pretest of experimental group were; N=30, M= 31.23, SD= 8.325. t= (58) .235 and p=.856 > 0.05 (Table 4.3).
4. The Students Team Achievement Division method has a significant effect on the academic achievement of elementary-level students in General Science. The marks of the posttest of the experimental group were; N= 30, M= 78.70, SD=10.478, and marks of the pretest of the experimental group were; N=30, M= 31.23, SD= 8.325. t= (29) 19.635, p=.000 < 0. (Table 4.4).
5. The Lecture Method has a significant effect on the academic achievement of elementary-level students in General Science. There was a significant difference between the marks of the posttest and the pretest of the experimental group. The marks of the posttest of control group were; N= 30, M= 60.27, SD=10.254, and marks of pretest were; N=30, M= 31.23, SD= 8.325. t= (29) 19.635, p=.000 < 0.05. (Table 4.5).
6. The Students Team Achievement Division method has a significant effect on the academic achievement of lower achievers in General Science. There was a significant difference between the marks of lower achievers of the experimental group in the pretest and posttest. The marks of the lower achievers of the experimental group in the posttest were; were: N=8, M=

63.25, SD=6.446 whereas their pretest marks were; N=8, M= 115.25, SD= 4.979. t= (7) 38.160 and p=.000 < 0.05. (Table 4.6).

7. The Students Team Achievement Division method has a significant effect on the academic achievement of medium achievers in General Science. There was a significant difference between the marks of medium achievers of the experimental group in the pretest and posttest; moreover, the effect of the Students Team Achievement Division Model on the medium achievers is also significant. The marks of the medium achievers of the experimental group in the posttest were; N= 14, M= 79.85, SD=6.383 whereas their pretest marks were: N= 14 were; N=14, M= 33.79, SD= 4.388. t= (13) 60.845, p=.000 < 0. (Table 4.7).
8. The Students Team Achievement Division method has a significant effect on the academic achievement of higher achievers in General Science. There was a significant difference between the marks of higher achievers of the experimental group in the pretest and posttest; the marks of the posttest were; N= 8, M= 90.28, and SD=1.389; whereas the pretest marks were: N=8, M= 42.12, SD= 1.356. t= (7) 149.687, p=.000 < 0.05. (Table 4.8).
9. The Lecture Method has a significant effect on the academic achievement of lower achievers in General Science. There was a significant difference between the marks of lower achievers of the control group in the pretest and posttest. The marks of posttest were; N= 8, M= 48.25, SD=3.059 whereas their marks in pretest were; N=8, M= 20.25, SD= 5.148. t= (7) 33.991, p=.000 < 0.05. (Table 4.9).
10. The Lecture Method has a significant effect on the academic achievement of medium achievers in General Science. There was a significant difference between the marks of medium achievers of the control group in the pretest and posttest; the marks of the posttest were; N= 14, M= 56.98, and SD=4.438, whereas their marks in the pretest were; N=14, M= 33.93, SD= 3.512. t= (13) 15.831, p=.000 < 0.05. (Table 4.10).
11. The Lecture Method has a significant effect on the academic achievement of higher achievers in General Science. There was a significant difference between the marks of higher achievers of the control group in the pretest and

posttest; the marks of the posttest of the control group were; N= 8, M= 87.32, SD=2.748, while their pretest scores were: N=8, M= 45.12, SD= 1.553. t= (7) 92.891, p=.000 < 0.05. (Table 4.11).

12. The student team Achievement Division method on the lower achievers is greater than the effect of the Lecture Method. There was a significant difference between the marks of lower achievers of control and experimental groups in the post-test. The marks of lower achievers of the experimental group in the posttest were; N= 8, M= 63.25, SD=8.446, while their pretest scores were: N=8, M= 48.25, SD=3.059. t= (7) 11.544, p=.002 < 0.05. (Table 4.12).

5.3 Discussion

This study aims to compare the effect of two teaching methods: the Student Team Achievement Division Method and the Lecture Method on the academic performance of elementary school students. The study was conducted under controlled conditions, where the researchers attempted to manage the threat of external variables.

The study aligns significantly with previous research on team based learning, particularly the Student Team Achievement Division (STAD) model, reinforcing its effectiveness in improving student academic achievement. The literature extensively supports the premise that STAD enhances learning outcomes by fostering peer collaboration, promoting active engagement, and reinforcing individual accountability. The findings of your study validate these claims, demonstrating that STAD yields better results, especially for lower and medium achievers, compared to the traditional Lecture Method. Research by Slavin (1995) and other scholars highlights STAD’s positive impact on students' academic performance across various subjects, including science, mathematics, and language arts. Your study supports this notion by showing that students taught using STAD performed better in General Science than those taught via the Lecture Method. This improvement is particularly evident among lower and medium achievers, a finding that is consistent with prior studies emphasizing the benefits of cooperative learning for struggling students. The structured group activities in STAD enable weaker students to receive

peer support, which enhances their conceptual understanding and boosts their confidence.

Moreover, previous research indicates that STAD is particularly beneficial for students who require additional motivation and scaffolding to grasp complex topics. The study reinforces this by demonstrating that lower achievers in the experimental group made significant gains in their posttest scores compared to those in the control group. These results align with studies that argue that cooperative learning helps struggling students stay engaged and persist in their learning, leading to higher academic gains. It is also found that medium achievers significantly benefited from STAD, which is in line with existing literature suggesting that structured peer interactions enhance comprehension and retention. Prior studies emphasize that STAD learning environment encourage students to articulate their thoughts, ask questions, and refine their understanding through discussions elements that contribute to academic success. The findings mirror this trend, as medium achievers in the experimental group demonstrated notable improvements, supporting the claim that STAD fosters deeper learning.

For high achievers, this study is found that both STAD and the Lecture Method were effective, though previous research suggests that some high-achieving students may prefer working independently rather than in groups. While it confirms that STAD positively influences high achievers by developing their teamwork and communication skills, it also acknowledges that traditional lectures may better serve students who prefer direct instruction and independent study. This nuanced perspective aligns with studies suggesting that while the learning benefits most students, differentiation in instructional strategies may be necessary to cater to all learners effectively. The literature also highlights that STAD enhances student motivation by incorporating group rewards and fostering a sense of responsibility. The study corroborates this, demonstrating that students in the experimental group showed greater engagement and achieved higher scores. Previous studies argue that team based learning promotes both intrinsic and extrinsic motivation, as students feel accountable for their group's success. However, some studies caution against over-reliance on rewards, suggesting that students might focus on task completion rather than deep learning.

Prior research acknowledges that successful STAD implementation requires careful planning, teacher training, and continuous monitoring. Your study indirectly supports this notion by showing that the experimental group achieved superior results, likely due to the structured execution of STAD learning principles. However, the literature also notes potential challenges, such as resistance from students accustomed to traditional learning methods or difficulties in forming balanced groups. This study does not report such challenges, implying effective classroom management during the intervention. In summary, the study strongly aligns with previous research on STAD learning, confirming its effectiveness in enhancing student academic achievement. It reinforces established findings that STAD benefits lower and medium achievers more than traditional lecture-based teaching while also supporting high achievers in developing collaboration skills. Thus, study adds valuable empirical support to the literature, affirming STAD as a powerful instructional strategy for improving General Science education at the elementary level.

5.4 Conclusions

Based on the findings, it is concluded that;

1. The control group had slightly higher average marks than the experimental group in the pretest. However, this difference was not statistically significant, indicating that both groups had similar prior knowledge and academic understanding before the intervention.
2. To investigate the effect of STAD model on the academic achievement in general science of 8th grade, the finding revealed that the experimental group demonstrated significantly higher average marks in General Science compared to the control group in the posttest. This indicates that the applied intervention had a positive impact on students' academic performance, leading to improved learning outcomes.
3. To compare the effect of STAD model on the academic achievement in general science of 8th grade, the pretest analysis showed no significant difference between the control and experimental groups, confirming that both groups had a similar academic standing before the intervention. This

ensures that any improvements observed in the posttest results can be attributed to the applied teaching methods rather than pre-existing academic disparities.

4. To find out the effect of STAD model on the academic achievement in general science of 8th grade The Students Team Achievement Division (STAD) method significantly enhanced the academic achievement of elementary-level students in General Science. The experimental group's posttest scores were substantially higher than their pretest scores, indicating that these learning strategies effectively improve students' performance. The results highlight the STAD method as a powerful instructional approach, fostering better engagement, knowledge, and academic success compared to traditional teaching methods.
5. It is revealed in conclusions that the Students Team Achievement Division (STAD) method significantly improved the academic performance of lower achievers in General Science. The posttest scores of students in this group showed a substantial increase compared to their pretest scores, indicating that STAD learning strategy effectively enhance their understanding and engagement. This suggests that STAD provides a more supportive and interactive learning environment, which is particularly beneficial for students who need additional academic reinforcement.
6. It is indicated that the Students Team Achievement Division (STAD) method had a significant and positive impact on the academic achievement of medium achievers in General Science. The considerable increase in their posttest scores compared to their pretest scores suggests that this approach effectively enhanced their understanding of scientific concepts. The effectiveness of the STAD method in improving the performance of medium achievers highlights the importance of interactive and student-centered instructional strategies. By fostering a collaborative learning environment, STAD encourages active participation, critical thinking, and knowledge-sharing, all of which contribute to better academic outcomes.
7. It is confirmed that the Students Team Achievement Division (STAD) method significantly improved the academic performance of higher

achievers in General Science. Higher achievers benefited from peer interactions, structured teamwork, and problem-solving activities, which deepened their engagement and reinforced learning. The results suggest that STAD not only supports struggling students but also challenges high-performing learners, making it a valuable strategy for improving academic outcomes across all proficiency levels.

8. It is revealed that the Lecture Method significantly improved the academic performance of lower achievers in General Science. The notable increase in their posttest scores suggests that direct instruction helped these students grasp key concepts more effectively. Lower achievers likely benefited from the structured delivery of content, repetition, and teacher-guided explanations, which provided clarity and reinforced learning. While the Lecture Method proved effective, additional interactive strategies may further enhance engagement and understanding for students requiring more academic support.
9. It is concluded that the Students Team Achievement Division (STAD) method had a greater positive impact on the academic performance of lower achievers compared to the Lecture Method. Students in the STAD group showed significantly higher posttest scores, highlighting the effectiveness of STAD based learning in improving their understanding and engagement. This suggests that interactive and peer-assisted learning strategies are more beneficial for lower achievers than traditional lecture-based instruction, as they provide greater support, motivation, and active participation in the learning process.

5.5 Recommendations

The following recommendations were made;

1. It is recommended that teachers may develop a team based learning environment by using the student team achievement division method which is very helpful for the teaching and learning process and students can learn better through team-based activities in the classroom.
2. It is recommended Students actively participate in team discussions and activities, for the development of strong communication skills to share ideas

clearly and listen to others effectively class discussion during learning can be very effective.

3. The teacher may set group goals for learners to stay focused and productive, which can assist team members who may struggle with good learning and understanding.
4. By fostering a collaborative, inclusive, and dynamic learning environment, team based learning not only enhances academic success but also may prepare students for life beyond the classroom
5. It is recommended that quizzes are a form of individual assessment, it can be ensured by conducting quizzes that each student contributes and learns.
6. It is recommended that the STAD method develop among students how to collaborate effectively, share responsibilities, and respect diverse opinions. Further, it teaches students how to handle disagreements constructively for clear articulation of ideas and active listening

Recommendations for the Curriculum Developers

1. It is recommended that the curriculum developers of the teacher's training programs design curricula that contain structured phases of group-based learning, peer collaboration, and mentorship in the learning process.
2. It is recommended that the curriculum developers of teachers' training programs integrate group-based activity learning design which can support effective learning.

Recommendations for future researchers

The current study was conducted to find out the effect of the Students Team Achievement Division Model on the academic achievement of elementary-level students in General Science, the future researchers may research to check out the effectiveness of the Students Team Achievement Division Model on;

1. The academic achievement of the students in other subjects mathematics, computers etc.
2. The scientific attitude of the students of elementary, secondary, and higher secondary levels.

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PPENDICES

Appendix 1

Pre-test-Post-test

STUDENTS' ACADEMIC ACHIEVEMENT TEST

General Science Class VIII

Time: 50 minutes Total Marks:80

Roll Number…… Section……

Note: Tick the correct answer, cutting and extra writing is not allowed

1. Biotechnology is concerned to.

   a. animal
   b. plants
   c. medicines
   d. both A and B

2. Biotechnology helps to produce

   a. Rice
   b. Wheat
   c. Rose
   d. Biofuels

3. New variety of wheat introduced by biotechnology contains more

   a. Potassium
   b. iron
   c. zinc
   d. both B &C

4. Yogurt is produced by

   a. formic acid
   b. uric acid
   c. lactic acid bacteria
   d. viruses

5. Insulin is used to treat

   a. Fever

b. Tuberculosis
c. polio
d. diabetes

6. Ethanol can reduce the use of

a. Vitamins
b. fossil fuel
c. water
d. carbohydrate

7. Inserting genes in plants can produce crops that can combat

a. fever
b. headache
c. fats
d. blood cancer

8. Deficiency of insulin in humans causes

a. Diabetes
b. heart disease
c. hypertension
d. Epilepsy

9. Which of the following can be used as a biofuel

a. kerosene oil
b. High octane
c. methane
d. Ethanol

10 Which of the following is not a product of biotechnology

a. polythene
b. insulin
c. human growth Harmon
d. Thymosin

Unit 5 chemical reactions

11. Which of the following is a chemical change

a. Melting of ice
b. dissolving of sugar in water
c. burning of magnesium
d. change of water into steam

12. Photosynthesis in green plants and the decomposition of limestone are examples of reactions

a. Synthesis
b. decomposition
c. combustion
d. Endothermic

13. Which of the following is not a chemical reaction

a. Rusting
b. frying an egg
c. photosynthesis
d. melting of ice

14. Which of the following is a chemical change

a. light
b. sunshine
c. air
d. Photosynthesis

15. The substances which take part in the chemical reaction are called

a. elements
b. compounds
c. reactants
d. Products

16. The following are products of respiration

a. carbon dioxide and water
b. carbon dioxide and oxygen
c. glucose and oxygen
d. glucose and water

17. Which gas is released on heating solid potassium chlorate?

a. oxygen
b. carbon monoxide
c. chlorine
d. carbon dioxide

18. during the exothermic reaction

a. heat is evolved
b. Heat is absorbed
c. oxygen is released
d. carbon dioxide is absorbed

19. Which of the following gases is burned in a burner for cooking

a. carbon dioxide

b. Oxygen
c. stream
d. Methane

20. Chemical change is called

a. Chemical reaction
b. Deformation
c. Chemical effect
d. Chemical disappearance

Unit 6 Acids, Bases, and Salts

21. Which acid is present in vinegar?

a. HCI
b. HNO
c. CH3COOH
d. H2SO4

22. Which ACID is used in your car battery?

a. HCI
b. HNO
c. CH3COOH
d. H2SO4

23. When an aunt or a bee stings you it injects

a. an alkali
b. An acid
c. a salt
d. Water

24. Which of the following is not a mineral acid

a. hydrochloric acid
b. sulfuric acid
c. acetic acid
d. nitric acid

25. Acids react with carbonates to liberate

a. hydrogen
b. oxygen
c. Carbon dioxide
d. Ammonia

26. Acetic acid is present in

a. ant sting
b. Curd
c. stomach
d. Vinegar

27. What color change takes place in blue litmus paper in an acid solution?

a. Red
b. yellow
c. pink
d. Colorless

28. Which gas will be released when baking soda is added to vinegar?

a. hydrogen
b. oxygen
c. carbon dioxide
d. Ammonia

29.Which acid is found in the human stomach?

a. formic acid
b. nitric acid
c. sulfuric acid
d. hydrochloric acid

30. Which ions are produced by alkalis in aqueous solutions?

a. Hydrogen
b. hydroxide
c. sulfate
d. Chloride

Unit 7 Force and pressure

31. The unit of Buoyant is for

a. Pascal
b. Newton
c. buoyancy
d. Pressure

32. Which of the following quantities is measured unit of Pascal

a. Friction
b. Buoyancy
c. pressure
d. force

33. The depth pressure in a liquid

a. decreases
b. increases
c. stay the same
d. is zero

34. The atmospheric pressure will be the lowest

a. in Islamabad
b. Lahore
c. Karachi
d. on top of K2

35. When a charged comb is brought near tiny pieces of paper they are attracted toward it the forces acting on it are

a. contact forces
b. balanced forces
c. unbalanced forces
d. non-contact forces

36. As you go from Lahore to the mountains of the Murree the atmospheric pressure

a. Increases
b. Decreases
c. remain same
d. is variable

37. The pressure of water at the bottom of a pond is at the surface of the pond

a. Same as
b. lower than
c. greater than
d. either the same or lower than

38. The atmospheric pressure is greater at

a. Karachi
b. Murree
c. Kaghan
d. Lahore

39. Fuel in a rocket produce

a. sound
b. energy
c. light
d. pressure

40. During walking there are forces and

a. Resistance
b. Slope level
c. Walking style
d. Foot and shoes

Answer Key

1D	2 D	3D	4C	5D	6B	7D	8A	9D	10A
11C	12 A	13D	15C	16B	17A	18 A	19D	20A	
21C	22D	23B	24C	25C	26D	27C	28 C	29D	
30B	31B	32C	33B	34 D	35D	36B	37C	38A	
39D	40A								

Appendix 2

LESSON PLAN

The Herbarian model of the lesson plan consists of 5-steps. The format of these steps was applied to develop the lesson plans of the experimental and control groups of this study. J.F. Herbart (1776-1841) and his followers used this model for the development of lesson plans. (Retrieved from www.freenaleen.blogspot.in/2013/12/lesson-plan-steps-herbartian-approach.html)

Preparation/ introduction: The teacher asks some questions from the students to check the previous knowledge and to produce interest in learning the topic.

Statement of aim: The teacher writes the topic on the board and shares the objectives of the topic.

Presentation: Presentation reflects the cooperative learning in the classroom. Teacher motivates and stimulates the cognitive development of students by giving them chances to learn by themselves and questioning. The teacher compares and associates the facts, events, and application of taught knowledge within the subject and also with other subjects.

Generalization: After taking the session, the teacher provides an opportunity for the students to think and recapitulate the topic. This step was termed as "system" by J.F. Herbart

Application: It is basically the review of the knowledge. Teacher wants to know the depth of the acquired knowledge of the present topic. Questions were recapitulated or given a chance to apply the acquired knowledge in new situations.

Lesson Plan No.1 **(Experimental Group)** Date Class Period Subject Topic	…….. 8th 40 minutes General Science Biotechnology
General objectives	The general objectives of this lesson will be to:) Organize collaborative instructional strategies for the students to create an enriched environment consistent with the STAD team-based learning model.) Develop a "low threat and high challenge" environment among learners studying at the elementary level.) Minimize the role of rote learning and maximize benefiting from team-based learning for the inculcation of general science concepts
Specific objectives	After going through this lesson, the students will be able to: Understand and elaborate the concepts with examples related to biotechnology and their effects on the environment. Analyze the role of biotechnology in daily life. Justify the concepts of biotechnology Which is the field of Biotechnology give examples What are the applications of biotechnology? How we can enhance the productivity of different things by using biotechnology Biotechnology is concerned animals and plants Biotechnology helps to produce Environment-friendly chemicals Medicines and biofuels Bio technology helps to produce more meat from chickens GMO New variety of wheat introduced by biotechnology contains more

	iron and zinc How Yogurts are made with biotechnology What is insulin and what is its functionality What is ethanol and how it is used How genes are inserted in the plants
Material	Textbooks, Handouts, Quizzes, White Board, Marker
Team Formulation	Students will be divided into small groups of 4 -5 people in class Working in heterogeneous teams, academic performance, students discussing problems, comparing answers, and correcting misconceptions.
Plan	Make a plan of learning such as worksheets and quizzes,
Introduction Brain Storming (05 minutes)	The teacher will ask questions from the students about the biotechnology. What is biotechnology? Define biotechnology. Describe the relationship between DNA, genes, and chromosomes.
Statement of aim **(Announcement of the topic)** (05minutes)	Define bacterium Explain how genes are introduced into a bacterium List some biotechnological products used in daily life Explain that genetic modification in different foods can increase the amount of essential nutrients

Presentation (20 minutes)	**STAD Method** 1) Students are divided into small groups of 4 -5 people, 2) Make a plan of learning such as worksheets and quizzes, 3) Read the tasks performed by the team, 4) Give quizzes, evaluations, or assignments, 5) Make individual scores and team scores, 6) Recognition of student achievement
Instructional strategies	Developing team-based learning through a student team achievement division model
Provide a List of some biotechnological products used in daily life.	Questions to disseminate knowledge
Explain how biotechnology allows for meeting the nutritional needs of growing populations.	information
Team-based Assignments	Assignments will be provided to the students and all students will do the assignments with cooperation and with help from each other

Quizzes	the students take individual quizzes, not permitted to help each other during the quizzes, This is meant to ensure that each student is responsible for knowing the material,
Make individual scores and team scores,	To motivate the student to work hard and perform better than in the past, the base score is taken from the average result of similar quizzes performance in the past.
Team recognition and Awarding	A certain criterion may earn a certificate or other rewards, The student is given three levels of rewards based on the average team scores Good Team, Great Team, and Super Team,

Lesson Plan No.2 **(Experimental Group)**	
Date	……..
Class	8^{th}
Period	40 minutes
Subject	General Science
Topic	Biotechnology
General objectives	The general objectives of this lesson will be to: 1) Organize collaborative instructional strategies for the students to create an enriched environment consistent with the STAD team-based learning model. 2) Develop a "low threat and high challenge" environment among learners studying at the elementary level. 3)Minimize the role of rote learning and maximize benefiting from team-based learning for the inculcation of general science concepts

Specific objectives	After going through this lesson, the students will be able to: Understand and elaborate the concepts with examples related to bacterium and biotechnological products As :
Material	Textbooks, Handouts, Quizzes, White Board, Marker
Team Formulation	Students will be divided into small groups of 4 -5 people in class Working in heterogeneous teams, academic performance, students discussing problems, comparing answers, and correcting misconceptions.
Plan	Make a plan of learning such as worksheets and quizzes,
Introduction Brain Storming (05 minutes)	The teacher will ask questions from the students about the bacterium biotechnological products .
Statement of aim (Announcement of the topic) (05minutes)	Define bacterium Explain how genes are introduced into a bacterium Why do Scientists use Bacteria in Genetic Engineering? How do Scientists Insert Genes in a Bacterium?
Presentation (20 minutes)	**STAD Method** 1) Students are divided into small groups of 4 -5 people, 2) Make a plan of learning such as worksheets and quizzes, 3) Read the tasks performed by the team, 4) Give quizzes, evaluations, or assignments, 5) Make individual scores and team scores, 6) Recognition of student achievement

Instructional strategies	Developing team-based learning through a student team achievement division model
Provide a List of some biotechnological products used in daily life.	Questions to disseminate knowledge
Explain how biotechnology allows for meeting the nutritional needs of growing populations.	Developing team-based learning through a student team achievement division model
Team-based Assignments	Questions to disseminate knowledge
Quizzes	information
Make individual scores and team scores,	To motivate the student to work hard and perform better than in the past, the base score is taken from the average result of similar quizzes performance in the past.
Team recognition and Awarding	The student is given three levels of rewards based on the average team scores Good Team, Great Team, and Super Team,

Lesson Plan No.3 **(Experimental Group)**	
Date Class Period Subject Topic	…….. 8th 40 minutes General Science Genetic Modifications and Biotechnology Products
General objectives	The general objectives of this lesson will be to:) Organize collaborative instructional strategies for the students to create an enriched environment consistent with the STAD team-based learning model. 5) Develop a "low threat and high challenge" environment among learners studying at the elementary level. 6)Minimize the role of rote learning and maximize benefiting from team-based learning for the inculcation of general science concepts
Specific objectives	After going through this lesson, the students will be able to: 1) Genetic Modifications and Biotechnology Products 2) Insulin 3) Vaccines
Material	Textbooks, Handouts, Quizzes, White Board, Marker
Team Formulation	Students will be divided into small groups of 4 -5 people in class Working in heterogeneous teams, academic performance, students discussing problems, comparing answers, and correcting misconceptions.
Plan	Make a plan of learning such as worksheets and quizzes,

Introduction Brain Storming (05 minutes)	The teacher will ask questions the students about the Genetic Modifications and Biotechnology Products Insulin Vaccines
Statement of aim (Announcement of the topic) (05minutes)	List general applications of biotechnology in various fields. Explain how biotechnology allows for meeting the nutritional needs of growing populations.
Presentation (20 minutes)	**STAD Method** 1) Students are divided into small groups of 4 -5 people, 2) Make a plan of learning such as worksheets and quizzes, 3) Read the tasks performed by the team, 4) Give quizzes, evaluations, or assignments, 5) Make individual scores and team scores, 6) Recognition of student achievement
Instructional strategies	Developing team-based learning through a student team achievement division model
the Genetic Modifications and Biotechnology Products	Questions to disseminate knowledge
Insulin Vaccines	information
Team-based Assignments	Assignments will be provided to the students and all students will do the assignments with cooperation and with help from each other
Quizzes	the students take individual quizzes, not permitted to help each other during the quizzes, This is meant to ensure that each student is responsible for knowing the material,

Lesson Plan No.1 (Control Group)	
Date	**……**
Class	**8th**
Period	**40 minutes**
Subject	**General Science**
Topic	**Biotechnology**
General objectives	The general objectives of this lesson will be to: 1) Organize conventional instructional strategies for the students to reproduce the concepts in the textbook. 2) Develop a passive environment among learners studying at the elementary level. 3) Maximize the role of rote learning and control benefiting from conventional methods to clear general science concepts.
Specific objectives	After going through this lesson, the students will be able to understand the concept of : Biotechnology and their effects on the environment. Analyze the role of biotechnology in daily life. Justify the concepts of biotechnology Which is the field of Biotechnology give examples What are the applications of biotechnology? How we can enhance the productivity of different things by using biotechnology How Yogurts are made with biotechnology What is insulin and what is its functionality What is ethanol and how it is used How genes are inserted in the plants

Material	Textbooks, Handouts, White Board Marker
Introduction (03 minutes)	The teacher will ask the students to open the books and the page number. Allow the students to note the main points during Lecture.
Statement of aim **(Announcement of topic)** (10 minute)	Biotechnology and their effects on the environment. Analyze the role of biotechnology in daily life. Justify the concepts of biotechnology Which is the field of Biotechnology give examples What are the applications of biotechnology? How we can enhance the productivity of different things by using biotechnology How Yogurts are made with biotechnology What is insulin and what is its functionality What is ethanol and how it is used How genes are inserted in the plants
Presentation (20 minutes)	**Lecture Method**. The teacher will ask students to open the general science textbook at page, Where the topic is given. The teacher will explain all the same by writing the main points on the whiteboard. He will also perform following activities.
Explanation Teacher will explain the terms given in the text	Asking forcibly all students to copy one by one all concepts written on whiteboard, Explanation with the help of some examples and students writing them on the whiteboard

book (10 minutes)	Showing resentment/anger/displeasure on a) poor attention b) copying slowly/ imperfectly/ differently c) talking/laughing with one another d) making mistakes e) questioning during teaching or writing sessions f) Seeking permission to have water during teaching sessions by the students. The teacher will ask all students to give a tight look to above the terms within 5 minutes. After 5 minutes, the teacher will order all class to be attentive to note down the question given in textbook. The teacher will revise and explain most of the terms given in the textbook on page No. In the end, the teacher will assign students to reproduce the classroom tasks in written form on notebooks.

Review Questions The purpose of these questions will be to practice the student's learning (05 minutes)	What is biotechnology? Define biotechnology. Describe the relationship between DNA, genes, and chromosomes
Home assignment (01minute)	Write the answers to this topic in your notebooks. At the end of the lesson, a home assignment will be given to the students in the same teaching unit

Lesson Plan No.2 (Control Group)	
Date	……
Class	8th
Period	40 minutes
Subject	General Science
Topic	bacterium
General objectives	The general objectives of this lesson will be to: 4) Organize conventional instructional strategies for the students to reproduce the concepts in the textbook. 5) Develop a passive environment among learners studying at the elementary level. 6) Maximize the role of rote learning and control benefiting from conventional methods to clear general science concepts.
Specific objectives	After going through this lesson, the students will be able to: Understand and elaborate the concepts with examples related to bacterium and biotechnological products

Material	Textbooks, Handouts, White Board Marker
Introduction (03 minutes)	The teacher will ask the students to open the books and the page number. Allow the students to note the main points during Lecture.
Statement of aim **(Announcement of topic)** (10 minute)	Define bacterium Explain how genes are introduced into a bacterium Why do Scientists use Bacteria in Genetic Engineering? How do Scientists Insert Genes in a Bacterium?
Presentation (20 minutes)	**Lecture Method**. The teacher will ask students to open the general science textbook at page, Where the topic is given. The teacher will explain all the same by writing the main points on the whiteboard. He will also perform following activities.
Explanation Teacher will explain the terms given in the text book (10 minutes)	Asking forcibly all students to copy one by one all concepts written on whiteboard, Explanation with the help of some examples and students writing them on the whiteboard Showing resentment/anger/displeasure on a) poor attention b) copying slowly/ imperfectly/ differently c) talking/laughing with one another d) making mistakes e) questioning during teaching or writing sessions

	f) Seeking permission to have water during teaching sessions by The students. The teacher will ask all students to give a tight look to above the Terms within 5 minutes. After 5 minutes, the teacher will order all class to be attentive to note down the question given in Textbook. The teacher will revise and explain most of the terms given in the textbook on page No. In the end, the teacher will assign students to reproduce the classroom tasks in written form on notebooks.
Review Questions The purpose of these questions will be to practice the student's learning (05 minutes)	Define bacterium Explain how genes are introduced into a bacterium Why do Scientists use Bacteria in Genetic Engineering? How do Scientists Insert Genes in a Bacterium?
Home assignment (01minute)	Write the answers to this topic in your notebooks. At the end of the lesson, a home assignment will be given to the students in the same teaching unit

Lesson Plan No.3 (Control Group)	
Date	……
Class	8th
Period	40 minutes
Subject	General Science
Topic	Genetic Modifications and Biotechnology Products
General objectives	The general objectives of this lesson will be to: 7) Organize conventional instructional strategies for the students to reproduce the concepts in the textbook. 8) Develop a passive environment among learners studying at the elementary level. 9) Maximize the role of rote learning and control benefiting from conventional methods to clear general science concepts.
Specific objectives	After going through this lesson, the students will be able to understand : Genetic Modifications and Biotechnology Products Insulin Vaccines
Material	Textbooks, Handouts, White Board Marker
Introduction (03 minutes)	The teacher will ask the students to open the books and the page number. Allow the students to note the main points during Lecture.
Statement of aim **(Announcement of topic)** (10 minute)	Genetic Modifications and Biotechnology Products Insulin Vaccines
Presentation	**Lecture Method**. The teacher will ask students to open the general science

(20 minutes)	textbook at page, Where the topic is given. The teacher will explain all the same by writing the main points on the whiteboard. He will also perform following activities.
Explanation Teacher will explain the terms given in the text book (10 minutes)	Asking forcibly all students to copy one by one all concepts written on whiteboard, Explanation with the help of some examples and students writing them on the whiteboard Showing resentment/anger/displeasure on a) poor attention b) copying slowly/ imperfectly/ differently c) talking/laughing with one another d) making mistakes e) questioning during teaching or writing sessions f) Seeking permission to have water during teaching sessions by the students. The teacher will ask all students to give a tight look to above the terms within 5 minutes. After 5 minutes, the teacher will order all class to be attentive to note down the question given in textbook. The teacher will revise and explain most of the terms

	given in the textbook on page No. In the end, the teacher will assign students to reproduce the classroom tasks in written form on notebooks.
Review Questions The purpose of these questions will be to practice the student's learning (05 minutes)	What are Genetic Modifications and Biotechnology Products Insulin Vaccines
Home assignment (01minute)	Write the answers to this topic in your notebooks. At the end of the lesson, a home assignment will be given to the students in the same teaching unit

Appendix 3

Ability wise students through School Examination Scores (SES) Islamabad Model School for Boys
(Experimental Group & Control Group)

S.NO	Experimental group	SES%(8^{TH})	Control group	SES (8^{TH})
1	hammad	71	Faisal	71
2	mehmood	68	Fazal	68
3	noorahmed	68	Noorullah	68
4	Sultan ahmed	67	Hikmatullah	67
5	mujeeb	66	Zain	66
6	nazeer	64	Barkat	64
7	attaullah	63	Muneer	63
8	amanullah	63	Amin	62
9	atteeq	62	Tariq	62
10	bilal	62	Jameel	62
11	shakoor	62	Razzaq	62
12	haider	62	Sheraz	62
13	Aqeel	61	Basit	61
14	saif	60	Wali	60
15	majeed	60	Naseebullah	60
16	ali	60	Khan Muhammad	60
17	saleed	59	Muhammad jan	59
18	kareem	58	Inamullah	58
19	hakeem	57	Sultan	57
20	niaz	57	Mubeen	57
21	haris	57	Amjad	57
22	usman	56	Asjad	56
23	hameed	56	Habib	56
24	lateef	56	Ehsan	56
25	muneeb	56	Raziq	56
26	qadir	54	Nazeer	54
27	quddus	53	Akbar	53
28	farooq	53	Ibraheem	53
29	hikmat	53	Shafqat	53
30	niaz	52	Anjum	53

Appendix 4

Academics Wing

F.1-107/2008 (Academics) FDE
Government of Pakistan
Federal Directorate of Education
****

Islamabad, the 1st December 2023.

Principal
Islamabad Model College for Boys (Khanna Nai Abadi)
Islamabad.

Subject: **PERMISSION FOR DATA COLLECTION.**

I am directed to refer on the captioned subject and to say that Mr. Zafar Iqbal, PhD Scholar of International Islamic University, Islamabad is doing a research study on the topic **"Effect of Students Team Achievement Division Model on Academic Achievement in the Subject of Genera Science at Elementary Level".** In this regard you are requested to extend your cooperation regarding their research study.

2. The research scholar is required to forward a copy of his thesis to Federal Directorate of Education after completion.

3. This is issued with the approval of Director (Academics & Quality Assurance).

(TASEER REHMAN)
Deputy Director (Academics)
Phone #. 051-9262713

Copy to:
- PA to Director (Academics & QA).