USE OF STUDENT TEAMS-ACHIEVEMENT DIVISIONS APPROACH IN SCIENCE FOR VERBAL INTERACTIONS AND PERFORMANCE AMONG YEAR FOUR PUPILS

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ABSTRACT

The purpose of this study was to investigate the verbal interactions and performance of selected Year Four science pupils in National Type Tamil School. Generally, National Type Tamil school pupils are passive and tend to be listeners in the classroom. Even though pupils talk, they do more social talk and there is no increase in pupils' cognitive skills. Hence, this research focuses on pupils' verbal interactions among their cooperative group members when using the prepared Student Teams-Achievement Divisions (STAD) Teaching and Learning Guide. STAD Teaching and Learning Guide was prepared to help teachers to promote verbal interactions among pupils. The guide contained teaching strategies such as Think-Pair-Share, and sample of lesson plans for teachers. The research objectives were (i) to investigate pupils' verbal interactions during implementation of STAD cooperative learning approach in science classroom, (ii) to determine the pupils' performance in science lesson after implementing the STAD cooperative learning approach and (iii) to describe pupils' perception on STAD cooperative learning approach. Qualitative exploratory research design was utilized in this study. Twelve Year Four science pupils from a national type Tamil primary school were selected. These pupils were selected based on convenient sampling. The research was conducted for duration of three months and covered five topics in Year Four science syllabus. Data collection techniques included classroom observations, individual quizzes and interview sessions. Using constant comparative data analysis method, six broad themes were identified for the pupils' verbal interactions. There were Elaboration, Question, Short Response, Engages, Directs, Interruptions and Initiations. For the theme Elaboration, there were two categories: 'elaborations for

task management' and 'elaborations for content related matters'. Using a marking scheme the pupils' individual quizzes were analyzed. The findings of this quizzes revealed that low achievers were able to answer higher order thinking skills (HOTS) questions after each cooperative task. Pupils' interview analysis showed that pupils had both positive and negative perceptions of STAD cooperative approach. The pupils' positive perceptions of STAD cooperative approach were they felt engaged in group task; there was teamwork, better content understanding and peer support. Whereas, the negative perceptions were mismatch of group members and burdened with lower ability peers. It is hoped that the findings can provide an insight to the stakeholders and policy makers on how pupils interact verbally in a science classroom through a cooperative approach.

PENGGUNAAN KAEDAH STUDENT TEAMS-ACHIEVEMENT DIVISIONS DALAM SAINS UNTUK INTERAKSI VERBAL DAN PRESTASI MURID TAHUN EMPAT

ABSTRAK

Kajian ini dijalankan untuk mengkaji interaksi verbal dan prestasi murid Tahun Empat di Sekolah Jenis Kebangsaan Tamil dalam bilik darjah Sains. Secara umumnya, murid Sekolah Jenis Kebangsaan Tamil bersifat pasif dan sering menjadi pendengar dalam bilik darjah. Walaupun murid diberi peluang untuk berinteraksi dalam kumpulan, mereka hanya melakukan perbualan sosial dan mereka juga tidak menunjukkan peningkatan kemahiran kognitif. Maka, kajian ini memberi tumpuan kepada interaksi verbal murid di antara ahli dalam kumpulan koperatif mereka apabila menggunakan Panduan Pengajaran dan Pembelajaran *Student Teams-Achievement Divisions* (STAD) yang telah disediakan. Panduan Pengajaran dan Pembelajaran STAD telah disediakan untuk membantu guru-guru untuk menggalakkan interaksi verbal di kalangan murid. Panduan ini mengandungi kaedah pembelajaran seperti *Think-Pair-Share* dan contoh rancangan pengajaran harian untuk guru. Antara objektif kajian ini ialah (i) untuk mengkaji interaksi verbal murid semasa pelaksanaan kaedah pembelajaran STAD koperatif dalam bilik darjah sains, (ii) untuk menentukan prestasi murid dalam pengajaran sains selepas melaksanakan kaedah pembelajaran STAD koperatif (iii) untuk menerangkan persepsi murid terhadap kaedah pembelajaran STAD koperatif. Kaedah penyelidikan eksploratori kualitatif telah digunakan dalam kajian ini. Dua belas orang murid Tahun Empat dari sebuah Sekolah Jenis Kebangsaan Tamil telah dipilih. Murid ini telah dipilih menggunakan kaedah persampelan mudah. Kajian ini dijalankan untuk tempoh tiga bulan dan meliputi lima topik dalam sukatan pelajaran sains Tahun Empat. Teknik-

teknik pengumpulan data merangkumi pemerhatian bilik darjah, kuiz individu dan sesi temu duga. Dengan menggunakan kaedah analisis data komparatif berterusan (*constant comparative method*), enam tema utama untuk interaksi verbal murid telah dikenalpasti. Antaranya ialah Penjelasan, Penyoalan, Respons ringkas, Penglibatan, Arahan, Gangguan dan Permulaan. Untuk tema Penjelasan terdapat dua kategori : 'penjelasan berkaitan pengurusan tugas' dan 'penjelasan berkaitan kandungan'. Dengan menggunakan skema pemarkahan, kuiz individu murid dianalisis. Dapatan kajian menunjukkan bahawa murid berkeupyaan rendah dapat menjawab soalan Kemahiran Berfikir Aras Tinggi (KBAT) selepas setiap tugasan koperatif. Analisis temu duga murid menunjukkan bahawa murid mempunyai kedua-dua persepsi negatif dan positif terhadap kaedah pembelajaran STAD koperatif. Antara persepsi positif murid terhadap kaedah pembelajaran STAD koperatif ialah mereka berasa terlibat dalam tugasan kumpulan, terdapat kerja berpasukan, pemahaman kandungan yang lebih baik dan sokongan rakan sebaya. Manakala, persepsi negatif ialah ketidakpadanan ahli kumpulan dan dibebani oleh rakan sebaya yang berkeupayaan rendah. Adalah diharapkan bahawa hasil kajian ini boleh memberi kefahaman kepada pihak yang berkepentingan dan penggubal dasar mengenai bagaimana pelajar berinteraksi secara verbal dalam bilik darjah sains melalui pendekatan koperatif.

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LIST OF SYMBOLS AND ABBREVIATIONS

STAD	:	Student Teams-Achievement Divisions
HOTS	:	Higher Order Thinking Skills
GD	:	Group Discussion
L2	:	Lesson 2
IN	:	Interview
S1	:	Student 1

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CHAPTER 1
INTRODUCTION

1.1 Introduction

When you start walking around a Tamil school classroom you will notice that teacher's voice dominating the classroom discourses compared to pupil. Tamil school pupils are naturally said to be passive and introvert learners (Vellymalay, 2012). Thus, teachers need to utilize a variety of teaching strategies to ensure pupils participate actively during science lessons. According to Agranovich and Assaraf (2013) classroom instruction determines the success and failure of a student.

In the context of Malaysia, Malaysian Education Blueprint (2013-2025) provides long-term policy implementations in order to make improvements in the quality of teaching in our classrooms. This blueprint has been designed to produce young Malaysians who are fit to face the challenges of 21st century. Hence, the paradigm shift from lecture-based method to a more interactive teaching method is essential in order to produce a younger generation who are versatile in achieving the vision of 2020. The Malaysian Education Blueprint (2013-2025) urges the teachers to improve the classroom strategies especially in science classrooms which is one of the core subject in Malaysian curriculum.

Researchers believe that pupils learn more while working in groups or through interactions with their classmates (Ibrahim, Mahmud, Thalib, & Dirawan, 2015; Koh, Lee, & Kang, 2013; Lord, 2001; Sharan, 2015). Cooperative learning is widely accepted as one way which promotes interaction among pupils (Chin, 2006; Gillies, 2004, 2006b; Mang Li, Zheng, Tang, & Sang, 2015). Moreover, cooperative learning is a student-centred approach where teachers become the facilitators in the classrooms (Kaldi, Filippatou, & Anthopoulou, 2014). The large body of research

indicates that cooperative learning is able to promote both academic and social developments among pupils (Ebrahim, 2012; G. M. Ghaith, 2004; Hernandez, 2002; Hertz-Lazarowitz, 2008; Ismaon, Iksan, & Othman, 2013; Johnson, Johnson, & Stanne, 2000). Cooperative learning is an essential instruction method in a 21st century classroom for pupils to achieve (Ministry of Education, 2015).

Gillies (2004) who compared the verbal interactions among cooperative groups and unstructured groups found that pupils in cooperative groups showed more verbal interaction than the pupils from unstructured group. Moreover, Alghamdi (2014) added that the explanations given by the cooperative group pupils from one pupil to another lead to the constructive learning performance of the group members. The help seeking pupils in the cooperative groups were aided by the help providers or high performing students by giving them needed explanations regarding the task in an easier way to understand. Then the help seekers use the explanations given to complete the task. This shows how cooperative learning promotes verbal interaction among cooperative group pupils and how it helps to improve their learning performance.

The verbal interactions among pupils are crucial for the success of cooperative learning because research has shown that it is the interaction that occur in groups that facilitate learning (Webb, 2009). However, the task and the structure of cooperative learning determine how members interact. When pupils interact in cooperative groups they learn to share information, develop new understandings and enhance their cognitive skills (Gillies, 2006b). Consequently, cooperative learning can enhance active and meaningful learning among pupils.

There are many different approaches to cooperative learning such as STAD (Student Teams-Achievement Division), JIGSAW, Teams-Games-Tournament

(TGT), Cooperative Integrated Reading and Composition (CIRC), Learning Together (LT), Team Assisted Individualization (TAI) and many more (Slavin, 2015; Tarim & Akdeniz, 2008; Van Wyk, 2012). Among all the different types of cooperative learning approaches, STAD approach is one of the simplest and most extensively researched cooperative learning methods (Gillies, 2006; Gillies et al., 2007; Gillies & Boyle, 2010). STAD approach has shown consistently positive outcomes for the pupils (Khansir & Alipour, 2015). STAD approach comprises of five major components: class presentations, teams, quizzes, individual improvement scores and team recognition (Slavin, 2015). The detailed process of each component will be explained further in following chapters.

STAD which is befitting for most school subjects, is also appropriate for science (Kaldi et al., 2014; Tarim & Akdeniz, 2008). STAD requires simple procedures that are easy to understand, remember and apply (Khan & Inamullah, 2011). In a meta-analysis done by Johnson et al. (2000) on eight cooperative learning, STAD shows the highest degree of usability, and it was claimed by teachers as the easiest approach that can be implemented in classrooms (Rai & Samsuddin, 2007). Hence, this present study selects STAD approach to promote verbal interactions and their achievements in Year Four Tamil school science classroom.

1.2 Background of the study

According to Malaysian Education System, Malaysian Tamil schools are referred as 'National-Type Schools' which use Tamil as the medium of instruction. The subjects and their content taught in Tamil schools are the same as the National Schools except the medium of instruction in is Tamil. However, the subjects Bahasa Malaysia and English are taught in their respective languages.

Parents' socio-economic status have a strong impact on pupils achievement in education (Bhat, Joshi, & Wani, 2016). Most of the parents in rural Tamil schools are laborers and consequently their socio-economic status is low. They failed to give proper attention and support to their children's education since their main focus is on upgrading their families' financial background (Vellymalay, 2012). As a result of this, few studies have revealed that self-esteem of Tamil school pupils are naturally low (Arumugam, 2008; Maniam, 2010; Nair & Kim, 2014). Moreover, their interactions are between their own communities and as a whole Tamil school pupils become passive in classrooms (Maniam, 2010). They prefer to be listeners rather than participate in the lessons.

Tamil schools also lack of basic infrastructures and facilities such as library, science laboratory, computer rooms and sufficient classrooms (Tek and Manikam, 2014). Most of the Tamil schools still share one classroom for two different classes by using simple dividers. The lacks of facilities deteriorate the feeling of a conducive, resourceful and comfortable schooling environment. This causes a lag in rural Tamil schools pupils education excellence (Vellymalay, 2012). Furthermore, Palani and Yahaya (2008) and Vellymalay (2012) mentioned that Tamil schools lacked of multimedia and technology facilities which can be integrated into daily lesson. This situation causes teachers to depend merely on textbooks and using 'chalk and talk' pedagogy. Consequently, this conventional teaching method makes pupils' learning less interaction and limited communication among them during lessons. It is essential to zoom in the problems faced by the Tamil school pupils' in their classroom as it will determine their achievement. Therefore, it is justified why Tamil schools should be studied as our Malaysian Education Blueprint (2015-2025) requires more engaging classes which lead to the wider learning and thinking skills.

Therefore, this research will focus on the verbal interaction and performance of Year Four science students during the implementation of STAD cooperative learning approach. This study is important as fewer studies have been done on Tamil primary school environment which is a minority group to see what is exactly happens in its classrooms (Arumugam, 2008).

1.3 Statement of Problem

Engaging primary pupils with interactive activities during teaching and learning empowers them to generate new ideas and enables them to actively participate in the lesson (Amburgh, Devlin, Kirwin & Qualters, 2007). Biggs and Tang (2007) claimed that an effective teaching does not just involve the delivering of knowledge rather it should aim at engaging pupils in learning activities. However, primary teachers seem to transmit knowledge to pupils using traditional teaching methods and claiming that it is the most efficient and effective way to learn science (Gillies, Ashman, & Terwel, 2007). Thus, Gillies and Boyle (2010) found that primary pupils rarely work together during their lessons.

This causes, the verbal interaction among the primary pupils decline over the years (Ebrahim, 2012). Pupils are unable to work together to achieve a common learning goal and to be truly engaged in the activity. When pupils are not verbally engaged, they are not able to encourage their peers and keep them motivated during the lesson. Most importantly, pupils would miss the opportunity to translate the teacher's input into "pupil's language" to one another. This is because, students were not given enough opportunity to communicate among the peers regarding the task given. This in turn, reduces pupils understanding of the science concepts and may be detrimental for their science achievement (Herrmann, 2013).

Hence, the implementation of an effective cooperative learning technique is essential to promote active participation of elementary children in classrooms. Among the various teaching techniques of cooperative learning, STAD is one of the simplest and most researched teaching techniques that are popular in elementary classrooms (Gillies, 2006; Gillies et al., 2007; Gillies & Boyle, 2010). Besides that, STAD has the greater flexibility in elementary classroom's daily schedule to implement cooperative learning easily. Rai and Samsuddin (2007) said that when the teachers fail to implement any of the cooperative learning strategy it causes the students to become passive, less motivated and self-regulating learning skills also not nurtured among them.

Zakaria and Habib (2012) who discussed the implementation of verbal interactions claims that teachers as a facilitator should allow pupils to talk more. Their research proves that interaction among pupils result in greater student performance than pupils involved in conventional teaching method. This shows that, when pupils are not given enough chance to interact with each other and to share their ideas they tend to become passive learners in classroom. According to Ebrahim (2012) passive learners will lead to rote learning in critical subjects such as science which is rich with contents and pupils need to understand the concepts and knowledge by relating them to their daily life situations. Hence, it is a must for science teachers to change their classroom instruction to a student-centered approach to ensure meaningful learning take place.

In addition, Gillies and Boyle (2010) reported that teachers are failed to accommodate cooperative learning activities in the classroom because the implementation demands personal commitment of a teacher. Teachers need to put more effort in planning the effective activities and evaluationg pupils' performances

compared to in traditional lesson (Hertz-Lazarowitz, 2008). Moreover, Linton, Farmer, and Peterson (2014) claim that inexperienced and inappropriate implementation of STAD cooperative learning activities might lead to ineffective lesson.

Besides that, another study claims that teachers do carry out group acivitites in science classrooms but the analysis of pupils' talk reveals that pupils do more social talk and there is no increase in pupils' cognitive skills (Lopata, Miller, & Miller, 2003). This shows that, the normal and unstructured group works does not promote pupils learning. Their communication skills during their normal group work does not really contribute to their learning. Hence, analyzing pupils' verbal interactions during the cooperative learning will help us to study how pupils communicate each other to promote their learning.

In the Malaysian context, implementing 21st century learning skills in classrooms have been emphasized in Malaysian Education Blueprint 2013-2025. This blueprint is aimed to equip our younger generations with skills that needed to face the challenges of 21st century (Blueprint, 2015). The most important 21st century skill that is stressed in this blueprint is collaboration and teamwork. The collaborations skills developes higher-level thinking, communication skills, achievement, self-management and leadership skills among the pupils (Rissanen, 2014). Therefore, there is a need for teachers to encourage verbal interactions among pupils which concequently improves their achievements in science lessons.

However, implementation of cooperative learning in Malaysian primary classrooms is still not promising as stated by L. L. Chan and Idris (2017). They claimed that Malaysian pupils are learning facts by memorizing. Memorizing facts does not sustain learning of science concepts.

This present study will focuses on the Tamil school science classrooms. Very less studies have been done on Tamils schools since this is a minority group. Vellymalay (2012) states that Malaysian Tamil school pupils lack of interaction and communication skills. This statement is supported by Maniam (2010) who argues that Tamil school teachers still rely on traditional teaching method which leads pupils become passive during lessons.

Most of the previous researches were focused on the effectiveness of cooperative teaching and learning on pupils but very few were concern about how is the communication or verbal interactions among pupils during cooperative learning (Ahmad, 2010; Balfakih, 2003; Ibrahim et al., 2015; Kaldi et al., 2014). The study on effectiveness alone is not convincing as it just shows the outcome of the approach rather than explains what happens during the implementation of the approach. Hence, it will more helpful if teachers were provided with a guide to implement STAD cooperative learning to promote pupils' verbal interactions. Therefore, this study intends to prepare a teaching and learning guide on STAD cooperative learning and study the verbal interactions among Year Four Tamil school pupils in science lesson.

1.4 Aim of the Study

This research is aimed to study the verbal interactions among Year Four Tamil school pupils using STAD cooperative Teaching and Learning Guide in science. This research also investigated pupils' science performance and pupils' perception on STAD cooperative learning approach.

1.5 Research Objectives

The specific research objectives of this study were:

1. To investigate Year Four pupils' verbal interactions during implementation of STAD cooperative learning approach in learning science.
2. To determine the pupils' science performance after implementing the STAD cooperative learning approach.
3. To describe pupils' perceptions on STAD cooperative learning approach.

1.6 Research Questions

The following research questions have been identified for this study:

1. How is Year Four pupils' verbal interactions during implementation of STAD cooperative learning approach in learning science?
2. What is the pupils' science performance after implementing the STAD cooperative learning approach?
3. What is the pupils' perceptions on STAD cooperative learning approach?

1.7 Significance of the Study

The findings of this study will be useful to students, teachers, instructors, instructional designers and policy makers as it will ascertain the credibility of STAD-cooperative teaching and learning module and will be a guidance to implement cooperative learning in classrooms. It is hoped that the findings of this study would promote the application of cooperative learning approach in science classrooms. Teachers are generally seeking to gain understanding on what works and what does not works on their pupils. Teachers do try to find better ways to solve the problems they face in their daily classrooms. Hence, this study will be useful for those teachers

who find their pupils are passive and are finding for more effective teaching approaches to implement in their science classrooms.

Teachers are reluctant to incorporate cooperative learning into daily teaching and learning practices because they are a lack of guidance and materials which will help them to understand more on cooperative learning. Hence, the module that will be prepared will suggest the suitable cooperative learning strategies that can be used in daily classrooms.

If teachers are able to implement the STAD approach effectively in their lessons, pupils can be engaged and developed not only understanding of the content but also social skills such as communication and team work. Moreover, this study could help policy makers to assess the ascertain the credibility of STAD-cooperative teaching and learning guide that will be prepared in this study. The findings will help them to decide on implementing this module in other primary schools as a guidance for teachers in applying cooperative learning.

This study will also help the teachers to play their role as a facilitator which is required in developing 21st-century learners. Teachers can receive useful information such as the benefits of cooperative learning, the role of teacher and student during the implementation of STAD cooperative strategy, and assessment and feedback that is suitable for this learning strategy. Teachers will get more idea on how to design tasks during the application of STAD cooperative learning strategy which will make the students solve in a group. This will make teachers will feel more confident and comfortable in applying STAD cooperative learning strategies during lessons.

Policy makers in the Curriculum Development Centre (CDC) in the Ministry of Education will be able to determine whether STAD cooperative learning strategies is beneficial for primary science classroom and they can consider the usage of this module in schools. Moreover, the process of cooperative learning that will be studied in this research might help them to understand the challenges that teachers will encounter in implementing the STAD cooperative learning. Hence, policy makers will decide how to improve the implementation of this teaching method in primary classrooms according to its feasibility in Malaysia.

This guide contain the teaching and learning strategies which follow the nature of STAD-cooperative technique. The tasks were designed to satisfy the characteristics of cooperative learning technique and aimed to promote the active participation of pupils in science lessons. Hence, teachers may utilize this guide in implementing cooperative learning in other lessons too. In future, this guide can gradually become a complete STAD-cooperative teaching and learning module which comprises all the topics in primary science.

1.8 Operational Definitions

1.8.1 Student Team Achievement Division (STAD) Cooperative learning Approach

Student Team Achievement Division (STAD) cooperative learning approach is the simplest form of cooperative learning approach (Gillies, 2006; Gillies et al., 2007; Gillies & Boyle, 2010). The unique characteristic of STAD is it requires all the team member work together to achieve the common goal. STAD generally have five elements which are class presentation, teams, quizzes, individual improvement score and team recognition. Class presentation was initiated by the teacher to introduce the

lesson of the day. Teachers need to ensure pupils to pay attention during the class presentation as it will help them later to complete their group task. The second element is teams. This is where pupils will be given a group task to discuss and interact among their group members to complete the group task. After the team study, pupils will answer the individual quizzes given to them. But pupils are not allowed to discuss during the quizzes. Later, each pupil will be given individual score based on their performance in the individual quiz. Finally, the teams with highest score will receive rewards from their teacher. This present study implemented this STAD cooperative learning approach by preparing the STAD Teaching and Learning Guide. This guide comprises all the five elements of the STAD cooperative learning approach. The detailed explanations of each element in the STAD Teaching and Learning Guide will be discussed in Chapter 3.

1.8.2 Verbal interactions

Verbal interactions can be operationally defined as the discussions and interactions take place among group members while doing the group task during the implementation of STAD cooperative learning approach. Verbal interactions refer to how pupils in each cooperative group talk and discuss about the task given to them. Gillies (2004) has classified verbal interactions into six categories such as Elaborations, Questions, Short Response, Engage, Direct and Interrupt.

1.8.3 Science Performance

Science performance in this study can be operationally defined as how pupils answer the individual quizzes given at the end of each STAD cooperative learning lessons. In total there were five lessons carried out using the STAD cooperative learning approach. The topics that were selected for this study are Avoiding Bad Habits, Humans Respond to Stimuli, Inheritance, Breathing Organs of Animals and

Photosynthesis. Pupils were required to answer the questions individually and without the help of their group members. These questions were designed to gain pupils' science performance in the selected topics.

1.9 Summary

The first section on this chapter presented a brief introduction on background of this current study. The next section contained the most essential part of this study which was the statement of problem of present study. The aim of the study was explained in the following sections. It followed by research objective and research questions of the study. The final sections contained the significance of the study and the operational definition of the terms that has been used in this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The chapter begins with the brief introduction of cooperative learning. It followed by the elements of cooperative learning and benefits of cooperative learning. Then the application of cooperative learning in science classrooms was explained. Group formation is an essential element in cooperative learning strategy. Previous studies have discussed the issues that have to be considered in assigning pupils into heterogeneous groups. The challenges in incorporating cooperative learning also will be discussed in this chapter. Later, the past studies and findings of students' verbal interaction in science classroom were discussed in the following sections.

Cooperative learning has received increasing attention from researchers. This chapter presents the previous studies done on the cooperative learning and especially on the STAD technique. In recent years, researchers and practitioners have become increasingly convinced that STAD technique is the most prevalent method among other cooperative learning techniques. Numerous studies have compared STAD technique with other methods and concluded STAD as a highly applicable teaching method (Alghamdi, 2014; Balfakih, 2003; Ghaith, 2004; Khan & Inamullah, 2011; Khansir & Alipour, 2015).

Next, the chapter continues with the discussion of STAD technique, the methodologies used in previous studies and its findings. This discussion is important in identifying the gap in the previous studies that need to be filled through this present study. Later, the role of STAD in promoting verbal interaction among science pupils also will be explained. The previous findings will be summarized in a

conceptual framework which shows the clear view of this study. Lastly, the theoretical framework which explains the theories that underpinning the present research also will be discussed here.

2.2 Cooperative Learning as an Active Learning Strategy

Active learning can be explained as providing opportunities for pupils talk and listen, write, read and reflect meaningfully on the content, ideas, issues, and concerns of a subject (Monk & Silman, 2014). Current 21st century teaching skills require pupils to be active learners which claim that pupils learn best when they engage with course material and actively participate in their learning. This is parallel to the proverb by Confucius which *sounds I hear and I forget, I see and I remember, I do and I understand*. It has proven widely that pupils retain more content for a longer period and able to apply the knowledge in a wider range of contexts when they actively participate in the classrooms (Goodhew, 2007; Hinckley, 2010; Smyth, 2004).

The teaching and learning activities in classrooms can be classified under two main types of learning which known as active and passive learning. However, teachers failed to understand the effectiveness of these strategies and how these activities are affecting the participation of pupils in the classroom (Nelson & Crow, 2014). Figure 2.1 shows Edger Dale's cone of learning which shows the few types of active and passive learning activities.

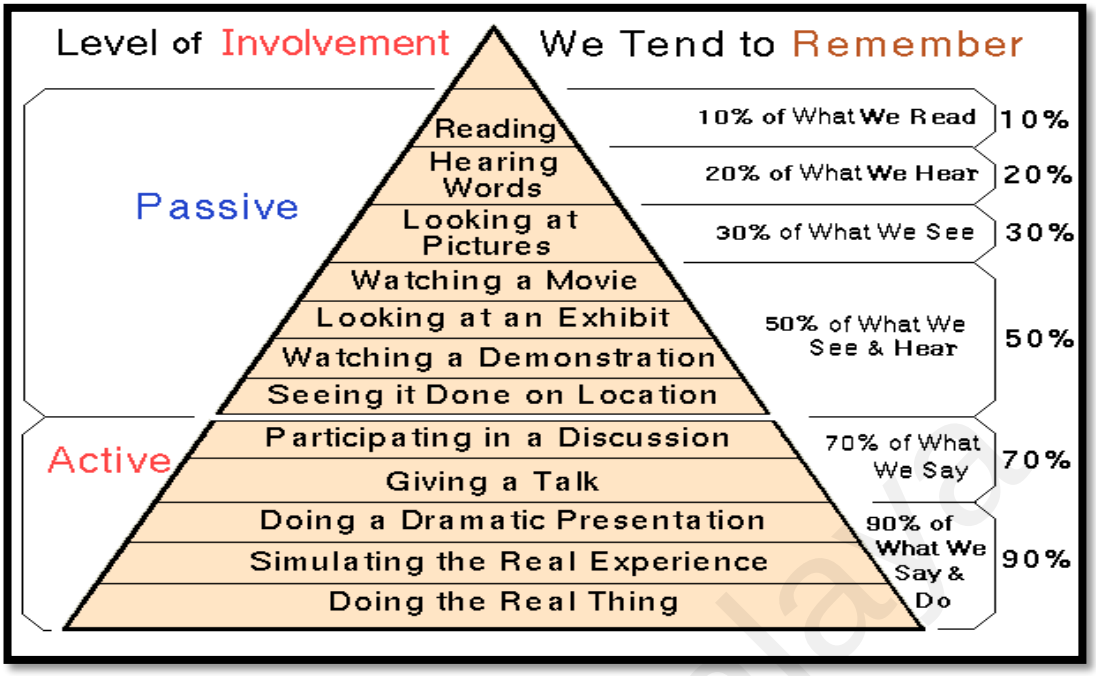


Figure 2.1 Edger Dale's the Cone of Learning

The cone of learning designed by Edger Dale shows the examples of active and passive learning activities. This pyramid explains that pupils learn and remember more when they are actively participating in the lesson rather than just receive the knowledge from the teachers (Dale, 1969). Besides that, we can notice that participating in a discussion or involve in group work is considered as an active learning technique and pupils tend to remember 70% of the content. Hence, it is clearly explained that cooperative learning is one of the active learning strategies which is very effective and involves pupils' participation.

A group of researchers Amburgh et al. (2007) developed the Active-Learning Inventory Tool which quantifies and characterize the use of active learning techniques in the classrooms. There are 20 types of active learning activities are listed in this inventory tool and they are categorized under three level of complexity. Cooperative learning is placed on the high complexity activity but one important

speciality of these techniques has been identified by this group of researchers. Cooperative learning can be implemented by comprising all other active learning techniques such as quizzes, one-minute paper, think pair and share, peer teaching, debates and role playing. Hence, it is essential for teachers to understand the nature and strategies of implementing cooperative learning in order to make pupils participate in classroom activities.

2.2.1 Elements of Cooperative Learning

Cooperative learning differs from other types of group work or traditional instruction in several ways. There are five main characteristics of the cooperative element. The first element of cooperative learning is *positive interdependence*. In contrast to traditional classrooms where pupils work individually or competitively, pupils are mutually dependent on another in order to accomplish the common goal in cooperatively structured classrooms (Johnson et al., 2000). Pisapia, Pang, Hee, Lin and Morris (2009) suggested that positive interdependence can be developed in several paths, including sharing resources, working towards a common learning goal, and depending on another for rewards and acknowledgements.

The second, *individual accountability* requires all the team members' responsibility to achieve higher and contribute to their group. For an instance, when one student attains a goal, it increases the probability that other pupils will achieve the goal whereas in a competitive structure goals are negatively linked. So, when one student accomplishes the goal, it reduces the likelihood of other pupils will attain the goal (Johnson et al., 2000). This makes each member of a group become a stronger individual. Parveen (2012) listed few common ways to structure individual accountability in cooperative learning classroom such as giving an individual test to each student, randomly selecting one student's product to represent the entire group

and having each student to explain what they have learned among their group members. These suggestions will be useful for us in structuring a cooperative lesson in classrooms.

The third element is *face-to-face promotive interaction,* which requires pupils promote each other by helping and supporting each other to accomplish the goal. Every individual in the group help, assist, support, encourage and praise each other's effort to achieve a common goal (Johnson et al., 2000). Charania, Kausar, and Cassum (2001) explain that certain cognitive activities and interpersonal dynamics can only occur when pupils get involved in promoting each other during the learning process. For an example, orally explaining how to solve problems, discussing the nature of the concepts being learned, teaching one's knowledge to others and connecting knowledge with daily life problems are the few cognitive activities which occur when pupils promote each other's efforts (Parveen, 2012).

The fourth element of cooperative learning suggested by Johnson et al. (2000) was the *social skills*. The success of a cooperative learning depended on the contribution of interpersonal and small group skills. Khansir and Alipour (2015) warns that the lack of social skills causes many cooperative lessons to experience failure and pupils were not be able to achieve the learning objective of the lesson. Pupils need to be taught with suitable social skills such as leadership, decision-making, trust-building, communication and conflict management skills before participate in cooperative lessons.

The fifth is *group processing* where group members reflected on their achievement and discussed how they might improve it (Johnson et al., 2000). Pupils discuss how well they were performing, achieving their goals, and how they were maintaining the effective working relationships among their group members. Here,

the group members are given a chance to describe what member actions were helpful and unhelpful during their group work. Moreover, they can make decisions on behaviors and attitudes of their members which were considered as a hinderance in their team. This element was essential in identify the weakness and strength of every group member and improvise their team work in order to achieve the common goal successfully.

M Li and Lam (2005) argued that understanding these five elements of cooperative learning allows teachers to adapt cooperative learning to their classroom context and needs of pupils, finely adjust the use of cooperative learning to their circumstances and prevent and solve the problems face by pupils during their work in a group. The figure below summarizes the five types of the element of cooperative learning that suggested by Johnson et al. (2000).

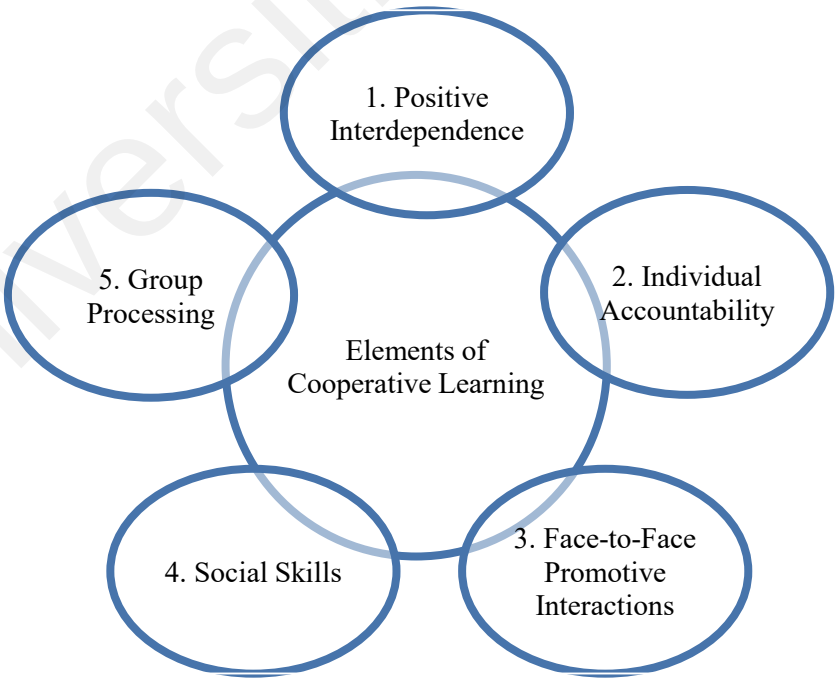


Figure 2.2 The Five Elements of Cooperative Learning

2.2.2 Benefits of Cooperative Learning

Numerous researches revealed the advantages and benefits of cooperative learning. Through cooperation, pupils are able to involve actively and meaningfully in classroom lessons (Johnson et al., 2000). This helps the teachers to shift the passive classroom environment to a more active and participative environment where pupils actively engaging them2selves with the lesson. Moreover, while working together to accomplish the common goal, it enhances the academic achievement of pupils and increases the productivity than working alone (Baer, 2003; Gillies, 2006a; Johnson & Johnson, 1999; Koutselini, 2008; Parveen, 2012).

Results of the study done by Ishee and McHale (2002) clarified the lesson goals were similar for both the teacher and pupils who were involved in cooperative learning as both were looking to develop cognitive and cooperative skills. This shows that pupils and teachers were aware of the benefits of cooperative learning and they are looking for self development to improve their skills. Moreover, the same study revealed that pupils realized each of their roles was important and that if they failed to perform their role they would be letting their group down. This finding is consistent with Koutselini (2008) who claims that pupils were conscious of the benefits of cooperative learning included getting the lesser-skilled pupils to play their role in their team to achieve the common goal. This caused the lesser-skilled pupils to felt more important because they had a specific job in their team and contributed to the success of their team.

Meanwhile, Gillies and Boyle (2010) reported that pupils were able to examine well the tasks given, share their thoughts, clarify the differences and build new knowledge. Another study which was done by Lopata et al. (2003) claimed that

cooperative learning promotes self-esteem among lower achievers. Lower achievers tend to be more active and motivated because they have more friends around them (Ishee & McHale, 2002). Balfakih (2003) found that there was an increase in social relationship and also in self-esteem among pupils involved in cooperative learning. Hence, we can conclude that cooperative learning will be helpful in increasing the performances of lower achievers in classrooms.

Moreover, findings by Lord (2001) add more strength to the benefits of cooperative learning in the classroom. His study proved that cooperative learning able to enhance thinking and learning of science, attitudes towards a subject, pupils' understanding of practical relationships, reading and writing skills and social skills of pupils. Besides that, Johnson et al. (2000) revealed that cooperative learning can result in better attitudes toward peers who are from different ethnic and socio-economic group. Hence, cooperative learning is a need in Malaysian classrooms which consists of pupils from a multi-ethnic background. All the findings listed above indicate that cooperative learning benefits pupils in both academic and social performance.

2.2.3 Cooperative Learning in Science Classrooms

According to Parveen (2012), cooperative learning created many learning opportunities that do not occur in the traditional classroom especially in science classrooms. Zakaria and Habib (2012) listed two factors that claim why cooperative learning is essential to promoting verbal interactions in science classrooms. The first factor is during science lessons pupils mostly work in group, therefore it is easy to carry out group activities and the second is the duration of science lessons usually two periods each with 30 minutes which is enough to carry out cooperative learning activities.

Besides that, cooperative learning in a chemistry classroom proved that greater achievement gains and made greater use of specific verbal patterns that will lead to success in learning (Balfakih, 2003). This was supported by Khansir and Alipour (2015) who urged science teachers to implement cooperative learning in science classrooms to enhance scientific skills and to increase achievement in science. K. W. Chan (2014) found that cooperative learning able to increase pupils' enthusiasm in learning concepts of science because they are more interested in listening to their member's ideas rather than listening to their teacher's explanations. This situation is totally opposite to traditional classroom where teachers just stress on the presentation of science knowledge and do not encourage the active participation of pupils in group learning (Li & Lam, 2005).

Lord (2001), a professor of biology at Indiana University has done a research review on 300 articles about cooperative learning in science classrooms and found that 92% of the researchers shows positive results on pupils achievement and involvement. The 8% of studies which shows negative experiences was due to the errors that happened during the implementation of cooperative leaning. Other than that, he listed 101 reasons for using cooperative learning in biology teaching which is very beneficial to all he science teachers. The suggestions he listed in his article is based on his own experiences while implementing cooperative learning strategies in his biology classes.

2.2.4 Grouping in Cooperative Classroom

Grouping the pupils is an essential element in implementing cooperative learning. Cooperative learning is usually associated with heterogeneous grouping (Baer, 2003). Findings by Johnson et al. (2000) show that heterogeneous group with 3 to 4 members for a long term would build a stable relationship between the

members. They would give support, help, encouragement, and assistance among each other which resulted in the members' academic performances and cognitive development. Moreover, (Johnson et al., 2000) warns that to achieve the stable relationship between the heterogeneous group members, they would have to meet twice a week in primary schools and once in a week for secondary schools.

Forming a heterogeneous group needs consideration of few factors such as academic performances, race, and sex (Balfakih, 2003). However, an essential factor is academic performance. Most of the studies cooperative learning show that low achieving learners benefitted more when they are placed in a heterogeneous group (Balfakih, 2003; Khansir & Alipour, 2015; Tiantong & Teemuangsai, 2013).

2.2.5 Challenges in Incorporating Cooperative Learning

There is no denying that cooperative learning benefits the pupils as well as teachers in improving academic performances, yet there were several findings argued that teachers confronting some challenges were implementing cooperative learning. According to Koutselini (2008), cooperative learning is time-consuming and teachers required advance planning before the lesson. In other words, the heavy role had been placed on teachers' shoulders. Teachers should play their role well and manage their teaching and learning activities to fulfill the need of cooperative learning.

Other than that, teachers are unable to differentiate between normal grouping and cooperative learning grouping. Learning groups are divided into 4 such as pseudo-groups, traditional groups, cooperative groups, and high-performance cooperative groups (Johnson et al., 2000). Table 2.1 below briefly explains the four different types of learning groups.

Table 2.1

Types of learning Group

Pseudo-groups	The group consists of members who have little or no interest in working together. This may resist the group's achievement in overall.
Traditional groups	Members of the group who favour to work alone and solve the task. At the end of the lesson, individuals will be rewarded according to individual performances and obviously less interaction takes place here.
Cooperative groups	Members have the individual potentials and they share their ideas and productivity to achieve the common goal and it leads the group to success.
High-performance groups	Groups that meet all the requirement of a cooperative group and perform extraordinarily.

Koutselini (2008), stated that many teachers failed to incorporate cooperative learning because they do not how to formulate interdependent and heterogeneous group. This finding supports Johnson et al. (2000) where most teachers prefer to choose pseudo-groups and traditional groups in classrooms. As a result, pupils tend to on their own even after being placed in a group.

Another group of teachers complained that they could not control a large number of pupils in a group and some low achieving pupils were just being a 'passenger' in the group (Parveen, 2012). They feel comfortable sitting in groups because the high achievers will complete the task given without relying on them. The absence of clear picture about the actual process of cooperative learning is also considered as another primary challenge in implementing cooperative learning (Duron, Limbach, & Waugh, 2006).

In addition, Gillies and Boyle (2010) reported that teachers reluctant to accommodate cooperative learning in the classroom because the implementation demands the personal commitment of each teacher. Teachers need to put more effort in planning the cooperative lesson and evaluating pupils' performances compared to in traditional lesson. This suggestion supported by Hertz-Lazarowitz (2008) who

found that student able to perform extraordinarily if the cooperative learning environment is challenging and the role given to each of them in the group is different during each group activity.

Interaction and communication skills are essential while corporating in group activities. Certainly, Baines, Blatchford, and Kutnick (2003) claim that pupils need to be taught with efficient interactional skills and skills on how to communicate while working in a group. This will enable those quiet and passive pupils to adapt themselves to the environment and communicate effectively with their members. This is also proposed by an earlier study done by Manning and Lucking (1994) who demands teachers to develop interpersonal skills in order to achieve the cooperative learning goals. In the context of Malaysia, this suggestion will be useful for primary classrooms where the pupils come from the different social background. Hence, they need proper communication skills to avoid miscommunications among group members.

Gillies and Boyle (2010), in a case study of teachers' reflection on implementing cooperative learning, found that teachers are facing difficulties in assessing pupils' group work. Teachers are still not sure with the type of assessments can be done on the pupils' group activities. However, some researchers (Ahmad, 2010; Booysen & Grosser, 2014) clarified that there are many ways in assessing group activities which include formative and summative assessments. However, how far these assessing techniques are efficient in evaluating group activities is still being doubtful.

Manning and Lucking (1994) carried out a study to clarify the myths on cooperative learning. Cooperative learning is divergent to American belief who relies more on competition rather than cooperation to excel in academic. American

believes that competition will boost pupils' confidence and motivates which subsequently contributes to academic achievement. However, this myth has been clarified by Slavin (1990), who provides evidence that cooperative learning benefits rather than competition. He proved that pupils with low confidence changed dramatically when the teacher introduces cooperative learning in the classroom.

Another most common myth while implementing cooperative learning is all cooperative learning requires group grade and all the pupils receive the same grade. But this myth has been elucidated by the various types of cooperative learning strategies. For an instance, Student Team Achievement Division (STAD), a cooperative learning strategy requires pupils work in a heterogeneous group to solve a given task or problem and at the end of the lesson they will be assessed individually. The individual grades will contribute to the achievement of the whole group (Balfakih, 2003; G. M. Ghaith, 2004; Khan & Inamullah, 2011; Khansir & Alipour, 2015).

Cooperative learning groups can offer potentially valuable learning opportunities, but teachers need to be aware that simply adopting one of the cooperative learning structures does not necessarily promote deep engagement. On the contrary, teachers should expect some resistance, and the following issues should be carefully considered. First, the task and the subject matter have to be sufficiently challenging without being too difficult. Discussing, applying and interpreting might be more meaningful tasks to cooperate on than the easier task of defining and explaining concepts. Second, the teacher has to strike a very delicate balance between supporting pupils and ensuring they are on track without starting to lecture. This is indeed very difficult because some students strongly prefer the teacher to elicit the correct answer rather than facing the challenging task of engaging in

conversation, confronting their own misconceptions and those of peers. Finally, pupils are unlikely to fully engage in cooperative learning unless it is meaningful to them and to pupils that are not internally motivated this might imply explicitly ensuring alignment between cooperative learning activities and assessment criteria. Teachers also need to invest time carefully explaining the intention and purpose of cooperative learning and encouraging pupils' verbal interaction in the classroom.

Despite substantial research evidence on the challenges and misconceptions of implementing cooperative learning, more detailed study of the variety of cooperative learning strategies in needed. This will ensure teachers to select the appropriate strategy that is suitable for their classroom background.

2.3 Students' Verbal Interactions in Science Classrooms

What teachers carry out in classrooms do make visible changes in students' participation and their performances (Hermann, 2013). Engagement with science starts with willingness to participate in the science lesson. However, engagement is simply different than truly understanding and involving in the lesson. Ethnographic study of classroom science practice by Alghamdi (2004) suggested that the verbal interaction practice unfolds distinctively different ways of practising science. The prevalent verbal interaction pattern in the most of the science classrooms may be characterized as talking about science. Talking about science can be defined as that students spend their time on talking about science exams, classrooms and peers without critically examining how the scientific theories are constructed.

Chin (2006) claims that when students learn in a classroom setting, a vital source of information input comes from student-student interactions, as the idea transformations involved in the construction of meanings are mediated through

language. Verbal interaction is playing an important role in increasing the significance of teaching and learning carried out by the teachers and also minimizes the classroom domination by the teachers. The notion of the teacher assisting student performance through the 'zone of proximal development' also suggests that teachers can guide the interaction among the students to support their learning. This clearly explains the importance of student–student interaction in the classroom, which is considered as a form of scaffolding.

Moreover, Gillies (2006) mentioned that when children interact cooperatively they learn to listen to what others have to say, give and receive information, discuss differing perspectives and, in so doing, develop mutual understandings of the science topics at hand. As a conclusion, students who actively participating in the cooperative science lessons show increased participation in group discussions, engage in more useful help-giving behaviours and demonstrate more sophisticated levels of interactions than students who do not given chance to cooperate with their peers.

2.4 Student Teams-Achievement Divisions (STAD) as a Cooperative Learning Technique

There are many different forms of cooperative learning techniques such as, Teams-Games-Tournament (TGT), Jigsaw, Cooperative Integrated Reading and Comprehension (CIRC), Team Assisted Individualization (TAI), Learning Together (LT), Academic Controversy (AC), Group Investigation (GI), and etc (Tarim & Akdeniz, 2008). All these techniques hold the same idea where pupils work together. However, there are few characteristics of these techniques which make them different from one another. This present study has adopted Student Teams-

Achievement Divisions (STAD) cooperative learning approach to teach science in primary school classroom. STAD was designed and researched by Robert Slavin and his colleagues at Johns Hopkins University (Slavin, 2015; Van Wyk, 2012).

2.4.1 Characteristics of STAD

In STAD pupils were assigned to a heterogeneous group which consists of four or five pupils who are mixed in performance level, gender and ethnicity (Johnson et al., 2000; Slavin, 2015; Tiantong & Teemuangsai, 2013). The main aim of STAD technique was that all the members in the assigned group contributed their fair share to the group and determine the success of their group while achieving the learning objective individually (Khansir & Alipour, 2015). Therefore, Slavin (2015) claimed that the main idea behind STAD is to encourage pupils to interact actively during the teaching and learning and help each other to master the knowledge presented by the teacher.

The original STAD technique which was introduced by Robert E. Slavin made up of five major components: class presentations, teams, quizzes, individual improvement scores and team recognition (Slavin, 2015). The second element which is known as team is the most important element in STAD which promotes verbal interaction among the peers. All the five major components of STAD are described clearly in the following sections.

Class presentation is the session conducted by the teacher to start up the lesson. Commonly teachers use lecture method to deliver the knowledge but Van Wyk (2012) suggested that audio-visual presentations by integrating multimedia and technology would be more effective in gaining pupils' attention before start with group activities. Moreover, Tiantong and Teemuangsai (2013) prompted that group discovery activities where pupils work to collect information on the topic on their

own before teacher's instruction also will be another unique way of class presentations where pupils will be actively participating. Meanwhile, a study by Tarim and Akdeniz (2008) mentioned that class presentation is the 'Golden Rule of Implementing STAD'. The time a teacher spends on the initial instruction will determine the success of the activity planned. They warned that the lesson will not be successful if the teacher failed in explaining and demonstrating the initial stages. These techniques would help the pupils stay focused on the lesson and directly would help them to score better in the quizzes later.

The second component is teams. As mentioned earlier this element is the most important element in STAD which encourages students to interact actively among their heterogeneous members. The STAD cooperative team is a heterogeneous team which consists of four to five members that are mixed in performance level, gender, sex and ethnicity (Slavin, 2015). The team is the most prominent feature of STAD. The primary role of the team is to prepare its members to perform well in the quizzes and help each other to gain the knowledge. After the class presentation by the teacher, the team gathers to complete the tasks or the activities provided. The tasks designed by the teacher must be a real group based activity which requires a team to solve the task (Nair & Kim, 2014; Slavin, 2015; Tiantong & Teemuangsai, 2013). The members will be working together to discuss the problems, compare their answers and correct any misconceptions among the team members. Other than enhancing the understanding of the concepts, the social skills such as self-esteem, respecting each other, acceptance of other's ideas will be developed among pupils (G. Ghaith, 2001; G. M. Ghaith, 2004).

Approximately after one to two periods of a class presentation and team activities, each student takes the individual quizzes. During the quizzes, pupils are

not allowed to discuss each other. The outcome of the quiz is the full responsibility of each student. This stage is to ensure that every student is individually responsible for acquiring the knowledge and the content (Slavin, 2015).

After answering the quizzes, each student would be given individual improvement scores. According to Slavin (2015), the aim behind this individual improvement score was to give each student an achievement reward that the student could reach by performing better than their previous achievements. Pupils would be contributing their maximum scores to their team but it only can be given if they show improvement from their previous score. Each student will be given a 'base score' at the beginning of the quiz. 'Base score' is an average score gained from the pupils' average performance on similar quizzes. Then, pupils obtain points for their teams according to how much their quiz scores exceed their base score. In short, the more pupils learn, the more their individual improvement scores and the more they can contribute to their team. However, Ghaith (2004) claimed that this individual improvement score is a form of motivation for what pupils has obtained and the essential issue here is how much pupils significantly learn not the accumulation of marks.

Finally, each team receives the team recognition from the teacher. It can be in the form of certificates or any rewards that could make pupils feel rewarded and motivated.

2.4.2 Implementation of STAD in Primary Classrooms

In the review by Johnson et al. (2000) on eight methods of cooperative learning (TGT, Jigsaw, CIRC, LT, STAD, TAI, AC and GI) were compared in terms of ease of learning, ease of initial use, ease of maintaining its use, robustness and adaptability. Based on his results, STAD scored the highest score among other

methods in all categories and this was the easiest method that can be adopted by primary teachers. Moreover, Johnson et al. (2000) and Tarim and Akdeniz (2008), claims that STAD more conceptual than other method and could be modified according to the subjects and conditions. Besides that, STAD could also be applied in many subjects including mathematics, science, language subjects and literature and it had simple procedures that were easy to understand, remember and apply (Ghaith, 2001; Ghaith, 2004; Khan & Inamullah, 2011). Hence, STAD method has been selected for this study due to its degree of usability and easy for beginners who are new to cooperative learning.

Slavin (2015) claimed that STAD has three unique characteristics which make it easier to apply in the elementary classrooms. First, STAD technique is practical where teachers can apply this technique in the classroom on the next day after they learn about it. Second, STAD is applicable to a broad range of curriculum. This technique does not require a different set of objective or a new curriculum, but it helps pupils' especially primary pupils to gain a better learning in whatever objectives they are taught. STAD can also be applied in teaching problem-solving skills, language mechanics or creative writing and experiential topics in the elementary classrooms. Third, STAD is one of the most extensively researched cooperative learning methods which show consistent positive outcomes for the elementary pupils.

A study by Tarim and Akdeniz (2008) compared the effects of two cooperative learning strategies, STAD, and TAI on elementary pupils mathematics achievement and attitude. It was an experimental study where seven groups of pupils were formed and three of the groups were the control group. Another two groups of pupils were taught with STAD approach and another two groups with TAI approach.

The teachers attended one day seminar to expose themselves to these two approaches. Both TAI and STAD methods found to have positive effects on pupils' mathematics achievement and attitude. However, this study also found that the STAD approach is more conceptual and easier to adapt by teachers according to subjects compared to TAI.

2.5 Methodologies and Findings of Past Researches on STAD

The previous researches help us to know the dimensions that other researchers have looked into and it showed the gap that needs to be filled. Many researchers had studied the STAD cooperative learning for various subjects and level as STAD method is one of the most prevalent strategies (Gillies, 2006; Gillies et al., 2007; Gillies & Boyle, 2010). . An experimental study by Tiantong and Teemuangsai (2013) found that the learning module called 'Moodle' significantly increase the learning achievement of pupils in computer programme course. The researchers claim that the module is a readymade source and it is a time saving option for teachers which will help them to continuously apply the STAD approach in their classrooms.

The studies on learner's perceptions on STAD approach reveal many important points that need be considered from the pupils' side. Ghaith (2001) and Nair and Kim (2014) studied the pupils' perception after they enrolled in STAD classroom. Both the researches have been done in middle school and the pupils are aged between 13-16 years old. The pupils were very positive about STAD and they recommend the implementation of STAD in other classrooms. Moreover, pupils claimed that the amount of knowledge that they learned is more compared to what they gained during traditional instruction. Low achievers prefer the STAD approach

better than normal lecture method because it boost their confidence level and they feel appreciated when they contribute to their team (Balfakih, 2003; Ghaith, 2001; Ghaith, 2003). The team study during the lesson tends to promote a better understanding of the abstract concepts, retain the concept learned for a longer period of time and helps to answer problem solving questions more easily (Bilgin, Aktaş, & Çetin, 2014; Ibrahim et al., 2015).

However, STAD received considerable criticism from both learners and teachers. Teachers complain that it takes a longer time to complete the STAD technique in the classroom and they could not finish the lesson in the allocated time (Van Wyk, 2012). High achievers claim that they were unable to complete the group task fast because they need to wait for their low performing team members (Tiantong and Teemuangsai, 2013). Ghaith (2001) also pointed out that more competent pupils who are slowed down by their low performing members feel isolated due to their self-esteem and achievement. However, the listed dilemmas in applying STAD can be overcome by planning the lesson and activities wisely (Khan & Inamullah, 2011; Khansir & Alipour, 2015).

The lessons designed must be able to attract pupils' attention regardless of their preforming levels. Teachers must be supplied with efficient teaching guides and lesson plans to help them carry out the STAD approach in their daily classrooms. Few past research mentioned that teachers attended one day workshop to learn the strategies on implementing STAD (G. Ghaith, 2001; Tarim & Akdeniz, 2008). Hence, only limited teachers will get to know about this strategy and others could not implement it in other classrooms. Providing a teaching and learning module with well-designed worksheets and activities will be a better guidance for the teachers not

only for those involved in a research but others may use the same activities in other classrooms.

The evaluation of the methodologies used in previous researches reveals that quantitative study has been used widely in studies on STAD (Balfakih, 2003; Bilgin et al., 2014; G. Ghaith, 2001; Ibraheem, 2011; Ismaon et al., 2013; Khan & Inamullah, 2011; Khansir & Alipour, 2015; Nair & Kim, 2014; Tarim & Akdeniz, 2008; Ural, Umay, & Argü, 2008; Van Wyk, 2012). The meta analysis done by Yeung (2015) on few studies of STAD, points out the doubts on the sole use of questionnaires in finding out the in-depth feeling of the respondents. The features of quantitative study which are limited causes the data might be affected by the nature of respondents. They might be afraid they were indifferent and they tend to choose favourable options in the questionnaires. Moreover, standardized questions such as tests and questionnaires could only offer an estimation of researchers instead of the respondents.

From this point of view, it is clear that quantitative research on studying a teaching method has demonstrated certain limitations. Hence, the addition of observations, in-depth interviews, and open ended questions will be the remedy for these hindrances.

2.6 STAD Approach in Promoting Verbal interactions among Pupils

As mentioned in the background of the study, pupils in the National Type Tamil Schools are naturally passive. Past findings shows that after many years of teacher-centered learning, few pupils especially low achievers are nervous to speak and to share their ideas (Tiantong & Teemuangsai, 2013; Slavin, 2015; Van Wyk, 2012). According to Gillies & Boyle (2010) cooperative learning strategies particularly

STAD aids pupils' individual improvement by providing them opportunities to interact during their small group discussion.

Moreover, the structured cooperative task which is one of the essential characteristic of STAD encourages the passive learners to talk and interact among their group members. Pupils in STAD cooperative tasks were put into a heterogeneous group where the group is equally balanced with high and low achievers. Hence, they gain support and guidance from their members to interact actively in their group. Besides that, Chan & Idris (2017) claim that pupils were forced to speak in their group when specific roles were assigned to each member and they need to interact to fulfill the needs of their roles during the group work.

According to Lim, Park, Ha, Lee, and Kim (2019) the structured tasks given to the small group of pupils ensure that there is no rider in the cooperative group. The STAD approach tasks ensure that all the members in the group contribute to complete the task designed for each group. Besides that, Alghamdi (2014) justifies that pupil in experimental group poses all types of verbal interactions compared to the controlled group pupils. He found that experimental group pupils who exposed to the STAD approach able to interact and communicate more among themselves. Moreover, the verbal interaction analysis on the experimental group pupils revealed that they discussed more relevant and task content talk as they shared, debated and clarified information and developed new understandings and knowledge. This shows that pupils with STAD approach able to pose constructive interaction among their peers.

Gillies (2004) categorized verbal interaction into six main themes such as Elaborations, Questions, Short Response, Engages, Directs and Interrupts.

Elaborations refer to providing solicited and unsolicited explanations and providing detailed help for the members to complete the task. Gillies (2004) defined Questions as asking both open and closed questions to their group members regarding the given task. Short Response can be explained as using short responses to guide the group members. Engages refers to affirming another member's ideas and actively extending the discussion by making statements and exchanging ideas. Next, Directs refer to providing a clear direction, discipline the group members in completing the task given to them. Finally, Interrupts refer to butt-in and interrupt the speaker in a forceful manner and provides useful interruptions for the members.

This present study used these verbal interaction categories suggested by Gillies (2004) to categorize pupil's interaction during STAD approach. However, these categories are too broad and it posing limitations to identify internal characteristic of the pupil's interactions during the STAD approach.

2.7 Conceptual Framework

The Conceptual Framework was mapped out to show how the ideas were organized to achieve the objectives of this current study. As described earlier, verbal interactions among pupils are essential to the success of teaching and learning activities as research has shown that the interactions among pupils facilitate the learning process (Tiantong & Teemuangsai, 2013).

In this present study, STAD cooperative learning approach was implemented among Year 4 pupils in science classroom to promote verbal interactions during the group task. Previous studies report that cooperative learning able to frame pupils' interaction and raise positive interdependence among pupils (Efe & Efe, 2011; Johnson & Johnson, 2008; Lopata et al., 2003). STAD approach has been chosen for

the present study to promote verbal interactions among pupils as it is the most researched and shows highest degree of usability in both elementary and secondary classrooms (Gillies, 2006a; Mang Li et al., 2015). Besides that, STAD is more applicable and advantageous to pupils (Tarim & Akdeniz, 2008; Van Wyk, 2012) and has shown consistent positive outcomes on pupils and teachers are consistently adopting this in daily practices (Balfakih, 2003; X. Li & Luo, 2010).

According to Slavin (2015) the main essence of STAD cooperative learning approach is to encourage pupils to interact among their peers and help each other to achieve their common goal. This STAD cooperative learning approach comprises of five major elements such as class presentation, teams, quizzes, individual improvement scores and team recognition.

Class presentation is where the teacher introduces the content of the lesson to the whole class. The teacher is free to utilize audio-video visual presentations, charts and pictures to introduce the topic to the pupils. This stage is essential for the pupils to collect the information on the topic before they were assigned to their cooperative groups for group task. The class presentation stage is also known as 'Golden Rule of Implementing STAD' where the quality of the whole lesson depends on the initial instruction by the teacher (Tarim and Akdeniz, 2008).

The second element is the team study which is the most focused element in this current study. This team study is responsible for promoting verbal interactions among the cooperative group members. The primary role of the team study is to encourage the peers to interact by providing them group tasks which involve all the group members. This element is believed to cause a paradigm change in the classroom which is essential to promote interaction among pupils in order to produce 21st century learners. Alghamdi (2014) found that through interaction pupils are

contributing intellectually valuable discussions among them which consequently lead to greater learning gains.

The third element of STAD is individual quizzes. After the team study, it is important to evaluate the pupil's performance and understanding on the topic. During the individual quizzes pupils were required to answer the quizzes individually and without the help of their group members. This is to ensure each and every pupil involves and gain the knowledge from group task which helps them to answer the quizzes later. Besides that, interaction enhances pupils' ability to answer higher order questions (L. L. Chan & Idris, 2017). This proves that pupils are improving their cognitive skills during the interaction and discussion session during teaching and learning activities. Moreover, pupils' ability to answer the questions clarifies that verbal interactions also promotes understanding and helps in teaching process (Linton et al., 2014). Gillies et al. (2007) reported that when pupils interact among them and gather information, they basically get five times learning gains than conventional teaching method. This situation continuously leads pupils to the meaningful learning.

The fourth element of STAD is individual improvement scores. Based on their answers in the individual quizzes, pupils will be given improvement scores for each quiz. Ghaith (2004) claimed that this individual improvement score is a form of motivation for pupils and it will make pupils and teachers realize how significant the STAD group tasks help the pupils to perform better. Finally, the fifth element is team recognition. At the end of lesson, each team will receive team recognition from the teacher based on the accumulation of the peer's individual improvement scores. The recognition can be in the form certificates or any rewards that could make pupils feel motivated.

STAD is considered as a good teaching pedagogy as it can raise pupils' participation and involvement in lessons (Johnson & Johnson, 2008). Based on Yusuf, Natsir, and Hanum (2015) who studied teachers' experience in teaching STAD reveals that this approach promote student-centred learning where the interactions were not only between teacher-teacher but also with student-student. At the same time this practice makes sure teachers play their role as a facilitator in classroom. Consequently, it will minimize passive learners and will ensure pupils actively participate during teaching and learning.

According to Gillies (2004) based on his past findings he identified and categorized verbal interactions into six themes. The six themes of verbal interactions were showed in the Figure 2.3. The themes suggested by Gillies (2004) are elaborations, questions, short response, engages, directs and interrupts. Hence, pupil's verbal interaction during the group task will be analysed based on the categories proposed by Gillies (2004).

This present study will focus on the implementation of STAD cooperative approach among Tamil school pupils in science classroom. As mentioned earlier, Tamil school pupils are naturally passive and they need a well-planned lessons and tasks to make them more actively interact during learning. Moreover, very few studies done on minority communities in our country (Maniam, 2010). To cater this need, a STAD approach guide will be used by the researcher in implementing STAD cooperative learning science classroom to observe pupils' verbal interactions and achievement in cooperative group.

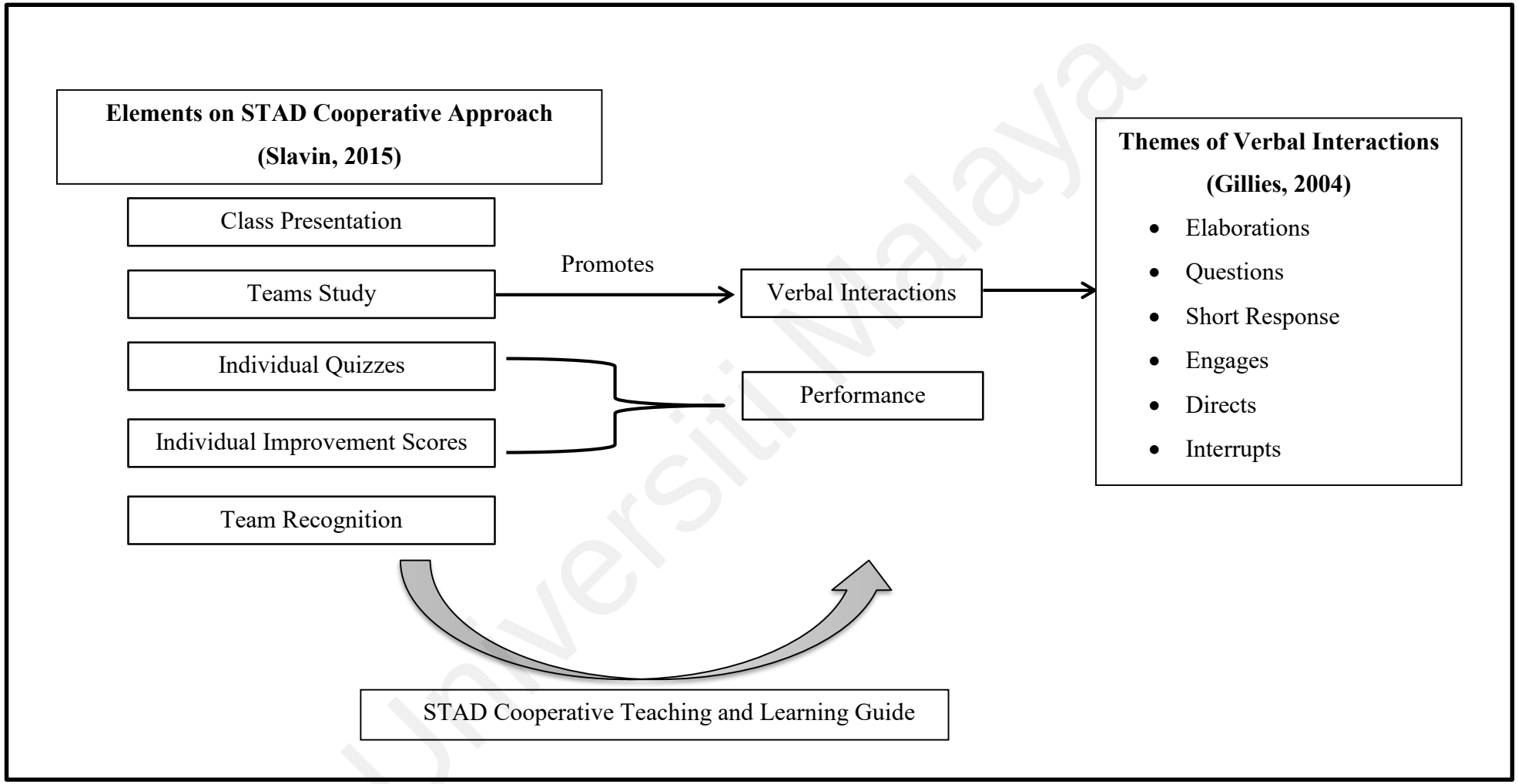


Figure 2.3 Conceptual Framework of the Present Study

2.8 Theoretical Framework

Cooperation exists when learners work together in a group to promote both their individual and peers' learning outcome. Theoretically, cooperative learning is rooted within social interdependence theory and its basic premise that 'the way in which social interdependence is structured determines how individuals interact within the situation which, in turn, affects outcomes' (Johnson & Johnson, 2008). Social interdependence theory is a classic example of the interaction among theory, research, and practice. The premise of the theory is that the way in which goals are structured determines how individuals interact, which in turn creates outcomes.

Based on this theory, cooperation is functioning when learner's aware that they share common goals and when the individual member's goal are positively dependent on actions of the group (Herrmann, 2013). The success or failure of a cooperative learning depends on the interdependence among the group members. According to Johnson and Johnson (2008), the social interdependence theory is relevant when each individual's goal is interdependent on the action of others. The essence of a cooperative learning is the interdependence among members, which results in the group success and a change in the state of any group member changes the state of other group members. Positive interdependence exists when there is a positive correlation among individuals' goal attainments; individuals perceive that they can attain their goals if and only if the other individuals with whom they are cooperatively linked attain their goals. Group members are made interdependent through common goals. As members identify their common goal, a state of tension increases and motivates member's movement towards the accomplishment of goal.

In this presence study, STAD approach which is one of the most researched and flexible cooperative learning technique is used in implementing cooperative learning among group members. Teachers will be using designed lesson plans which implements the STAD approach during their lesson. These lesson were designed in order to promote passive Tamil school pupils' verbal interactions and interdependence among group members. These lessons are known as a form of scaffolding. Scaffolding in cooperative learning refers to the instructions of the tasks that were prepared for pupils which promote social interaction among pupils (Nair & Kim, 2014). Interdependence allows students to talk to each other and place equal importance to all the members. Pupils work in their group by lifting each other and they work togethe towards achieving the comon learning goal. Hence, to complete the tasks given pupils are forced to interact among group members and consequently it helps the cognitve development of pupils.

Besides that, Herrmann (2013) claims that promotive interactions consequently lead to higher academic achievement or learning outcome which is the final outcome of this theory. This outcome determines how effective the cooperative lesson is. Moreover, Johnson and Johnson (2008) clarifies positive interdependence as the collective effort of the group members in ensuring each member to achieve the shared goal. Hence, it is essential that the cooperative tasks designed for each group is well structured and involves all the group members. Furthermore, the advanced peers in a group help to give immediate feedbacks to their members in their own language. Therefore, it will promote positive learning outcome of pupils.

At the end of this present study, pupils' verbal interactions during their group work and their achievement will be studied. The designed group tasks are believed to increase the verbal interactions among pupils and their achievement in the lesson. Figure 4.2 below shows the theoretical framework of this current study.

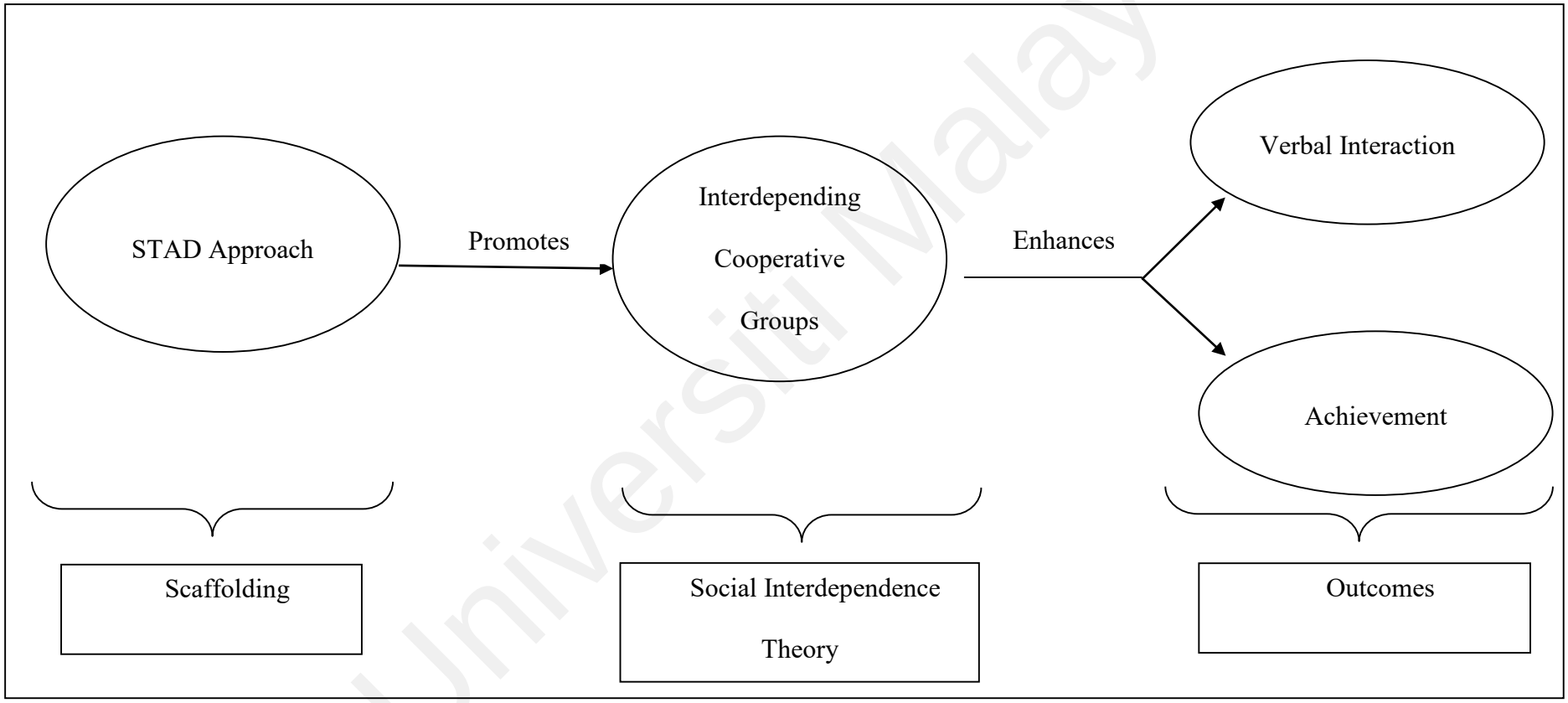


Figure 2.4 Theoretical Framework of the present study

2.9 Summary

The chapter began with introduction and the reporting of previous studies on cooperative learning. This section comprises its elements, benefits, the implementation of cooperative learning in science classroom, the formation of groups for cooperative learning and the challenges in incorporating cooperative learning in classrooms. It followed by the discussion of students' verbal interactions in science classrooms. The next section described the STAD cooperative approach in detailed. It followed by the reporting on the methodologies and findings from the past studies of STAD cooperative learning. The following section describes how STAD approach promotes verbal interaction among pupils. The final part demonstrated the conceptual and theoretical framework of this present study.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The chapter begins with the brief description of the research design employed on this study. It followed by the description of the participants of the study according to their groups. Then, procedures of the study were explained in detail. The prepared STAD Teaching and Learning Guide will be explained in the following section. Data were collected using classroom observations, individual quizzes and semi structured interviews. Lastly, the data analysis methods which were used to analyze the data also discussed in this chapter.

3.2 Research Design

This study employed the qualitative approach to cater the needs of the research objectives. In general, qualitative research methods are useful to explore the quality of relationship, activity, and situation and helps to get a holistic explanation (Creswell, 2013). Qualitative exploratory research design was utilized in this study. The main purpose of this research was to study the verbal interactions among Year Four science pupils with the help of STAD Teaching and Learning Guide during the science lessons. This study also investigated the performance of pupils after implementing this approach. This research also highlighted pupils' perception on STAD cooperative learning approach. This study used a constant comparative method to analyse the findings and to explain the verbal interactions among Tamil school pupils during the implementation of STAD cooperative learning approach.

3.3 Participant of the Study

Convenient sampling technique was used to select the participants for this current study. The researcher is teaching in a Tamil primary school and since it is difficult to find Tamil school participants, convenient sampling was used.

The Year Four classroom in this school consists of 12 pupils and all the 12 pupils participated in this study. All of them were ten years old. They consist of six male and six female pupils with mixed ability. The samples were divided into three heterogeneous groups with four pupils per group. Each group has members of different level of academic ability which was determined by using their previous science examination marks. Their Year Three final term science examination marks were used as an indicator to group the pupils into three categories which is high performing, average performing and low performing. The Year Three final term examination questions follow the exact format of UPSR examination questions. Hence, this scores were used an indicator to categorize pupils into three groups. Pupils who obtained the score zero to 45 categorized as low performing pupil. Those scored 46 to 70 considered as average performing and pupils who scored above 71 categorized as high performing pupils.

After categorizing the pupils into three groups according to their scores, three heterogeneous groups were formed to place the students during the implementation of the STAD Teaching and Learning Approach. Each group consists of two high performing pupils, one average performing student and one low performing student. Heterogeneous group is essential in cooperative learning approach as it ensure pupils with all levels are present in each group. This will help the pupils to work together to achieve their group's common goal. All the pupils who participated in this study were given pseudonyms to protect their identities.

The following table 3.1 shows the distribution of pupils in the three groups.

Table 3.1

The Pupils' Distribution from Each Heterogeneous Group

Pupils' Ability	Group 1	Group 2	Group 3
High Performing student	1. Previn 2. Sakthi	1. Vasan 2. Thivya	1. Divenes 2. Barath
Average Performing student	3. Nisha	3. Viroshini	3. Darshini
Low Performing student	4. Jana	4. Shini	4. Namitha

The following sections briefly describe the pupils in all the three groups.

3.3.1 Group 1

Group 1 consists of Previn and Sakthi who are the high performing pupils as they scored above 80 in their first term examination. Both of them are school prefects. Nisha, the average performer is a librarian and poses good values in the classroom. She voluntarily helped the history teacher who ended the lesson before the science lesson to collect her classmates' books. Jana is a silent boy in the classroom. He has a mild truancy record in the school's disciplinary board.

3.3.2 Group 2

Vasan and Thivya from group 2 are the high performing pupils. Vasan is a prefect and Thivya is an ordinary student. The interesting fact is that, Thivya is an average performer for all other subjects except for science. She always finds science was interesting and scores well in her science examinations. Viroshini is the Year Four class monitor who poses good leadership skills. Shini, the low achiever is a shy student and tend to be a silent participant in the class.

3.3.3 Group 3

In group 3, Divenes and Barath are the school prefects and the active participants in the classroom. Darshini is a librarian and Namitha is the class assistant. Namitha always liked by most of the teachers as she has a good handwriting. However, she is very silent and less active in classroom.

Overall, mostly all the participants share the same demographic profiles such as age and family background. However, their achievements and participations in science lesson were different and the following chapter will explain how they interacted among each other during the lesson.

3.4 Procedures of the study

The research will start with the preparation of the STAD teaching and learning guide. The guide begins with a brief explanation to the teacher on STAD cooperative learning approach, how to form heterogeneous groups in classroom, the role of teacher during the implementation, type of activities, sample of lesson plans, verbal interactions rubric and the individual quizzes for each lesson. The content of the STAD teaching and learning guide will be further explained in the following section. The figure 3.1 briefly explains the procedures of this present study.

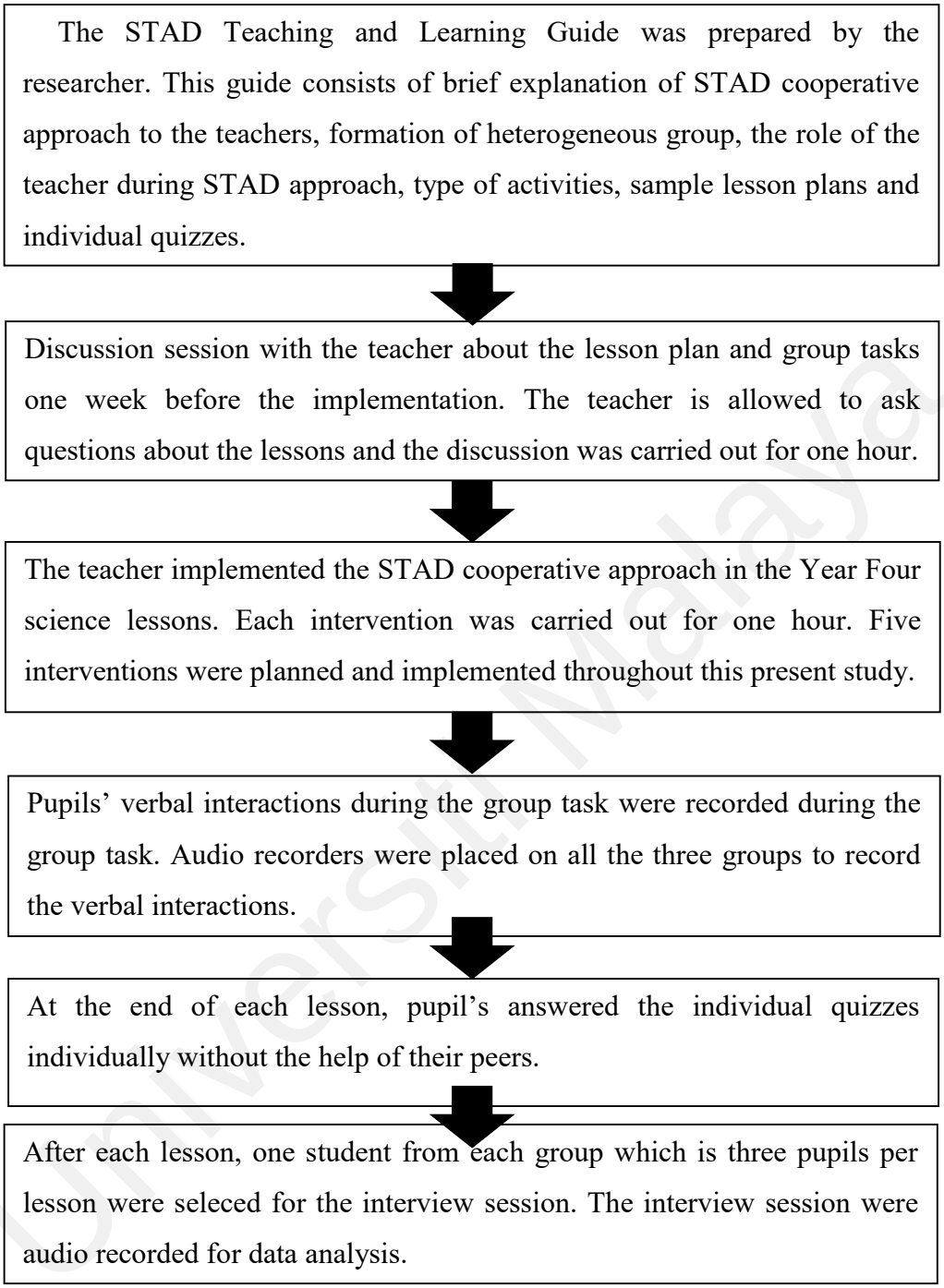


Figure 3.1 The Procedures of the Study

Initially, the researcher interviewed two science teachers in the same school about their opinion on the cooperative learning. According to the teachers, they are

not aware of the implementation strategies of cooperative learning and they suggested a guide which could help them in applying this strategy in a classroom. Researcher's personal experience also led to the development of this STAD Teaching and Learning Guide. When a teaching and learning guide is provided to the teachers it will help teachers to promote verbal interactions among passive learners and at the same time it helps to nurture 21st century learning skills in classroom.

The teacher who taught the pupils was given a brief training on the STAD Teaching and Learning Guide a week before the implementation. This training was done to ensure the teacher to get used of the method and to understand the approach more clearly. The researcher had a discussion session with the teacher twice a week for one hour period to discuss the lesson plans and implementation strategies. This allowed the teacher to familiarize to the teaching and learning strategies and to clear her doubts about the implementation.

The implementation was carried out during the Year Four science lessons. Five activities were carried out in five weeks period. Each activity was carried out for one hour. The researcher observed the lesson and pupils' verbal interactions were recorded using audio recorders which were placed in each cooperative group. After the STAD cooperative activity, pupils answered the individual quizzes each time after the STAD approach was implemented. This individual quiz will help to study the performance of pupils after they were exposed to the STAD cooperative approach. Later, one person from each group was interviewed individually to gain their perception about STAD cooperative learning approach. The flow chart below describes more about the procedures.

3.5 Data Collection Techniques

The study utilized a qualitative data collection technique. The techniques included classroom observations, individual quizzes and semi-structured interviews.

3.5.1 Classroom Observations

This current study focuses on the pupils' verbal interactions during the implementation of the STAD cooperative learning approach. Hence, the interaction that takes place in each group during the group task was recorded to analyze the verbal interactions. Audio recording was done on every STAD cooperative lesson throughout the intervention. Each group was placed provided with an audio recorder to record the verbal interaction among the group members. There are total of five lessons which were conducted using this STAD cooperative learning approach. All the interventions was recorded and analyzed. However, two recordings were done in the Year Four classroom before the real intervention takes place to ensure pupils get use to the environment. This is helpful for the researcher in obtaining reliable data.

3.5.2 Individual Quiz

The next purpose of this research is to study the pupils' performance after the implementation of the guided group tasks which integrates the STAD cooperative learning approach in the lesson. Hence, pupils were required to answer the open-ended questions individually which were provided at the end of each lesson. The individual quizzes were designed to study pupils' understanding on the selected topic after involved in the intervention. Each student required to answer the questions individually and without the help of their group members.

The quizzes which will be carried out at the end of each lesson were designed by the researcher to study pupils' understanding and learning outcome. The questions were designed based on the learning outcome questionnaire which was used by

Gillies (2004) in his study to check pupils' understanding. Gillies (2004) used the levels of Bloom's Taxonomy to design the questions.

The questions for these quizzes were arranged according to the level of Bloom's Taxonomy. Bloom's taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The goal of an educator using Bloom's taxonomy is to encourage higher-order thought in their students by building up from lower-level cognitive skills. There are six levels in Bloom's Taxonomy such as knowledge, comprehension, application, analysis, synthesis and evaluation.

Knowledge involves recognizing or remembering facts, terms, basic concepts, or answers without necessarily understanding what they mean. Comprehension involves demonstrating an understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas. Application involves using acquired knowledge—solving problems in new situations by applying acquired knowledge, facts, techniques and rules. Learners should be able to use prior knowledge to solve problems, identify connections and relationships and how they apply in new situations. Analysis involves examining and breaking information into component parts, determining how the parts relate to one another, identifying motives or causes, making inferences, and finding evidence to support generalizations. Synthesis involves building a structure or pattern from diverse elements; it also refers to the act of putting parts together to form a whole. Evaluation involves presenting and defending opinions by making judgments about information, the validity of ideas, or quality of work based on a set of criteria.

Less complex questions required pupils to recall the basic facts. Later it followed by comprehension questions and application questions where the

complexity of questions increasing. More complex questions required pupils to analyse and integrate information or evaluate different sources of information to find a solution or solve a problem.

The questions were content validated by a lecturer in Faculty of Education, University Malaya and a senior Science teacher in Temerloh district. The questions in the quiz sheet are following the format of current UPSR Science Subjective questions. Pupils would require having a good understanding on the topic in order for them to answer the questions. For instance, the Figure 3.2 below shows the sample

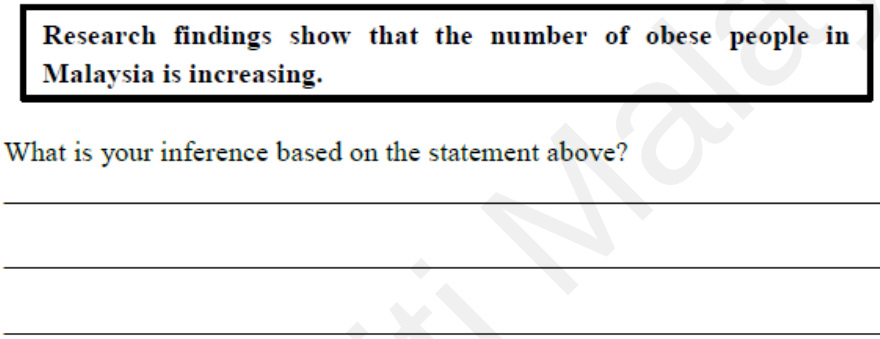


Figure 3.6 The Example of Individual Quiz

For the questions above, pupils were required to give inference or reasons on the given statement regarding the number of obese people in Malaysia. Hence, pupils would be able to state their answers from their group interaction they had earlier. The marking scheme which was developed by the researcher and validated by the experts was used for marking process. The marking scheme was developed based on the latest UPSR science paper marking technique and attached in Appendix B. The purpose of this individual quiz is to study to what extend their verbal interaction during group task help them to obtain the science content knowledge.

3.5.3 Semi structured Interview

The semistructured interview was carried out to study pupils' perception on cooperative learning after the implementation of the STAD cooperative learning

approach. After each lesson, one student from each group which is three pupils per lesson were seleced for the interview session. The interview session were audio recorded for data analysis.

The interview consists of ten questions. These questions were adopted from G. M. Ghaith (2004) who uses Likert scale questionnaire to study middle school EFL learners' perceptions on STAD cooperative learning. The interview questions were translated to Tamil language and later it will be translated to English during transcribing.

The questions were designed in accordance to answer the third research question which aimed to investigate the perception of pupils on cooperative learning. The interview questions were pilot tested with the three pupils with same level and age from nearby rural Tamil school. The usage of words and the sentence construction was modified after the pilot testing which proves that the pupils were not clear of the meaning of questions. For instance, pupils failed to understand questions number eight and the questions were modified to the simpler form. Moreover, ten questions were seems to be too many for primary pupils and it is time consuming. Hence, the number of questions was reduced to eight. The questions were shown in Appendix 2.

3.6 Research Tools

3.6.1 STAD Teaching and Learning Guide

The STAD Teaching and Learning was prepared to implement STAD cooperative learning in the science lesson among Year Four pupils. This guide is a compiled package for teachers as it consists of guidelines and explanations of STAD cooperative learning approach which were proposed by previous researchers (Gillies

& Boyle, 2010; Weimer, 2002; Zakaria & Habib, 2012). This guide consists of few sections such as the brief explanation on STAD cooperative learning approach, the heterogeneous group formation, the implementation of STAD approach, the role of teacher during the implementation, type of activities, sample of lesson plans, verbal interactions rubric and the individual quizzes for each lesson.

The aim of preparing this guide is to expose science teachers to cooperative learning especially to STAD approach. The first part will explain the five elements of cooperative learning such as positive interdependence, individual accountability, face-to-face promotive interaction, social skills and group processing. It follows with the five major components of STAD approach which are class presentations, teams, quizzes, individual improvement scores and team recognition. This is very essential for teachers to understand the implementation of this approach in classroom. Grouping pupils is an essential element in implementing cooperative learning. The following sections explain the factors that influence the heterogeneous group formation.

Furthermore, the teacher's role during the implementation of the STAD Teaching and Learning approach also listed in the guide. This is to ensure teachers play their role as a facilitator during the group activities. Moreover, the researcher has listed few types of activities such as Role Play, Think-Pair-Share and Place Mat which can be implemented using this STAD approach in this guide. This will help teachers to choose the suitable activities for their lesson according to their learning objective.

Later, five lesson plans that were designed for this intervention will be attached here for teachers' reference. The lesson plans were developed based on the guidelines on how to establish cooperative group activities suggested by Gillies

(2003b). The developed lesson plans contain four stages such as class presentation, team study, quiz and closure. The table 3.2 below shows the first section of the developed lesson plan. The first section contains the basic information such as date, day, time, class, topic, learning standard, learning objective, prior knowledge, pedagogical approach, science process skills, noble values and the teaching used.

Table 3.2

The first stage of the lesson plan

Date: 13.02.2018	**Day:** Monday	**Time:**11.00-12.00pm	**Class:** 4
Theme / Topic	Investigating Living Things / Avoiding Bad Habits		
Learning standard:	3.3 Bad habits can disturb human's life processes		
Learning objectives:	At the end of lesson pupils will be able to: ▪ 3.3.2 Explain with examples the bad habits that cause unhealthy lifestyle. ▪ 3.3.3 Explain the effect of bad habits to human's life.		
Previous Knowledge	Students have the prior knowledge on the healthy lifestyle.		
Pedagogical Approach	STAD Cooperative Learning - Role Play		
Science Process Skills	Making Inferences		
Noble Values	Cooperation, Maintaining healthy lifestyle		
Teaching aids	Laptop, Television, Quiz sheet, Envelopes		
Assessment	Group presentation (Role Play), Open-ended questions		

The figure 3.2 below explains the first stage of the sample lesson plan in the STAD Teaching and Learning Guide.

Stage / Time	Teaching & Learning Activities	Remarks
Class Presentation 10 minutes	1. Teacher will make a quick revision on the previous topic. 2. Teacher will ask pupils to list out the bad habits that lead to unhealthy lifestyle. 3. Teacher will show a PowerPoint presentation about unhealthy lifestyles such as smoking, unhealthy diet, and drug. 4. Teacher will ask the pupils in random about how to avoid this unhealthy lifestyles.	- List down the bad habits that cause unhealthy lifestyle. - How to avoid unhealthy bad habits.

Figure 3.2 The First Stage of the Lesson Plan

The first stage of the lesson plan is class presentation. During the class presentation, teacher starts the lesson with the topic's introduction. The teacher will verbally question the pupils regarding the bad habit in daily life. Later, teacher will utilize PowerPoint Presentation to present the content of the topic. The PowerPoint Presentation will help the teachers to show the videos and pictures regarding the topic. Hence, the first stage of the lesson helps the pupils to gain the content knowledge from the teacher. The Figure below shows the second stage of the sample lesson plan.

Stage / Time	Teaching & Learning Activities	Remarks
Team Study 30 minutes	1. Pupils sit in their heterogeneous group with four members each. 2. Teacher will give a brief explanation on the role play. 3. Each group will be given a piece of paper with a scenario on it. 4. The situations given were listed below this lesson plan. 5. Pupils will read the scenario given in the paper and discuss about it. 6. Pupils will divide the roles given. 7. Pupils will list down the points according to	

Stage / Time	Teaching & Learning Activities	Remarks
	the scenario and their roles. 8. Teacher assists students by groups. 9. After 15 minutes of discussion, each group will be given 5 minutes to present their role play. 10. Teacher will comment on each group's presentation and their points.	

Figure 2.3 The Second Stage of the Lesson Plan

The second stage of the lesson plan is Team Study. Team Study is the most essential stage in the STAD Cooperative Learning Approach. After the class presentation by teacher, pupils will sit in their heterogeneous group and they will receive their group task. Later, pupils will discuss among their group members regarding task and will carry out the activity. Pupils' verbal interaction during the group task was recorded during this stage. The group tasks were mainly focus on promoting the group members to interact to each other. For instance, in this sample lesson plan each group were given a scenario and they were required to do a role play. Hence, all the group members need to interact to gather the information regarding the scenario and their roles. The third stage of the lesson plan is showed below.

Stage / Time	Teaching & Learning Activities	Remarks
Individual Quiz **15 minutes**	1. Students will be given 4 open-ended questions on the topic studied. 2. Students will answer the questions individually without the help from their members.	

Figure 3.4 The Third Stage of the Lesson Plan

The third stage of the lesson plan is the individual quiz. This stage is important to study the performance of the pupils after the implementation of the

STAD cooperative learning approach. Each pupil will be given four open-ended questions and they were required to answer the questions individually. The fourth stage of the lesson plan is shown below.

Stage / Time	Teaching & Learning Activities	Remarks
Closure **5 minutes**	1. Teacher concludes the lesson by emphasize on ways on maintaining a healthy lifestyle. 2. Teacher will reward the best group.	

Figure 3.5 The Fourth Stage of the Lesson Plan

The final stage of the lesson is the closure. Here, teacher concludes the lesson by emphasizing and repeating the important points of the topic. Moreover, pupils will receive the comments regarding their presentation and group activities.

Five subtopics from Year Four science syllabus were selected for the intervention. The topics were chose based on Koutselini (2008) who claims that the cooperative learning techniques are not suitable for all the topics as it will make pupils get bored. Moreover, G. M. Ghaith (2003) suggests that this approach should be applied on topics which requires deeper understanding of pupils and topics related to daily life applications. These suggestions were considered by the researcher in choosing the topics for intervention. The subtopics that were selected for this study are avoiding bad habits, humans respond to stimuli, inheritance, breathing organs of animals and photosynthesis.

For each lesson, different types of cooperative learning activities were suggested by the researcher. This is to ensure the verbal interactions takes place among pupils and they can interact regarding the topic between their group members. Role play, Think-Pair-Share, Place Mat and Numbered Head Together are the

examples of cooperative group activities that were mentioned in the lesson plans. These activities were selected based on the previous studies which employed these activities to promote verbal interactions among pupils (Alghamdi, 2014; Baer, 2003; Gillies, 2003b). Furthermore, these activities are the basic 21st century learning activity which is suitable for primary pupils (Parveen, 2012).

The STAD Teaching and Learning Guide was prepared in English Language and later was translated to Tamil as this study was carried in Tamil School science classroom. The translated STAD Teaching and Learning Guide also validated by two Tamil teachers in Temerloh district. Finally, the observation protocol and the individual quizzes were also attached in the guide. The teaching and learning guide content validated by a lecturer in Faculty of Education and two senior science teachers in Temerloh district. The senior science teachers are experts of 21st century learning activities in Temerloh district. The content of the teaching and learning guide was improved after the content validation by the experts. The group tasks in lesson plans were improved in order to promote verbal interactions among pupils. Moreover, some amendments were made to the individual quizzes so it will be more usable in order to test the pupils' performances after the implementation of STAD approach. The STAD Teaching and Learning Guide is attached in Appendix 1.

3.6.2 Verbal Interaction Rubric

Initially, an observation schedule to observe pupils' verbal interactions during cooperative learning was developed by Webb (1985) and modified by Gillies (2003a). This was used to gather information on the types of verbal interactions that the pupils used during group activity. For this present study, an observation protocol to observe pupils' verbal interactions for cooperative group was developed based on this observation schedule. Six verbal interactions categories (elaborations, questions,

short response, engages, directs and interrupts) which were proposed by Gillies (2003a) were used as the criteria to develop the observation protocol. For instance, "Where does the plant store the product of photosynthesis?" is an example of interaction among pupils and this interaction will be categorized into the question category. This protocol will help the researcher to describe pupils' verbal interactions during cooperative learning in detail. Moreover, the six steps for developing effective performance schedule stated by Caroll, Durie, and Shropshire (2006) in her book was also referred by the researcher. Another strength of this observation protocol is, it is suitable to analyse elementary pupils' verbal interactions (Webb, 2009).

3.7 Pilot Study of the STAD Teaching and Learning Guide

The pilot study of the STAD Teaching and Learning Guide was done with Year 4 pupils from another Tamil school of Temerloh district. The purpose of the pilot study is to allow the teacher to familiarize with the STAD approach before implement it on the samples and to ensure the group tasks is promoting verbal interaction among the pupils. First, the researcher explained the lesson plan and the group tasks to the teacher. Later, the teacher carried out the lesson and followed by the group task. After the group task, pupils were given individual quizzes and focus group interview was done to gather pupil's perception on STAD cooperative learning approach.

Based on the pilot study, some improvements were done to the STAD Teaching and Learning Guide. Initially, the questions given in the individual quizzes were multiple choice questions. However, after the pilot study the questions were changed to structured questions because it will be helpful to explain to what extend pupils will be able to use the group interaction in answering the questions.

Besides that, it was found that focus group interview hinder the pupils from being honest in their answer during the interview. Hence, the interview was changed to individual interview where three pupils per lesson were selected for the interview to gather their perception on STAD cooperative approach. In addition, this will make them more comfortable in expressing their feelings and thoughts during the interview.

3.8 Data Analysis

In analyzing the verbal interactions of pupils during cooperative learning, researcher personally transcribed all the audio-taped pupils' group interaction and interview session with pupils. Initially, the transcripts were written in Tamil as pupils were discussing using Tamil languange during group interaction. Later, the transcripts were translated to English and then were given to expert teachers for 'member-checking' to validate the transcripts. The translations were done without changing the meaning of their interaction.

Next, pupils' interactions and interview trancripts were analyzed by identifying the codes and categorize them into the relevant themes and categories. Gillies (2004) in his past research suggested six themes of pupils' verbal interactions. The table 3.3 below briefly explains the six themes suggested by Gillies (2004).

Table 3.3

The Six Themes of Verbal interactions Suggested by Gillies (2004)

Criteria	Explanations
Elaborations	• Excellent in providing solicited and unsolicited explanations by extending another member's response. • Clearly provides a detailed help for members.
Questions	• Clearly asks both open and closed questions to their group members regarding the given task.
Short Response	• Gives clear and guiding solicited and unsolicited short responses during discussion.
Engages	• Affirms another pupils' response • Extends the discussion by making statements and actively exchanging ideas on the topic discussed.
Directs	• Provides a clear direction in completing the group task which is very useful. • Able to pay full attention in group work and also able to discipline other pupils to pay attention during discussion.
Interrupts	• Interrupts and butt-in the speaker in a forceful manner and provides useful interruptions.

However, the researcher found that the six themes are too broad to analyze the verbal interactions of pupils during their group task. Hence, the present study added categories to each verbal interactions themes proposed by Gillies (2004). These categories will help to refine the characteristics of the student's verbal interactions.

The following table 3.4 shows the example of a verbal interaction theme, it's category and the excerpts from pupil's interaction transcription.

Table 3.4

Excerpts for the Category Questions about Clarification

Theme	Categories				Excerpts
Questions	Questions about Clarification	*13*	*Sakthi*	:	*Their skin colour is same.*
		14	*Jana*	:	*Their teeth structure also looks same.*
		15	*Nisha*	:	*But, do you think teeth structure is inherited from mother? Because teacher did not mention about the teeth structure as inherited characteristics.*
					(GD, G1, L3)

This excerpt was taken from group discussion in Group 1 during Lesson 3. Lesson 3 is about the the topic inheritance. The excerpt shows that pupils pose questions about clarifications. For the group task each group was given a mother and a daughter's picture and they were required to find the similarities in their features. Firstly, Sakthi (Line 13) mentioned that their skin is similar. Jana (Line 14) added that their teeth structure also looks same. The conversation was continued by Nisha (Line 15) by asking a question to clarify is the teeth structure is inherited from the parents. She also warned her peers that the teacher did not mention about the teeth structure as inherited characteristics. So, here we can see that pupils able to use clarifying questions to share the ideas and correcting their member's ideas. This sample of analysis shows how pupil's verbal interaction was analysed in this present study.

Further discussion on the categories and the example of exerpts can be found in the following chapter. Next, pupils' individual quiz also analyzed and described qualitatively.

3.9 Summary

The methodology of this study employed various data collection techniques to gather data to answer the research questions that were put forward in this study. This chapter begins with a brief picture of methodology, procedure of this study, data collection techniques, research tools, pilot study and data analysis method. The following chapter will focus upon results and findings of the verbal interactions of pupils during cooperative learning, pupils' achievements and also perceptions on cooperative learning.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter focuses on the analysis of the data collected and the summary of the results. The chapter is organised into three main sections addressing the three research questions. The data provided answers to the following research questions:

1. How is Year Four pupils' verbal interactions during the implementation of the STAD cooperative learning approach in learning science?
2. What is the pupils' science performance after implementing the STAD cooperative learning approach?
3. What is the pupils' perceptions on STAD cooperative learning approach?

4.2 Participants in this Study

The participants were divided in to three heterogeneous groups. The three group members and the dynamics of the group will be presented in the following section.

4.2.1 Group 1

All the four participants Previn, Nisha, Sakthi and Jana were friendly and had good interactive skills during group discussions. However, Previn the high performing student in this group tends to dominate the discussion at times. He assumed himself as the group leader as he was very concerned about the quality of his group's presentations. Sakthi and Nisha were good listeners and they were actively sharing their ideas on the task given. The low performing student, Jana was considered as a passive member (he spoke 4 times during lesson 1) but managed to get involved in the group interaction as research progress. He able to get himself

adapts to the group (he spoke 8 times during lesson 3). He did not hesitate to seek help from the group when he had difficulties in completing the task.

4.2.2 Group 2

Vasan, Thivya, Viroshini and Shini are the participants of group 2. Vasan and Thivya who were the high achievers in this group, continuously supported the other members by providing suggestions. They were able to scaffold the peers' learning by recalling the content and suggesting the members on how to carry out the task.

Vasan : Before divide the roles I want all of us recall the four breathing organs that teacher mentioned just now.

(GD, L4, G2)

Thivya : You can ask like this. (Acting)
You (Monkey) are looking like a human and do you have breathing organ like a human too?

(GD, L4, G2)

Vasan played the role as the group leader when he redirects the group members whenever the discussion was not focused on the topic of discussion. Viroshini was the member that seemed to be passive at the beginning but manage to contribute more actively as time goes by. Shini was considered as the 'harmony-keeper' of the group as she always praises the other member's ideas during the group task.

4.2.3 Group 3

Divenes, Barath, Darshini and Namitha made up Group 3. Divenes and Barath who were the backbones of the group played a helpful role in their group. They helped their group members to generate ideas and being the role models to their peers.

Namitha was a very jovial girl. She seemed to prefer to manage her group members not verbally but through jotting down of the group member's discussion. Darshini enjoyed being part of the group.

Namitha : Ok thank you for the ideas. (Writing down the points). Can I add about the health issues of smoking?

(GD, L1, G3)

Overall, the groups were cordial and effective in terms of exploring ideas and giving suggestions. The next section will describe the analysis for each research question.

4.3 Verbal interactions of Year Four Science Pupils during the Implementation of the STAD Cooperative Approach

Investigating pupils' verbal interactions during the implementation of STAD cooperative learning approach was the main focus of this present study. Previous studies on STAD approach failed to explain qualitatively how the verbal interactions among the group members is while completing group task (Li *et al*., 2015). For this study, three groups with four members each carried out five group activities throughout the lesson. In total, fifteen group interactions were transcribed and analysed. The diagram 4.1 shows the themes and categories of verbal interactions based on the analysis of pupil's verbal interactions during the group task.

As mentioned in the earlier chapters, the six verbal interaction themes proposed by Gillies (2004) was used to analyse pupils' verbal interaction. However, in this present study the two categories for each theme were found to narrow down the focus of the verbal interaction analysis. Further analysis and findings also found one emerging theme of verbal interaction. The following subsections will explain

each category with the examples accordingly. The circle with bold line shows the emerging theme and the two categories that have been found in this study.

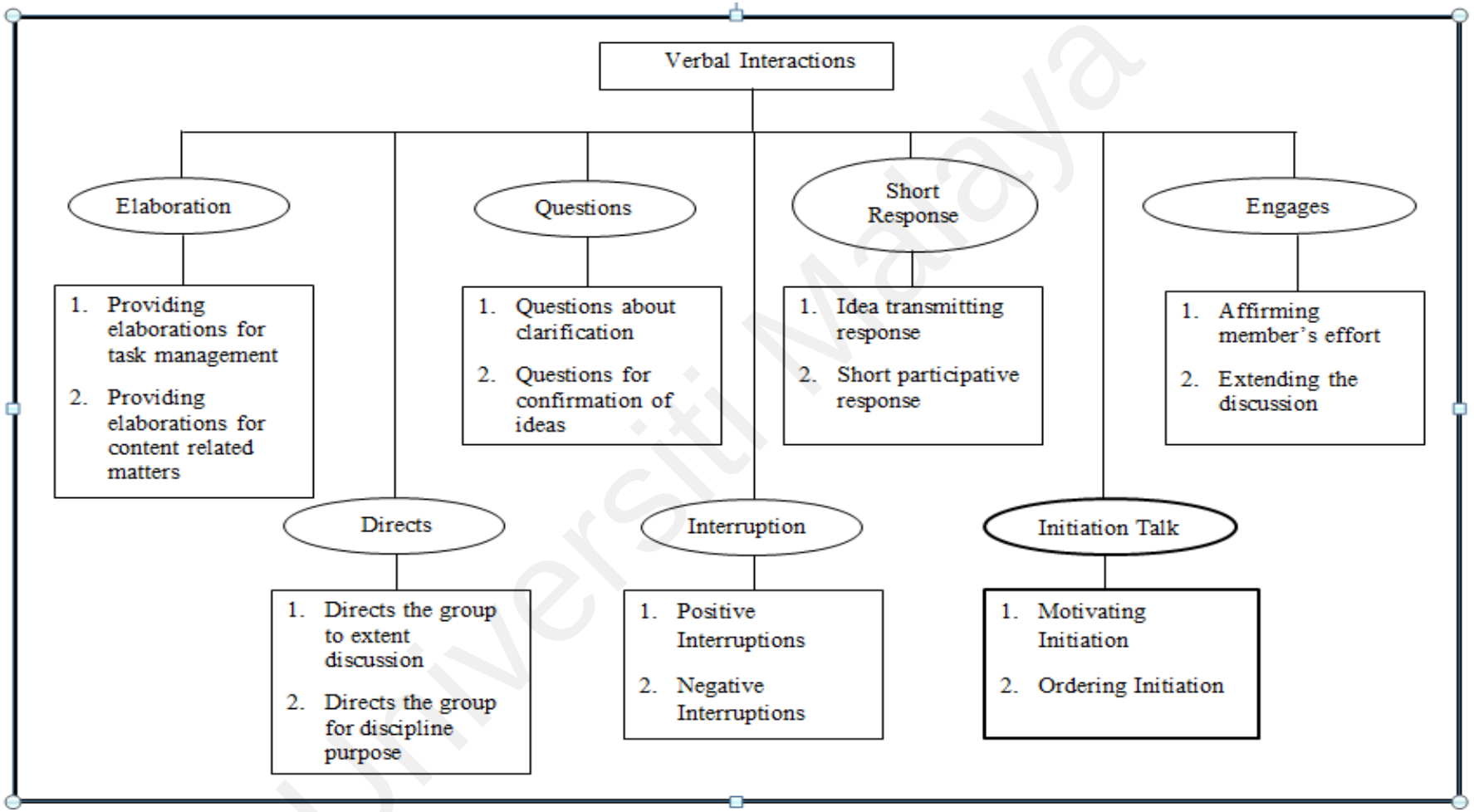


Figure 4.1 The Themes and Categories of Verbal Interaction

4.3.1 Elaborations

Theme elaborations refer to the interactions that providing solicited and unsolicited explanations by extending another member's response. This elaboration could provide a detailed help or guidance for the group members on completing the task. Pupils' transcripts show that pupils used elaboration for providing guidance for task management and providing elaboration for content related matters. The following subsections show the categories and explain the excerpts for the theme elaboration.

4.3.1.1 Providing Elaboration for Task Management

The table 4.1 below shows the excerpts from pupils' transcript that poses the elaboration for task management.

Table 4.1

Excerpts for the Category Providing Elaboration for Task Management (Example 1)

Theme	Categories	Excerpts
Elaborations	Providing elaboration for task management	*2 Previn : Now, we have to divide the* *3 Sakthi : roles.* *4 Previn : I will take the drug addict role.* *5 Jana : Ok. Good. Wait let me write* *6 Nisha : down the roles.* *7 Previn : I want to be the second drug addict.* *I will be Siva then.* *Ok. I will be the doctor. Let me explain the scenario before we start our role play. Nisha, you will play Siva's role. So, you will be meeting these two drug addicts to interview them about their life stories to complete your science scrapbook.* (GD, G1, L1)

Providing elaboration for task management is the first category for the theme elaboration and it explains how pupils elaborate their views in order to complete the task given. Lesson 1 is about the topic avoiding bad habits and each group need to do a role play based on the scenario given to them. Group 1 was given a scenario about interviewing the drug addicts. The task was designed in order to make pupils to gather detailed information about the topic given. For instance, group 1 members were required to explain the effects of being addicted to drugs and steps to be taken to avoid drugs. Hence, once receive their task they discussed the information in their group before carry out their role play.

During the discussion, it was found that pupils were elaborating on how to complete the role play task given to them. Referring to table 4.1, Previn (Line 2) started the discussion by instructing the peers to divide the roles before they can start the discussion on the given topic he (Line 4) voluntarily wrote down the roles. The remaining group members were being cooperative with Previn by selecting the roles they liked without any arguments. For instance, Sakthi (Line 3), Jana (Line 5) and Nisha (Line 6) voluntarily selected their roles and this helps them to carry out the task effectively. Moreover, Previn (Line 7) elaborates the whole scenario to his group members before they started the discussion on the content matter. Thus, this showed that Previn was concerned about the task management and he was actively providing elaborations on how to complete the group task.

Besides that, providing elaboration for task management also could be seen among Group 3 members during the group discussion for Lesson 1. The table 4.2 below shows the second excerpts from pupils' verbal interaction transcript that poses the elaboration for task management.

Table 4.2

Excerpts for the Category Providing Elaboration for Task Management (Example 2)

Theme	Categories				Excerpts
Elaborations	Providing elaboration for task management	2	Barath	:	*First we have to decide the roles. Can I be the smoking student, Ali because I'm the only boy in our group (Laughing).*
		3	Darshini	:	*That is ok.*
		4	Divines	:	*Got 3 more roles left. I will be the doctor.*
		5	Namitha	:	*I want to be the discipline teacher.*
		6	Darshini	:	*Then, I be the Maran (Ali's friend).*
		7	Divines	:	*Ok done. Let's discuss the points. Better we write down the points.*
		8	Darshini	:	*So, I will start the situation first.*
		9	Divines	:	*Ya, the first situation is Maran seeing Ali smoking at school toilet. Next, Maran complains about it to the discipline teacher. Then, teacher brings Maran to see the doctor. We need to make our role play more real and interesting.*
					(GD, G1, L1)

Referring to table 4.2, it was found that the pupils in group 1 providing elaboration among their group members to divide the roles for the role play task. The discussion was started by Barath (Line 2) who voluntarily selected the roles for and it was followed by other members who selected the tasks without any disagreements. Later, the conversation was continued by Divines (Line 7&9) who suggested the peers to discuss the ideas for the role play and narrated the whole scenario given to them to her group members. This shows how the group members interact among

them on how to divide the task management and this helps them to complete the task effectively.

4.3.1.2 Providing Elaborations for Content Related Matters

The table 4.3 below shows the excerpts from pupils' transcript that poses the elaboration on the content related matters.

Table 4.3

Excerpts for the Category Providing Elaboration for Content related Matters (Example 1)

Theme	Categories				Excerpts
Elaboration	Providing elaboration for content related matters	*18* *19* *20* *21*	*Divenes* *Namitha* *Divenes* *Barath*	: : : :	*Ya both of you are right. I need points to talk. I will explain about the health issues that caused by smoking.* *Ok ok I'm sorry.* *I will talk mainly about the disadvantages of smoking to health as what was stated in our textbook. For example, getting lung cancer and respiratory problems. (Showing the textbook)* *In my opinion, your statements must be strong to make the smoking student to regret and hmmmm want to stop smoking after this. (Laughing)* (GD, G3, L1)

Here the interaction transcripts show that, the team members elaborate about the content related matters. Based on the above excerpt in Table 4.3, Divenes (Line 18) agreed with her peers that she needed to add on more points to talk about smoking. Divenes said "*Ya both of you are right. I need points to talk".* In line 20, Divenes elaborates what she would add on about 'getting lung cancer and respiratory problems'. Besides that, it shows that Barath was elaborating how Divenes should add more statements so that her argument on the disadvantages of smoking would be

better. The another example of excerpts that showing providing elaborations for content related matters also found in pupil's verbal interaction transcripts. Table 4.4 below shows the second example for this category.

Table 4.4

Excerpts for the Category Providing Elaboration for Content related Matters (Example 2)

Theme	Categories				Excerpts
Elaboration	Providing elaboration for content related matters	13	*Barath*	:	*Yes. Not only their face shape but also their eyes and nose as well.*
		14	*Namitha*	:	*Their hair structure also looks similar. Like me. Haha. My hair is similar to my mother (Showing her curly hair).*
		15	*Darshini*	:	*Yes. We inherit similar characteristics from our parents such as the examples shown in this textbook (Showing the textbook).*
		16	*Divenes*	:	*Did you all notice the dimples on both their faces? Is the dimples inherited from parents?*
		17	*Barath*	:	*According to this example, we can say that dimples are heritable. Because both mother and daughter have it.*
		18	*Darshini*	:	*Yes we can consider dimples are heritable. My grandmother used to say that my sister and me inherited dimples from my mother. (Laughing and showing her dimples to her friends).*
					(GD, G3, L3)

This excerpt shows how group 3 pupils were interacting using elaborations to discuss about the content related matters. They were discussing about the similar features of a mother and daughter pictures. For instance, Namitha (Line 14) and Darshini (Line 18) were able to elaborate more regarding the inheritance topic by comparing their physical features with their own parents. This shows how confident

the pupils are in relating their daily life experience with the content they were discussing. Moreover, Darshini (Line 15) was able to elaborate by showing the examples given in the textbook. Hence, it is clear that pupils do more elaboration in their group regarding the topic or the content matters.

4.3.2 Questions

There were two types of questions posted by the group members regarding the given task. Hence, the researcher classified the questions into two categories such as questions about clarification and questions for confirmation of ideas. The following subsections show the categories and the examples from pupils' group discussion transcripts.

4.3.2.1 Questions about Clarification

The first category for the questions theme is pupils asking questions about clarification. In this subtheme, pupils do ask questions to help them clarify some issues and content matters that they are not familiar with. For example in Table 4.5 the excerpt from the lesson 1 were shown.

Table 4.5

Excerpts for the Category Questions about Clarification

Theme	Categories				Excerpts
Questions	Questions about Clarification	*13*	*Previn*	:	*As a doctor, I can tell the effects of being a drug addict, such as no energy and delaying in respond to stimulus.*
		14	*Jana*	:	*Ah? Wait? What is delaying in respond to stimuli?*
		15	*Previn*	:	*It means drug addicts are not in their conscious and there is a delay in responding to the environment.* (GD,G1,L1)

Here, Previn (Line 13) stated that "*the effects of being a drug addict, such as no energy and delaying in respond to stimulus".* To this Jana responded "Ah? Wait? What is delaying in respond to stimuli?" (Line 14). Jana is asking him a question to clarify the sentence that he did not understand.

This question created a chance for Previn (Line 15) to share his idea to his peers and at the same time it helped Jana to clarify his doubt.

4.3.2.2 Questions for Confirmation of Ideas

The second category refers to the questions that have been used by the group members to confirm their ideas. The following table 4.6 shows the excerpts for this category.

Table 4.6

Excerpts for the Category Questions for Confirmation of Ideas (Example 1)

Theme	Categories	Excerpts
Questions	Questions for Confirmation of Ideas	*1 Namitha : Ok let's start our discussion. We have three situations. First one is you are walking by the beach side at 12.00PM with barefoot.* *2 Darshini : 12.00PM is night ah?* *3 Barath : No* *4 Divenes : PM is afternoon.* (GD,G3,L2)

For an example, in lesson 2 pupils will discuss in their group about the three situations given to them such as '*You touched a hot kettle. Discuss the stimulus and stimuli involved*'. This lesson was about humans responding to stimuli. Here, they are required to identify the stimulus and response for each situation given to them. During the discussion, Namitha from group 3 (Line 1) read aloud the situations given to them 'You are walking by the beach side at 12.00pm'. To this Darshini (Line 2)

enquired *"12.00PM is night ah?"* This question was answered by Barath (Line 3) by saying no to her question and clarified that PM refers to afternoon.

Besides that another example from pupil's verbal interaction transcript was also found for the category questions for confirmation of ideas. Table 4.7 below shows the second example for this category.

Table 4.7

Excerpts for the Category Questions for Confirmation of Ideas (Example 2)

Theme	Categories				Excerpts
Questions	Questions for Confirmation of Ideas	6	*Shini*	:	*Stimulus is hot kettle and response is crying.*
		7	*Thivya*	:	*Crying ah? Really?*
		8	*Shini*	:	*Why? Is it wrong?*
		9	*Thivya*	:	*I think removing the hand faster is the best response.*
					(GD,G2,L2)

This excerpt was extracted from the Group 2 pupil's interaction during Lesson 2. In Lesson 2, pupils were given task about the topic humans respond to stimuli. They were given four situations and each group needed to find the stimulus and response for each situation. Based on the excerpts it was found that Thivya (Line 7) and Shini (Line 8) used questions to confirm their ideas. Initially, Shini (Line 6) mentioned that the stimulus is the hot kettle and response is crying. However, Thivya (Line 7) questioned Shini's answer to confirm her ideas and Shini (Line 8) replied Thivya using questions to ask for confirmation on her answers. Later Thivya (Line 9) suggested that removing the hand faster is better than crying. Therefore, it shows that both the group members are comfortable to use questions when they need a simple confirmation on their ideas from their group members.

4.3.3 Short Response

In this study, short responses are when group members discuss with each other by uttering ten or less than ten words. This response also was from various group members where they will be no one dominating the discussion. Based on the pupils' interaction transcript, some pupils were comfortable with short responses during the group interaction. The following subsections explain the categories and excerpts for this theme.

4.3.3.1 Idea Transmitting Short Response

The first category for the short response is the idea transmitting short response. This shows that pupils utilize short responses to share their ideas among the group members. The following table 4.8 shows the excerpts for this category.

Table 4.8

Excerpts for the Category Idea Transmitting Short Response

Theme	Categories	Excerpts			
Short Response	Idea transmitting short response	*2*	*Darshini*	:	*12.00pm is night ah?*
		3	*Barath*	:	*No.*
		4	*Divenes*	:	*12.00pm is afternoon.*
		5	*Darshini*	:	*Oh ok. So it will be a hot*
		6	*Barath*	:	*day.*
		7	*Namitha*	:	*Stimulus is hot.*
		8	*Darshini*	:	*Response is walking fast.*
		9	*Barath*	:	*How about run fast?*
					I think both are acceptable.
					(GD,G3,L2)

As stated earlier, lesson 2 was regarding human respond to stimuli and pupils were required to identify the stimuli and response for the situation given to them. During the discussion, Darshini (Line 2) from group 3 had a doubt between AM and PM. She posed the question to the group members and her peers (Divenes, Barath and Namitha) answered and explained her question using short responses. Moreover,

this shows that Darshini, an average performing student able to clarify her idea confidently by posing the short responses.

4.3.3.2 Short Participative Response

The second category for the short response theme is the short participative response. Researcher addresses this criterion from pupils' interaction because researcher found that few pupils who are passive in the group able to interact among group members using short responses. This show the pupils ensure their participation in the group. The following table 4.9 shows the excerpts for the short participative response.

Table 4.9

Excerpts for the Category Short Participative Response

Theme	Categories	Excerpts
Short Response	Short participative response	*1 Previn : This is about advantages of photosynthesis.* *2 Nisha : If plants do more photosynthesis, more plants* *3 Sakthi : will grow.* *Yes so we will get more* *4 Previn : oxygen supply.* *I list down the points. So we* *5 Jana : already have one.* *6 Nisha : Animals will get food.* *Yes not only animals but also* *7 Jana : humans.* *8 Previn : We get clean air.* *Ya it was already mentioned earlier.* (GD,G1,L5)

This excerpts show that, during lesson 5 pupils were required to answer three questions about photosynthesis through group discussion. The excerpt shows that group 1 pupils were discussing about the advantages of photosynthesis. Here we can see that Jana, who is the passive and low achieving student able to contribute his

ideas to the group by using short responses where he managed to state two advantages of photosynthesis (Line 5 and 7).

4.3.4 Engages

The theme engages refers to the affirmations made by the group members on another member's response. Engages also help the members to extend their discussion by making statements and actively exchanging ideas on the topic discussed. Therefore, two categories such as affirming member's effort and extending the discussion were emerged from engages theme. The following subsections show the categories and the example for this engages theme from pupils' group discussion transcripts.

4.3.4.1 Affirming Member's Effort

This category explains how pupils affirm or encourage their member's effort during group task. The following table 4.10 shows the example for this category.

Table 4.10

Excerpts for the Category Affirming Member's Effort (Example 1)

Theme	Categories				Excerpts
Engages	Affirming member's effort	3	Vasan	:	*Can someone explain the scenario?*
		4	Shini	:	*Yeah I can… Guna is having some breathing difficulties and he went to consult a doctor. The doctor examines Guna and explains the effects of obesity. Then, on his way coming back home Guna met his friend who is going for jogging. His friend advised Guna and asked him to join for jogging. The next day, Guna met his physical education teacher and discuss about his problems to him.*
		5	Thivya	:	*Wow a very good explanation. Like a teacher la.*
					(GD,G2,L1)

Based on the above excerpt, during the discussion some pupils were acknowledging and affirming other member's effort through discussion. For example it was found among pupils in group 2 during lesson 1. As described earlier for lesson 1, pupils were required to present a role play on avoiding bad habits. As shown in the table 4.6, Shini (Line 4) explained the scenario to her members voluntarily after asked by her peer Vasan (Line 3). Thivya (Line 5) praised and acknowledged Shini's presentation by stating that Shini explained as a teacher.

Furthermore, the similar situation was also found among Group 3 members during Lesson 2. Table 4.11 shows the second example of the excerpts for the category affirming member's effort.

Table 4.11

Excerpts for the Category Affirming Member's Effort (Example 2)

Theme	Categories				Excerpts
Engages	Affirming member's effort	14	*Namitha*	:	*So stimulus is ambulance with siren.*
		15	*Divenes*	:	*Good and the response is giving way to the ambulance.*
		16	*Darshini*	:	*Next we have to give one example for stimulus and response.*
		17	*Barath*	:	*Hmmmmm just now teacher did mentioned few. We can modify from there.*
		18	*Darshini*	:	*Yes. Looking at a sharp light at night. How about this?*
		19	*Namitha*	:	*Ok. I think. So stimulus is the sharp light.*
		20	*Divenes*	:	*Response is closing the eyes*
		21	*Barath*	:	*Ok good. We have done with this. Next drawing a graphic.*

(GD,G3,L2)

As mentioned earlier for lesson 2 pupils were given four situations and they were required to find the stimulus and response for each situation. Based on the excerpts it was found that Divines (Line 15) and Barath (Line 21) praised and acknowledged the responses given by their members. This shows how pupils in the group engage themselves in the group interaction by affirming other member's responses and answers. Hence, it is clear that pupil able to show their support and encouragement among their group members to motivate them.

4.3.4.2 Extending the Discussion

The second category for the engage theme is extending the discussion through engaging interactions. The following table 4.12 shows the excerpts for this category.

Table 4.12

Excerpts for the Category Extending the Discussion

Theme	Categories				Excerpts
Engages	Extending the discussion	*21*	*Viroshini*	*:*	*Ok then I will answer for that and will invite you to visit our friends near the pond.*
		22	*Vasan*	*:*	*Good! Then I will continue and asking about the breathing organs to monkey. But how to start? Hmm*
		23	*Thivya*	*:*	*Can we do like this? I can help you.*
				:	
		24	*Vasan*	*:*	*How ah?*
		25	*Thivya*		*You can ask like this. (Acting) You (Monkey) are looking like a human and do you have*
				::	*breathing organ like a human too?*
		26	*All*		*(Clapping hand)*
		27	*Vasan*		*It's a great start. Thank you Thivya. Ok Viroshini I will ask you the question Thivya asked just now.*
					(GD,G2,L4)

For lesson 4, pupils were required to discuss and prepare for a role play about the breathing organs of animals. Each member took an animal's role and they played the role play by discussing about the breathing organs of the animals. It shows that Vasan (Line 22 and 27) praised his group members, Viroshini and Thivya after they gave ideas to the group discussion. This shows that Vasan affirms another member's effort and at the same time the group members extending their group discussion. This attitude causes other member's feel appreciated and able them to actively participate in the group discussion.

4.3.5 Directs

Directs can be defined as an interaction where one member provides a clear direction in how the group should complete the task given. Furthermore, the member who establishes directs criteria, pay full attention in group work and also able to discipline other pupils to pay attention during group discussion. Hence, two categories were identified for this directs theme based on the analysis. The following subsections explain the two categories in detail.

4.3.5.1 Directs the Group to Extent Discussion

In this present study, directing interaction has been seen in directing the group to extent the discussion. The table 4.13 below shows the example for this category.

Table 4.13

Excerpts for the Category Directs the Group to Extent Discussion

Theme	Categories				Excerpts
Directs	Directs the group to extent discussion	*5*	*Jana*	:	*Ok now what we have to do?*
		6	*Sakthi*	:	*You never listen to teacher just now ah?*
		7	*Previn*	:	*We have to find out the stimulus and response for each situation. Later we need to show our answers in graphic representation. Let me write the answers first. So response is…….*
		8	*Jana*	:	(GD,G1,L2)

In this group discussion, pupils were asked to discuss about the stimulus and response, it was seen that Previn (Line 7) directed the group on how to proceed with the task given. For example, he claimed that they should not only find the stimulus but they need to show the answers in graphic representations.

4.3.5.2 Directs the Group for Discipline Purpose

The second category for the theme directs is directing the group for discipline purpose. The following table 4.14 shows the example for this category.

Table 4.14

Excerpts for the Category Directs the Group for Discipline Purpose

Theme	Categories				Excerpts
Directs	Directs the group for discipline purpose	*4*	*Namitha*	:	*Can we say aloud the characteristics before writing?*
		5	*Divenes*	:	*No.. no.. you cannot. You have to write first and later we will discuss.*
		6	*Barath*	:	*Ok ok don't waste the time. Let's start write first.*
		7	*Namitha*	:	*Hey.. she ah? Looks very familiar to me. (Pointing to the mother in the picture given). She is an actress*
		8	*Darshini*	:	

Theme	Categories			Excerpts
				right.
		9	*Barath* :	*Haiya.. (sigh) Now only you know ah? Both of them actress la.* *Keep your stories for later and let's start write first (strict tone).* (GD,G3,L3)

Here we can see that some pupils tend to be the discipline teachers of their respective group. This is because, the particular pupils directs their group members in order to discipline them to complete the task given correctly. For instance, during lesson 3, group 3 pupils were given the task about inheritance where they have to find the similarities among a real life mother and daughter and write their common ideas on the place mat given to their group. At the beginning of the conversation, Namitha (Line 4) and Divenes (Line 5) were busy discussing about the instructions for the task. Later, Barath urged his group members to not wasting their time and asked them to start discussing about characteristics. However, these members tend to be very excited after they found out that both mother and daughter are actresses. This again causes Barath (Line 9) to warn the group members to stop their stories and pay attention to the group discussion. This shows that how Barath discipline his group members to complete the task given on time.

4.3.6 Interrupts

In this present study, interrupts were seen when one member forcefully intercepts when another member is speaking. Interruptions may not always be something bad as sometimes it is essential for group members to supply needed guidance and ideas during interactions. However, in this it was noticed that interrupts could be considered as positive (helps with the discussion) or negative (where the

interrupts do not add value to the discussion). The following subsections explain each category in detail.

4.3.6.1 Positive Interruptions

The table 4.15 below shows the example of the excerpts for positive interruptions.

Table 4.15

Excerpts for the Category Positive Interruptions

Theme	Categories				Excerpts
Interrupts	Positive Interruptions	*16*	*Shini*	:	*Can we write them in the i-*
		17	*Vasan*	:	*Think map?*
		18	*Shini*	:	*Ya can but which type of i-*
		19	*Thivya*	:	*Think map?*
		20	*Viroshini*	:	*This one… (Showing the*
		21	*Vasan*	:	*map on the bulletin board?*
		22	*Viroshini*	:	*It is a good idea. I will …. Wait! Why? We forget something. We have to find an example for stimulus and response.* (GD,G2,L2)

This interaction was take place during the Lesson 2 where pupils have to discuss about three situations given to them and find the stimulus and response for each situation. Later, they have to show their answers in a graphic presentation. Moreover, they have to discuss and state one example of situation with correct stimulus and response. Shini and Vasan were discussing about the type of graphic representation that they would like to choose to represent their answers.

Later, they decided to choose i-Think map and Thivya agreed to their idea. However, Viroshini interrupted Thivya in a very forceful manner. This is because the group members forget to state one example of situation with the correct and stimulus and response as required by the teacher. Here, Viroshini had helped her group

members in completing the task perfectly and her interruption lead to a positive results.

4.3.6.2 Negative Interruptions

The table 4.16 below shows the example of the excerpts for negative interruptions.

Table 4.16

Excerpts for the Category Negative Interruptions

Theme	Categories				Excerpts
Interruptions	Negative Interruptions	*7*	*Previn*	:	*We have to find out the stimulus and response for each situation. Later we need to show our answers in graphic representation.*
		8	*Jana*	:	*Let me write the answers first. So response is…….*
		9	*Previn*	:	*Wait…….*
		10	*Jana*	:	*Why?*
		11	*Previn*	:	*We have to find the stimulus first. Walking at the beach on afternoon will be very hot.*
		12	*Nisha*	:	*So the response is ….*
		13	*Previn*	:	*Closing our eyes.* (GD,G1,L2)

Negative interruption shows how some pupils interrupting their group members to show their dominance in the group. From the above excerpt we can see that, Previn explains the task to the group members. Then, Jana offer himself to write the first answer but it was interrupted by Previn and Previn corrected Jana to write the stimulus and continue by the response. This excerpt was categorized as a negative interruption because Previn did not give chance to Jana to think about the stimulus and he provided the stimulus immediately. Next, Nisha tried to answer the response and again she was interrupted by Previn again. Previn interrupted her statement *"So the response is …."* to state immediately *"Closing our eyes"*. Previn's

interactions with his group members tend to show that he is dominating the discussions. This is presumably because he is a high performing student and does not seem to have patient to allow his team members to respond and interact in this conversation.

4.3.7 Initiation Talk

Though all the previous verbal interaction themes were similar to the six elements of Gillies (2004) however, one theme is emerged from this present study. In this present study, the researcher has found a pattern in initiating the group interaction. It is found that every conversation was started by the high achievers in all the groups. However, the initiation talk by the high achievers were not the in the same way. Therefore, two categories which are motivating initiation and ordering initiation were found by the researcher. The following subsections explain the categories in detail with the examples.

4.3.7.1 Motivating Initiation

In this study, motivating initiation was posed by the high achiever, Vasan where he started the group interaction with motivation. The following table 4.17 shows the excerpts from the transcripts.

Table 4.17

Excerpts for the Category Motivating Initiation

Theme	Categories	Excerpts
Initiations	Motivating Initiation	*1 Vasan : Before start our discussion, let's read the scenario. I hope our group do the best.* (GD, G2, L1)
		1 Vasan : We have to find the stimulus and response for three situations. We get the answers first then we think about how to put in graphic ok. (GD, G2, L2)

The above excerpts shows that Vasan, the high achiever in Group 2 was very interested on the task given to them and he initiated the group discussion by motivating the group members. In the first lesson, he mentioned that he want his group do the best in the given task. For the second lesson, he motivated his group members by explaining the task and what they are supposed to do. This type of talk shows that, the other peers in the groups especially the low achievers to get motivated in the group interaction and it makes them feel comfortable in contributing to the group.

4.3.7.2 Ordering Initiation

Whereas, another category that emerged for the initiation theme is ordering initiation. Here, it was seen that the high achievers initiate the group discussion by instructing the peers on completing the task. The following table 4.18 shows the excerpts from the transcripts.

Table 4.18

Excerpts for the Category Ordering Initiation

Theme	Categories	Excerpts			
Initiations	Ordering Initiation	*1*	*Previn*	:	*So, we have to complete this place mat. Are you all clear with the instructions given?* *(GD, G1, L3)*
		1	*Barath*	:	*Do all of you understand the instructions given by the teacher?* *(GD, G3, L3)*

The first excerpt shows that Previn initiated the group discussion by ordering his group members. He makes sure all his peers are clear about the instructions given before starts the discussion. Besides that, Barath the high achiever in Group 3 also initiates the discussion by ordering his peers to understand the instructions.

4.4 Year Four Science Pupils' Performance after Implementing the STAD Cooperative Learning Approach

The researcher also investigated what is the Year Four pupils' performance in science lesson after implementing the STAD cooperative learning approach. This step was done to study to what extent the participants able to build understandings and making connections between information presented and discussed during their group task. Each student was given four open ended questions for each session and these questions were to be answered individually and without the help of their members.

The questions for individual quiz were designed according to the levels of Bloom's Taxonomy. These quizzes contained HOTS questions. After the intervention, pupils' individual quizzes were marked by the teacher based on the marking scheme developed and their scores were recorded in the Pupils' Achievement Checklist (Table 4.7). The progress of each student throughout the five lessons was observed. As mentioned in the methodology, each STAD group consists of two high performing pupils, one average performing student and one low performing student. The analysis was done according to the pupils' performance level and their achievement in the individual quizzes. This is because heterogeneous grouping is one of the essential element in STAD cooperative approach. Heterogeneous members in a group are believed to give support, help, encouragement and assistance among each other which consequently improve pupil's academic performances and cognitive development (Balfakih, 2003). Pupils' performances according to their ability groups will be discussed in the following sections.

Table 4.19

Pupils' Achievement Score Checklist

Pupils' Performance Level	Pupils	Lesson 1 (10 M)	Lesson 2 (10 M)	Lesson 3 (10 M)	Lesson 4 (10 M)	Lesson 5 (10 M)
High Performing Pupils	Previn	10	10	10	9	10
	Sakthi	9	9	10	9	9
	Vasan	9	10	9	10	8
	Shini	9	8	9	10	9
	Divenes	9	9	8	9	10
	Barath	9	8	10	9	9
Average Performing Pupils	Nisha	6	6	8	9	8
	Thivya	7	7	9	8	9
	Namitha	6	8	7	8	9
Low Performing Pupils	Jana	7	8	7	8	8
	Viro	6	8	7	8	8
	Darshini	6	6	8	8	8

High performing pupils that were categorized based on their previous science examination scores, constantly showed scores of 9s and 10s. Average and low performing pupils started with slight lower scores (6 and 7) but by the end of the lesson many of the pupils were scoring as high as 8 or 9. However, it is not the intention of this study to discuss the numerical scores of the pupils but to describe then process of answering the questions based pupils' interaction during their group task.

4.4.1 High Performing Group

Table 4.19 explains that 6 high performing pupils in the class able to answer the individual questions from lesson 1 to lesson 5 consistently. For instance, Previn's answers shows that he able to answer the open ended questions with correct keywords and it helped him to score high marks. The following Figure 4.2 shows Previn's answer for individual quiz 1.

Evaluation

(IQ1, Q5)

4. மேற்காணும் படத்தின் அடிப்படையில், அந்தப் பெண்மணி இந்த உணவுப் பழக்கத்தைத் தொடர்ந்தால் என்ன நேரிடும் என்பதை முன் அனுமானம் செய்க. உன் விடையை விளக்குக.

Based on the above picture, predict what will happen to the lady if the above situation continues for few months? Explain your answer.

அந்தப் பெண்மணியின் (உடல் பருமன் அதிகரிக்கும்) காரணம், அவர் (சமீர் உணவு) உட்கொள்ளவில்லை அவர் (கொழுப்பான உணவுகளை) உண்ணுகிறார்.

(The lady's weight will increase. Because, she not taking a balanced diet. She is taking too much of fat contained foods.)

Figure 4.2 Previn's Answer for Individual Quiz 1

The above question required the pupils to predict what will happen if the lady continued to eat and the pupils asked to explain the answers. Here we can see that Previn able to mention the prediction correctly and he used the terms such as balanced diet and foods that contained fats. This question can be categorized as evaluation in Bloom's Taxonomy as the word 'predict' is refers to evaluation. Next, the figure 4.3 shows Previn's answer for Individual Quiz 5.

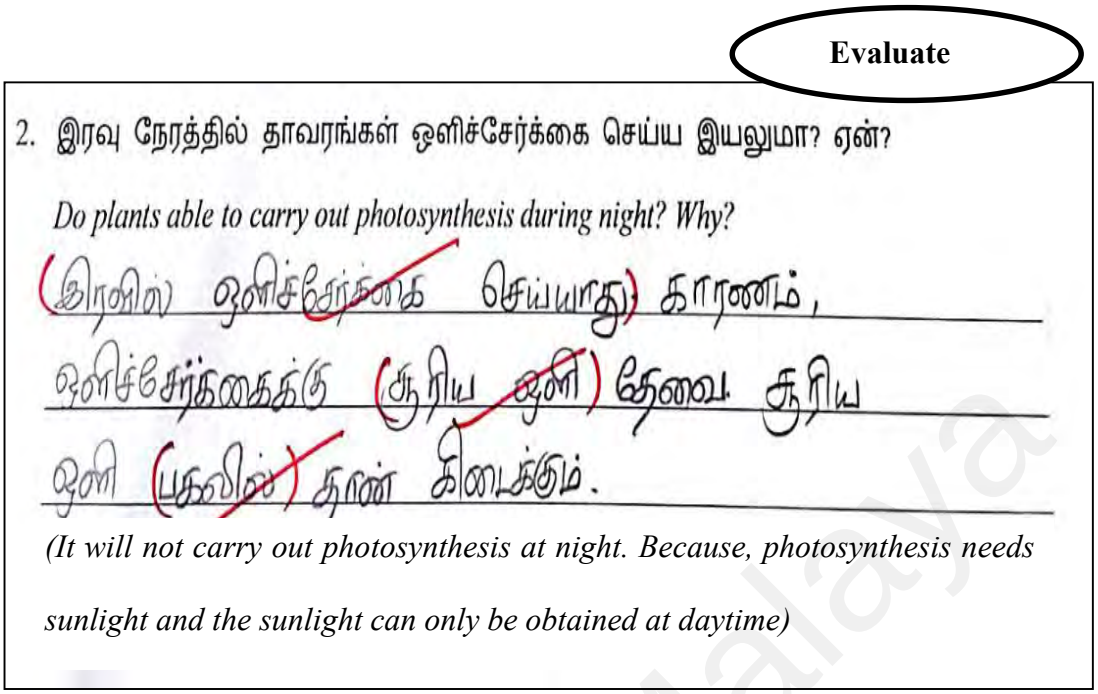


Figure 4.3 Previn's Answer for Individual Quiz 5

This question is also an example of evaluative question. Here it is clear that Previn able to answer the question correctly with the usage of correct words. He managed to state that plants need sunlight to carry out photosynthesis. It can be seen that Previn, the high achiever is able to answer the question from the highest level of Bloom's Taxonomy and he posed good answer writing skill for open ended questions.

4.4.2 Average Performing Group

In total there were 3 average performing pupils in the class. It was observed that, as indicated in Table 4.8 the average performers seemed to score low in the lesson 1 and lesson 2 but later their scores have increased in the following lessons. The following Figure 4.4 shows Namitha's answer.

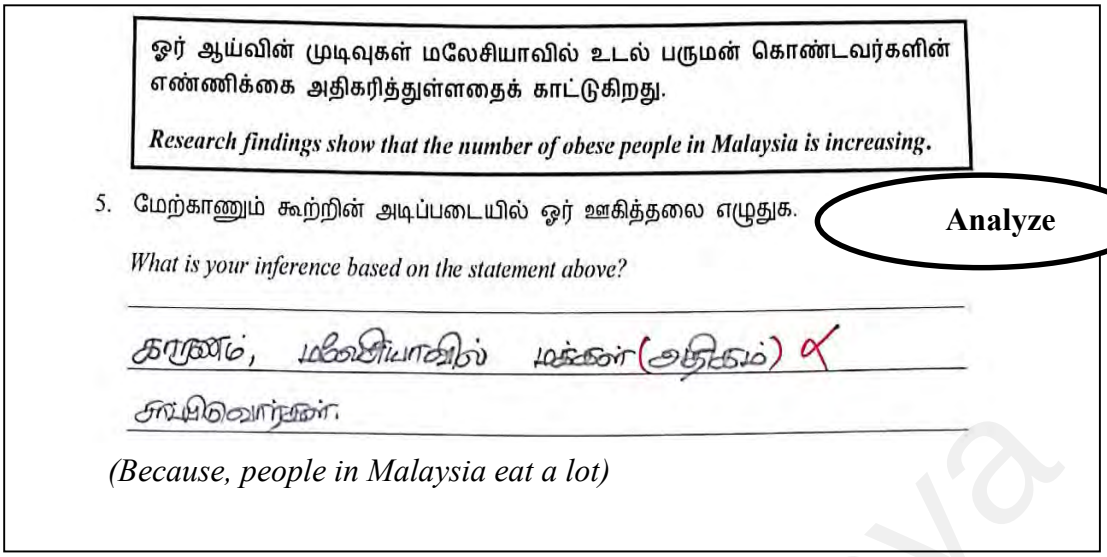


Figure 4.4 Namitha's Answer for Individual Quiz 1

The above question required the pupils to give reasons for the statement 'Research findings show that the number of obese people in Malaysia is increasing'. However, Namitha could not answer this question correctly. She used a very generally influencing answers and she failed to use correct keywords. She supposed to use to the terms such as eating imbalanced diet or lacking of exercise.

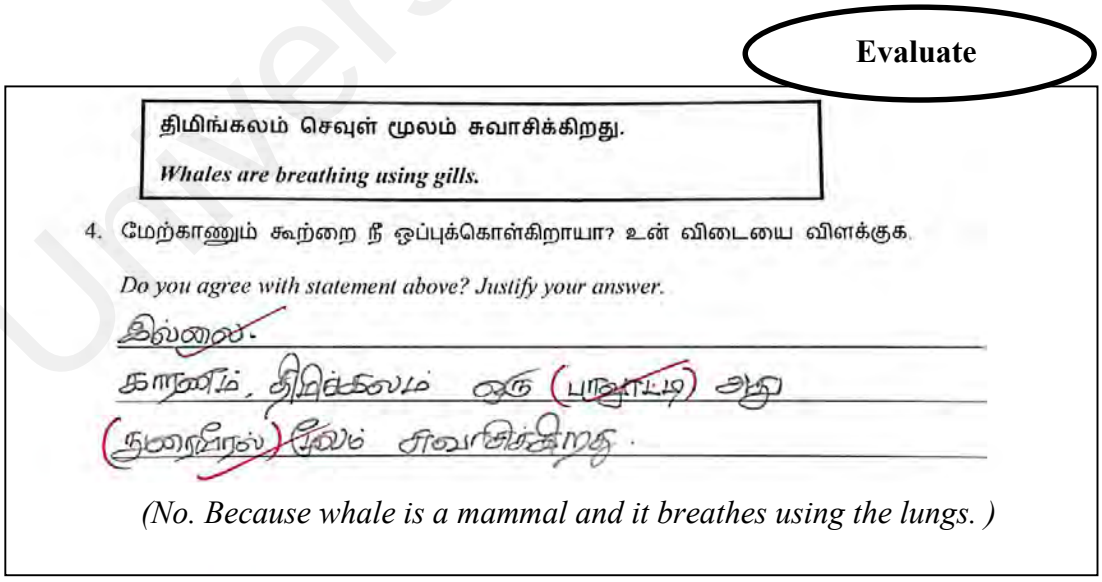


Figure 4.5 Namitha's Answer for Individual Quiz 4

For lesson 4, it can be seen that Namitha is able to answer the evaluative question correctly. She managed to justify her answer by stating that whale is a mammal and it breathes through lungs. Moreover, she was able to use the terms and concepts that they were discussed in their group earlier.

28	*Darshini*	*Can we add other examples for each breathing organs?*
29	*Divenes*	*Maybe we can add the special animals that have been mentioned in textbook such as whale, dolphin, and snake.*
30	*Namitha*	*Why it is special ah?*
31	*Barath*	*Ya la because whale and dolphin are mammals and they have lungs. They not same with other fishes in the sea. So, other group members also will have chance to get to know about these animals.*

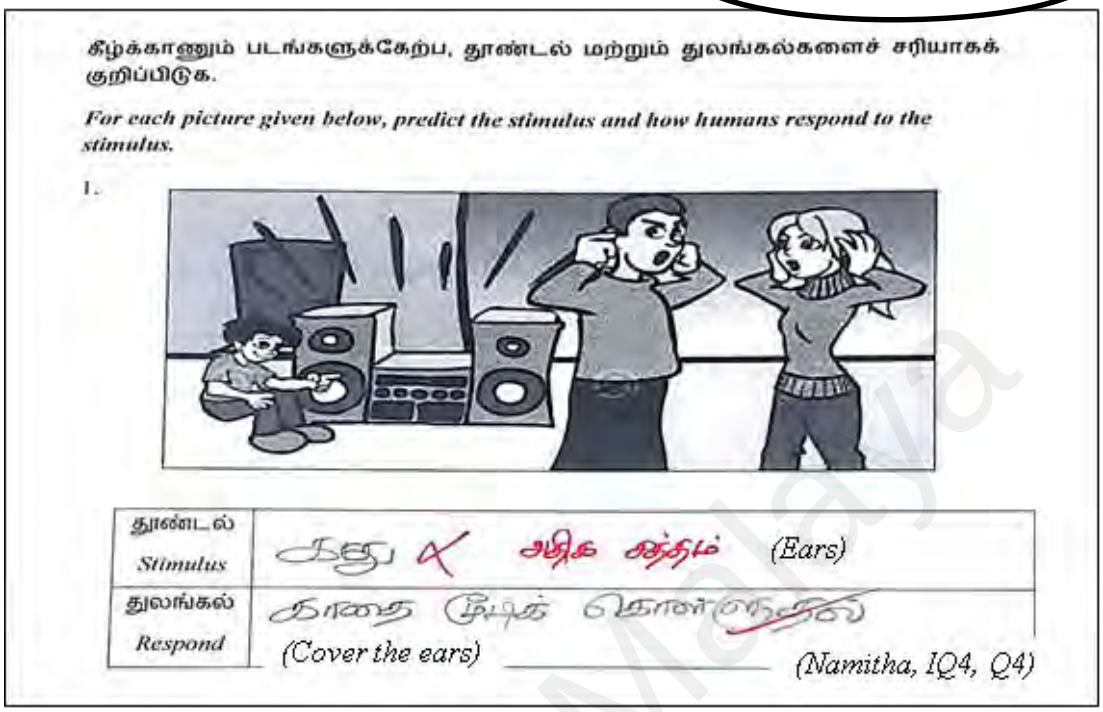
(GD, G3, L4)

Based on the above excerpt, we can see that during the group discussion about breathing organs Namitha's group member, Barath mentioned that whales and dolphins are mammals and they breathe using lungs. Thus, there is the possibility that Namitha's involvement in group discussion was able to enhance her understanding of the content matter and she able to answer more HOTS questions.

4.4.3 Low Performing Group

Initially, low performers also tend to score low in the first and second lessons. Later their scores were increased and during their lesson 5 their scores are as high as high performers. Figure 4.6 below shows the answers given by one of the low performer Darshini, in the individual quiz 2.

Application



கீழ்க்காணும் படங்களுக்கேற்ப, தூண்டல் மற்றும் துலங்கல்களைச் சரியாகக் குறிப்பிடுக.

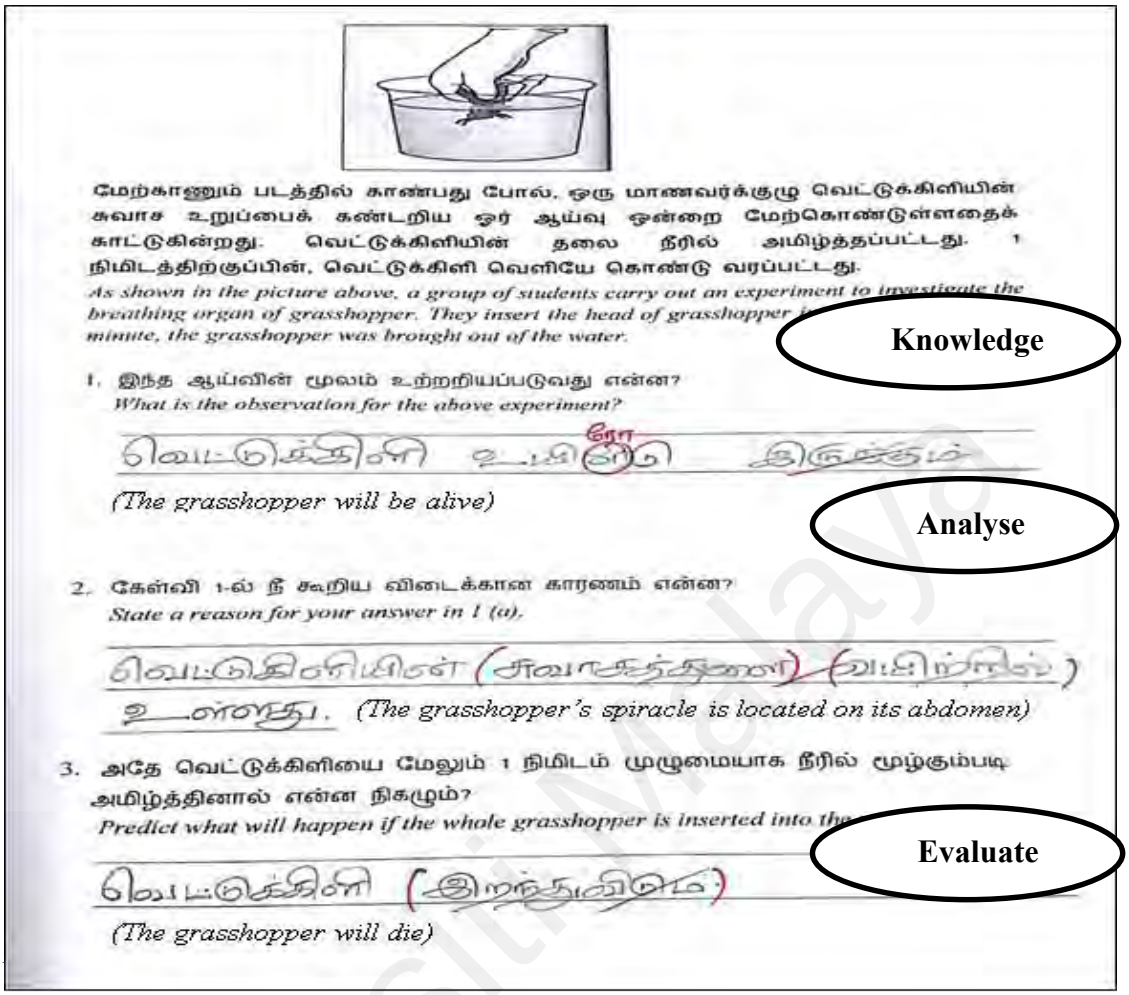
For each picture given below, predict the stimulus and how humans respond to the stimulus.

1.

தூண்டல் *Stimulus*	காது ✗ அதிக சத்தம் (Ears)
துலங்கல் *Respond*	காதை மூடிக் கொள்ளுதல் (Cover the ears) (Namitha, IQ4, Q4)

Figure 4.6 *Darshini's Answer for Individual Quiz 2*

Darshini has only managed to get score of 6 for the first and second quizzes but progressively improved her score to a score of 8. One of the questions in Quiz 2, required the pupils to respond for the situation given to them. Darshini had stated the stimulus was the ears and this was the wrong answer. The correct answer for the stimulus was to state loud sound. Ears are the sensory organs that help to identify the stimulus. She managed to write the correct response for the situation which was to cover their ears. Darshini was not able to correctly answer on application question in the beginning.



மேற்காணும் படத்தில் காண்பது போல், ஒரு மாணவர்க்குழு வெட்டுக்கிளியின் சுவாச உறுப்பைக் கண்டறிய ஓர் ஆய்வு ஒன்றை மேற்கொண்டுள்ளதைக் காட்டுகின்றது. வெட்டுக்கிளியின் தலை நீரில் அமிழ்த்தப்பட்டது. 1 நிமிடத்திற்குப்பின், வெட்டுக்கிளி வெளியே கொண்டு வரப்பட்டது.

As shown in the picture above, a group of students carry out an experiment to investigate the breathing organ of grasshopper. They insert the head of grasshopper [illegible] minute, the grasshopper was brought out of the water.

Knowledge

1. இந்த ஆய்வின் மூலம் உற்றறியப்படுவது என்ன?
What is the observation for the above experiment?

வெட்டுக்கிளி உயிரோடு இருக்கும்

(The grasshopper will be alive)

Analyse

2. கேள்வி 1-ல் நீ கூறிய விடைக்கான காரணம் என்ன?
State a reason for your answer in 1 (a).

வெட்டுகிளியின் (சுவாசத்துளை) (வயிற்றில்) உள்ளது. *(The grasshopper's spiracle is located on its abdomen)*

3. அதே வெட்டுக்கிளியை மேலும் 1 நிமிடம் முழுமையாக நீரில் மூழ்கும்படி அமிழ்த்தினால் என்ன நிகழும்?
Predict what will happen if the whole grasshopper is inserted into the

Evaluate

வெட்டுக்கிளி (இறந்துவிடும்)

(The grasshopper will die)

When Darshini attempted Quiz 4, one of the questions was about breathing organs of animals. Figure 4.6 shows the questions and the answers provided by Darshini. Not only was Darshini able to answer the question on the observation, she was also able to give a correct answer for the reason. She was able to state that the grasshopper's breathes through spiracle which is located in its abdomen. Besides that, Darshini also able to answer the third question which is a prediction question where she stated that the grasshopper will die if it is immersed into water

4.5 Year Four Science Pupils' Perception on STAD Cooperative Learning Approach

In order to answer the third research question of this current research, the researcher used semi structured interviews to elicit pupils' perception on STAD cooperative learning approach. The semi structured interview consisted of eight questions. Generally, pupils' perception regarding STAD can be classified into either positive or negative perception. The categories most emerge for the positive perceptions including 'being engaged', 'team work', 'content understanding' and 'peer support'. Besides that, pupils also uttered negative perceptions regarding the STAD. They include 'mismatch' and 'burden with peer involvement'. The following subsections explain the categories and excerpts for the positive perception and negative perception on STAD cooperative learning approach in detail.

4.5.1 Positive Perceptions

4.5.1.1 Being Engaged

Being engaged incorporates how the pupils engaged to the lesson throughout the STAD lesson. Almost all the participants felt that STAD group activities were attractive and they admit that they enjoyed the lesson. They said that "I like the group activities;" and "I enjoyed the lesson". They also commented that "The activities make my understanding easier". It shows that the activities that were designed for each lesson able the pupils to understand the content easier especially for the five topics that were taught using this STAD approach. The table 4.20 below shows the excerpts for the category being engaged.

Table 4.20

Excerpts for the Category Being Engaged

Themes	Categories	Examples
Positive Perception	**Being Engaged**	• *I able to answer some of the questions / give point for role play.(IN, L1,S2)* • *I can write the answers in the quiz. (IN, L2,S4)* • *I feel motivated. (IN, L2,S6)* • *The activities are attractive and I had fun. (IN, L4,S10)*

Moreover, some pupils found that STAD group activities boost their motivation and they were able to answer the individual quizzes confidently. STAD approach seems to be an engaging tool for passive learners. For instance, Jana the passive learner commented that he was happy to contribute his ideas to his group and he was used the discussed points to answer the quiz. Hence, the STAD cooperative tasks help pupils enjoy the lesson by engaging themselves and also promoting their motivation.

4.5.1.2 Team Work

The second subtheme for positive perception is team work. The table 4.21 below shows the excerpts for the category team work.

Table 4.21

Excerpts for the Category Team Work

Themes	Categories	Examples
Positive Perception	**Team work**	• *It improves teamwork. (IN, L3,S8)* • *I like my team mates and I would like to work with them again. (IN, L2,S5)*

The activities had also fostered their cooperation and teamwork among the group members. Consequently, the teamwork encourages all the four members to participate actively in process of learning science. They pointed out that:- “We no longer sit quietly like before;” and “We share our ideas during the group task;”. Some were eager to work with the same group members in the future task. This findings helps to satisfy the need of this research which is enable pupils to participate actively and promote team work during science lesson.

4.5.1.3 Content Understanding

The third subtheme for positive perceptions is content understanding. The table 4.18 below shows the excerpts for the category content understanding.

Table 4.22

Excerpts for the Category Content Understanding

Themes	Categories	Examples
Positive Perception	**Content Understanding**	• *The activities helped me to remember the concepts. (IN, L1,S2)* • *The activities make my understanding easier. (IN, L2,S5)*

Pupils generally felt that the STAD group activities had helped them better understand and remember the science concepts that they learned. This is also proven when pupils able to utilize the terms and concepts that they discussed during the group task in their individual quiz. Moreover, the individual quiz scores also show those pupils able to answer the questions well and with correct terms.

4.5.1.4 Peer Support

Next subtheme for positive perception is peer support. The table 4.23 below shows the excerpts for the category peer support.

Table 4.23

Excerpts for the Category Peer Support

Themes	Categories	Examples
Positive Perception	**Peer support**	• *My friend helped me to complete the task. (IN, L4,S9)* • *My friend guided me. (IN, L4,S9)* • *My friends praised me. (IN, L5,S11)*

The STAD group tasks that were designed had also fostered the peer support and coaching the team members. Moreover, the low performing pupils admitted that they feel appreciated in their group when they are praised by their group mates. They commented that "I feel appreciated and proud;" and "My friends praised me when I gave the correct answer". This shows that the presence of low performing pupils in a group is appreciated by other members and there is a contribution of all level of pupils in a group.

4.5.2 Negative Perceptions

4.5.2.1 Mismatch

There were few concerns being brought out by some of the pupils. Firstly, low and average performing pupils want to work with different group mates for every activity. Some feel they want to learn new things from different group mates for different group task. Whereas, some felt that way because there are high performing student tend to dominate the group task and others feel unproductive in their group. The table 4.24 below shows the excerpts for the category mismatch.

Table 4.24

Excerpts for the Category Mismatch

Themes	Categories	Examples
Negative Perception	**Mismatch**	• *Next activity I want work with different group mates. (IN, L1,S1)* • *Some pupils dominating the activity. (IN, L2,S1)* • *Change the group mates for each activity. (IN, L3,S7)*

Consequently, they felt they want to work with different members so that they would not feel neglected due to their dominating team members in their group.

4.5.2.2 Burden with Peer Involvement

Besides that, the second subtheme for negative perception is burden with peer involvement. The table 4.25 below shows the excerpts for the category burden with peer involvement.

Table 4.25

Excerpts for the Category Burden with Peer Involvement

Themes	Categories	Examples
Negative Perception	**Burden with peer involvement**	• *I feel tired teaching the weak group mates. (IN, L3,S7)* • *It takes longer time to complete the task. (IN, L1,S2)*

The high performing pupils admitted that they needed longer time to complete the group activities. They had this feeling because they needed a lot of time to explain the instructions and contents to the low performing pupils. For instance, one of student admitted that "I feel tired teaching the weaker pupils in my group". Furthermore, another student felt that he prefers to do the task alone rather than working in a group as he can finish the task earlier. They felt they need to spend more time on explaining the task to their low achievers.

4.6 Summary

The first section on this chapter presented a brief observation on the participants of all the three groups. The second part explained the findings on the verbal interactions of Year Four science pupils during the implementation of the STAD approach. The six verbal interactions themes and the emerging Categories were explained in detail in this chapter. The following part demonstrated the pupils' achievement after implementing the STAD cooperative approach and the final part is about pupils' perception on the STAD cooperative approach.

CHAPTER 5
DISCUSSION AND CONCLUSION

5.1 Introduction

In this final chapter, the researcher will discuss the key findings from data analysis on verbal interactions of Year Four science pupils during the implementation of the STAD cooperative approach, pupils' achievement after the implementation of cooperative learning approach and their perception towards STAD cooperative learning approach. The subsequent sections highlight the pedagogical implications, limitations of the study and recommendations for improvement.

5.2 Summary of the Study

This current study employed the qualitative approach to explore Year Four science pupils' verbal interactions during the implementation of STAD cooperative learning approach. The STAD Teaching and Learning Guide was prepared to implement cooperative learning approach among Year Four science pupils. The main aim of this study is to investigate Year Four pupils' verbal interactions during the implementation of STAD cooperative learning approach in science lesson. Seven types of Verbal interactions themes were identified in pupil's group interaction. Each theme and the categories were elaborated in the previous chapter. Moreover, this study also determined the learning outcome of the pupils after the implementation of STAD cooperative learning approach. Here, it was found that low achievers benefitted more through the implementation of the STAD approach. Their ability to answer HOTS questions was improved and they showed tremendous improvement in lesson four and five compared to the first lesson. Besides that, this research also described the pupils' perception on STAD cooperative learning approach. The

perception analysis explained that pupils posed both positive and negative perception on the STAD approach.

5.3 Discussion of Findings

This section reviews and discusses the research findings based on the three research questions of the study. The following section will focus on the key themes which emerged in the data in terms of implementation of STAD cooperative learning approach in Year Four science classroom. The first section of the discussion focuses on the pupils' verbal interactions during the implementation of cooperative learning during the science lesson. The second section discusses the second research question on the pupils; achievement after the implementation of STAD cooperative learning approach. The third section deals with the third research question on the pupils' perception on the STAD cooperative lesson.

5.3.1 Discussion of Verbal interactions

The role of the teachers is pivotal. Their approach to science teaching is the main contributing factor in determining the level of student interest in learning science during these formative years. Essentially, the notion of engaging students in science is a key issue facing the education community. Essentially, primary school science should be exciting for students and should encourage curiosity about the world. Therefore, to better understand the impact of effective teaching on student learning of science, it is important to explore strategies and approaches that assist in the development of student engagement with science. However, there is not a one-size-fits-all approach for capturing student interest in science. Therefore, this section will discuss the findings of the first research question.

The first research question was formulated to gain a better understanding of how the pupils verbally interact during the STAD cooperative group task. The findings in the study illuminated that the pupils were actively engaging among their members during the group task. The diversity of verbal interactions patterns among primary pupils leads to the hope that significant changes are occurring during the structured cooperative group task in science subjects Lim, Park, Ha, Lee, and Kim (2019). This shows that the STAD Teaching and Learning Guide facilitated meaningful engagement and promoted verbal interactions among the pupils. This finding is supported by Gillies (2004) who claimed that implementing cooperative learning by training the teachers, structuring the group task or providing a teaching module able to foster pupils' interaction in the group.

The formation of heterogeneous group during the group task also played a vital role in promoting verbal interaction among group members. The idea of the heterogeneous group is that each pupils from every group benefits from having the other pupils in the group. The richness of ideas and perspectives, as well as the shared learning help to benefit each pupil in the group. This clearly explains how the positive interdependence and individual accountability of STAD cooperative element is inserted in the implementation of STAD Teaching and Learning Guide.

Besides that, the findings revealed that the pupils able to provide elaborations on the content related matters during the interaction. This is parallel with Gillies & Boyle (2010) who compared the pupils' verbal behaviour in structured and unstructured cooperative groups and they found that pupils in structured cooperative group demonstrated more solicited and unsolicited explanation regarding the task. It is very essential for the pupils to interact on content related matter as it affects the learning that occur in the group. Furthermore, the tasks such as role play and think-

pair-share that were designed for this study require the pupils to interact with each other to complete the task. The cooperative group tasks ensure meaningful discussion takes place in all groups which is important to achieve the learning objective. It is also proven that, pupils taking up teacher's role during the group task and they are able to give elaborations on the science topic given to them. Their elaborations are essential for their peers to master the science topic and to understand the science concepts.

It was clear from the analysis of interactions that emerged that the pupils in the structured cooperative group engaged in more verbal interactions that are generally regarded as helpful and supportive of group endeavors than their peers in the traditional classroom. It appeared that these verbal interactions may have partially emerged from the developed STAD cooperative group tasks which were designed to promote verbal interaction among the group members.

Moreover, it has been clearly shown that besides elaborations, pupils pose short responses and directions to promote each other's understanding during the group task. The group interactions analysis shows that passive pupils who were afraid to talk among group members use short responses to start the conversation. Initially, the pupils tend to pose more short responses but they expand their interactions by using more elaborations during the third and fourth observations. This finding is parallel to Lopata et al. (2003) where the pupils who had been trained to cooperate demonstrated more explaining elaborating responses during the second and third observations.

Meanwhile, it was found that the high achievers posed themselves as 'experts' and tend to dominate the group interaction. The experts were actively providing guidance for the 'novices' in the group. This situation was referred as

asymmetrical group by Webb (2009). He also stated that symmetrical group is where the members asking and providing help while collaborating among each other with no pupils positioned as experts or novices. In this study, some pupils prefers symmetrical interaction pattern where they able to joint hand and cooperate together to complete the task given.

In addition, the emerging theme showed that the high achievers initiated their group task with motivating and also ordering their peers. This element is indirectly shows that pupils taking up the role of teachers where they able to lead their group in completing the task given to them. Moreover, the motivation helps other member especially low and average achievers to gain more confidence in contributing to the group task. Therefore, it is necessary to have a member with a central role who creates the role of teacher in which members feel supported to them and their discussion leads to cooperative interactions.

5.3.2 Discussion on Pupils' Performance

The second research question was designed to investigate the Year Four pupils' performance in science lesson after implementing the STAD cooperative learning approach. The pupils were answered open ended questions individually and without the peers' guidance. As mentioned in the previous chapter, the individual quizzes for the five science topics were designed according to the levels of Bloom's Taxonomy. Moreover, this individual quiz is essential to make connections between the information discussed during the group interaction and the information needed to answer the quizzes.

Conceptual understanding is important for pupils to excel in science based subjects. Hence, the choice of teaching method used to build the pupils' knowledge is important to ensure meaningful learning happens in classroom. Previous findings

show that STAD cooperative learning approach is one of the most effective teaching strategies for elementary classroom (Efe & Efe, 2011; Johnson & Johnson, 2008; Lopata et al., 2003). However, these studies focused on the effectiveness of STAD and failed to describe qualitatively how this STAD cooperative approach helps pupils to answer science HOTS questions.

The analysis was done according to the three groups of pupils such as high performing group, average performing group and low performing group. The analysis shows that low performing pupils able to score as high as high achievers after the fourth and fifth individual quizzes. This finding is parallel to Ghaith (2004) where he claims that cooperative learning enhances low achievers compared to high achievers. Moreover, the same phenomenon has been found in a study done by Balfakih (2003) where low ability pupils tremendous improvements in answering the questions after the implementation of STAD approach. This is parallel to the finding done by Hermann (2013) who mentioned when children were required to discuss the reasons for their conclusions in small groups, they used higher quality discourse and obtained higher scores on their post-discussion learning activity than their peers who did not engage in argumentative discourse.

This also proved that STAD approach successfully helped pupils to master the subject matter and to answer the HOTS questions (Van Wyk, 2012). Moreover, these findings also supported the previous studies which claims that STAD approach able to promote pupils' interaction skills and shows positive effects on pupils' academic achievement in science based subjects. A research done by Alghamdi (2014) on effectiveness of STAD approach on chemistry subject indicated that STAD approach was more effective than the traditional teaching method in

chemistry subject. Hence, meaningful interaction in cooperative groups able to promote pupils' achievement in science based subjects.

5.3.3 Discussion on Pupils' Perception

The third research question was constructed to elicit the Year Four science pupils' perception on the implementation of cooperative learning approach. The researcher used eight semi structured questions to interview the pupils after the STAD lessons. Pupils' perception was classified into three categories such as positive perception, negative perception and suggestions for future STAD lessons. The analysis generally provides evidence that learners were positive about the STAD implementation in their science lessons. One of the possible reasons for this acceptance is the heterogeneous group condition that has been used during the lessons. This is because, Ghaith (2004) found that pupils generally favours groups with mixed-ability and mixed gender of pupils. This increases their confidence to perform rather than performing with the same gender or ability of pupils.

Besides that, it was found that the perception of low achievers and perception of high achievers on STAD cooperative approach if different. The perception of low achievers was generally more positive. They feel the team work was improved and they like to work with their team members in future. Moreover, they feel more engaged to the group discussion and they claim that they feel motivated and they able to answer the individual quiz questions confidently. Low achievers declared that their peers helped them to complete the task and some felt that they were appreciated as they were praised by their peers. The same phenomenon has been found by Clapper (2015) and Efe & Efe (2011) where the low achievers' self-esteem was improved and their performance level was increased.

However, the high achievers perception on STAD cooperative approach is in contrast with the low achievers. Some of the high achievers believed that the activities are fun and attractive. At the same time, some of them claimed that they are burdened with the peer involvement. They felt tired teaching the weak group mates and they felt that it takes longer time to complete the task as they need to guide the low achievers in their group. This finding is parallel with Ghaith (2004) where low achievers were comfortable working in a small group whereas high achievers felt that they had contributed more in the group task.

Besides that, some low achievers felt that the high achievers in their group are dominating the group. The verbal interactions analysis shows that the high achievers tend to dominate the lessons by controlling the other peers. This decreases the self-esteem and motivation of other pupils. This causes the low achievers to mention that they would like to work with different group mates for next activity.

Meanwhile, the preparation and implementation of the STAD Teaching and Learning Guide also influenced the pupils' perception and their performance in the group task. This is because, the study done by Alghamdi (2014) proves that the pupils in the groups that does not use any teaching aids were not interacting well or contributing to the activity.

In addition Herrmann (2013) claimed that the structured cooperative learning with the implementation of teaching aid will support the positive interdependence and individual accountability of pupils. This shows that the STAD Teaching and Learning Guide enhances the verbal interactions among pupils in the cooperative groups.

Other than positive and negative perception there are also some suggestions stated by the pupils during the interview. Pupils want more group activities to be

done for other topics too as the STAD intervention was just done for five selected topics for this study. Besides that, pupils were interested to carry out more variety of group activities other than role play and think-pair-share. These perceptions give an alarm for science teachers to implement more variety of group tasks during the lesson as pupils seem to be more interested and enjoying the lesson.

5.4 Pedagogical Implications

The findings of this present study, when taken collectively, provide robust implications for the pupils, educators and stakeholders. Several pedagogical implications can be raised from the findings.

First, the findings obtained illustrate that elementary pupils do need a structured cooperative group task to make them verbally active in the classroom. The well planned activities such as role play make the passive learners to speak up and share their ideas during the discussion. Hence, this shows that the teachers should be wise enough to plan the group task to promote verbal interactions during the lesson. Teachers should take the responsibility to make pupils to enjoy the lesson by selecting the suitable teaching strategy and teaching aids.

The well planned lesson should be able to create more chances for the pupils to talk and interact among their peers. This can be seen in this study where the pupils able to generate their ideas regarding the task given by engaging themselves in the group interaction. This situation will make the pupils more appreciated and responsible towards their own group to achieve the common goal together.

Besides that, the findings are also essential for the stakeholders and the policy makers. Even though the STAD cooperative approach has been widely researched, this current study had implemented STAD cooperative approach by preparing a

special STAD Teaching and Learning Guide. As explained in the previous chapters the teaching guide consists of detailed lesson plans, group tasks and the teaching material needed for each lesson. Hence, these materials make the teacher confident in implementing the approach and carry out the lesson efficiently. This shows that, the stakeholders and the policy makers should provide teaching guides and materials for teachers as a guide to implement 21st century learning skills in the classroom.

Moreover, this findings clarified that pupils should be given chance to share to their learning experience after the lessons. Pupils' reflection on the lesson will help teachers to know the strength and weakness of the activities that they implemented during the lesson. The pupils' perception in this study has given a clear view on the improvements that have to be done for future research. Besides that, by knowing the pupils' reflection teachers can plan the next grouping and analyse pupils' view on the activities done during the lesson.

5.5 Suggestions for Further Research

Based on the findings, several suggestions can be proposed for further research. Even though the data was only collected from only one class, we believe that this study can contribute by adding knowledge to the existing literature on STAD teaching approach in Malaysian Tamil school classrooms. Furthermore, it is also important to note that the teacher-student interaction patterns might influence the student-student interaction patterns during the STAD cooperative approach. This analysis will explain what the role of the teachers during the first stage of STAD approach and how teacher's interaction directs the quality of pupils' interaction in the group. Moreover, these findings could be used as a guide for other teachers to be aware of their interaction patterns.

Besides that, the data for this present study was gathered from only Tamil school Year Four science pupils. For further research, bigger samples can be used from all three types of schools in Malaysia to compare the quality of verbal interactions during the STAD approach. This could help to increase the generalizability of the findings.

Furthermore, the pupils' review on STAD approach during the interview should be considered as recommendations for future STAD cooperative lessons. For instance, some of the pupils suggested the switching of the group members for every group activities and they feel some pupils are dominating the group task. Hence, future researches should consider these reviews to form the heterogeneous groups which can be changed for every group task.

5.6 Conclusions

This study focused on the Year Four science pupils' verbal interactions during the implementation of STAD Teaching and Learning Guide in Tamil school classroom. It can be concluded that pupils able to interact verbally during the STAD lessons and their verbal interactions were classified into 6 themes such as elaborations, questions, short responses, engages, directs, interruptions and the emerging theme initiation talk. Moreover, average performers and low performers able to answer HOTS questions which were given as individual quizzes after each group task. Besides that, pupils' perception on STAD cooperative approach proved that pupils prefer STAD cooperative approach to be carried in their daily lesson with few improvements.

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