



**The Potential of Flipped Classroom Pedagogical Practice on
Classroom Interactions in Singapore Primary Classrooms**

A thesis submitted in fulfilment of the requirements for the degree of Master of Education

Hajera Bibi Abdul Kader

Master of Education
Nanyang Technological University
National Institute of Education, Singapore

School of Education
College of Design and Social Context
RMIT University

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Abstract

As we move further into the 21st Century, the call for education systems to equip students with skills such as communication and collaboration grow louder. Responding to such calls requires education settings to examine and potentially adapt their current pedagogical practices. Classrooms, such as in many Singapore schools, where there are large class sizes and strong teacher-centred practices, find it challenging to address the development of communication and collaboration skills. The opportunity for interactions between teachers and their students and among students, which are believed to foster these skills, can be limited. This small scale research project explored how the recent adoption of a flipped classroom pedagogical practice in one Singapore primary school can potentially contribute to increasing levels of classroom interactions. Through interviews, classroom observations and document analysis, it was evident that the teachers were able to design lessons within the framework of the flipped classroom pedagogical practice that can enhance classroom interactions and foster communication and collaboration skills. Teachers' engrained practices of didactic teaching have impeded the benefits of this practice to some extent. With time and professional development support from school, teachers and students can overcome the challenges in adopting the flipped classroom pedagogical practice.

Chapter 1: Introduction

I have been a teacher in Singapore primary schools for most of my professional career. Over the last twenty years, I have taught language, art and social studies for primary school students. Each primary class comprises between thirty and forty students, which is typical of primary classrooms in Singapore. When faced with teaching such large classes, I usually succumb to teaching via teacher-centred practices. With these practices, I was able to keep the class silent with minimal noise. It was important to keep the class silent so as not to disrupt the classes beside mine. Such practices also gave me an assurance that I was able to keep the class within my locus of control with students paying attention during my lessons. However, I had always hoped for my students to participate more in my lessons by interacting than just being passive learners. With professional development programs in place for teachers in schools, I attended several workshops and courses that enhanced my teaching competencies. I had been a leader in my school in the integration of innovative pedagogical practices such as information, communication and technological tools (ICT) in teaching. My motivation for innovation in teaching was primarily to help me establish rapport with my students. Establishing rapport with my students was important so that I can better understand their learning needs and customise my teaching according to their needs. However, in large classes such as in Singapore primary classes where didactic teaching practices are the norm, creating opportunities for students to interact with me and with each other during my lessons was a constant challenge.

There are many pedagogical practices that can improve the quantity and nature of interactions between teachers and students and between students in the classroom. One example is a flipped classroom pedagogical practice. In 2012, I participated in a professional development program that focused on flipped classroom pedagogical practice together with my colleagues. In acquiring knowledge about this practice, I developed a passion for a more communicative style of teaching focussed on student engagement and classroom interactions. During the training of the flipped classroom pedagogical practice, I learned how to plan my lessons with appropriate task design for the students to allow for more interactions in the classroom. In addition, the use of

relevant ICT tools in teaching had also allowed for innovative and interesting lesson design ideas. Upon completion of the flipped classroom professional learning, I implemented lessons with the flipped classroom pedagogical practice over a period of two years. I shared my lessons with fellow colleagues during best practices sharing sessions. This experience inspired me to explore the flipped classroom pedagogical practice more deeply and to see how other teachers experienced flipped classrooms.

Conducting lessons with opportunities for students to interact provided me with avenues to foster communication and collaboration skills in the classroom. Research on the importance of skills such as communication, collaboration, creativity and critical thinking have been emerging in recent years. In 2002, the Partnership for 21st Century skills was founded by a group of organisations comprising educational leaders and policymakers from the United States. The main goal of this Partnership was to foster the importance of what they refer to as “21st Century skills” for all students and to develop these skills in education (Partnership for 21st Century Skills, 2013). According to the Partnership for 21st Century Skills (2013), the skills of communication, collaboration, critical thinking and creativity (4Cs) are considered essential for achievement in today’s society and are best taught within the context of core subject areas. Since this study focusses on classroom interactions, the skills of communication and collaboration that can be potentially developed via these interactions will be explored.

With my training in the flipped classroom pedagogical practice and my determination to heighten interactions in a large class, it was pertinent for me to explore how the practice may contribute to classroom interactions. This small scale qualitative study explored the recent adoption of a flipped classroom pedagogical practice in one Singapore primary school via interviews and classroom lesson observations of three teacher participants over a period of three weeks. The primary focus of this study was the extent to which the flipped classroom pedagogical practice had the potential to contribute to classroom interactions in the Singaporean primary school settings and enhance the development of communication and collaboration skills. For this, I explore the definitions of classroom

interactions, communication and collaboration skills and the flipped classroom pedagogical practice with an overview of the Singaporean education system and reference to Ministry of Education, Singapore (MOE) policies that govern the system.

1.1 Defining Classroom Interactions

There are several definitions of classroom interactions. Primarily these interactions refer to talk in class between the students and the teacher as well as among the students. Conversations take place in the classroom in different contexts. Participants speak upon understanding each other's intentions and frame their responses accordingly (Johnson, 1995). Classroom interactions can be understood as the events of communicative talk constructed between the teacher and the students or among students in context to promote learning (Ellis et al., 2006). Based on this, the role of interaction is to engage the students in conversation as well as to promote learning of concepts. Hence, any conversation between two or more individuals that aid learning is a classroom interaction.

Two aspects of classroom interaction are relevant for this study – firstly, the content of the classroom interaction and secondly, the participants who are the teachers and the students (Ellis et al., 2006). Classroom interaction can be classified as being either topic orientated or activity oriented, depending on the focus of the class or lesson objective (Van Lier, 1988). Classroom interaction can also be classified as one that is language-focused or content-focused (Seedhouse, 2004). Classroom interactions primarily include verbalisation of knowledge, communicating with others to facilitate problem solving and task completion (Edstrom, 2015). When teachers assign collaborative tasks, learners build on each other's contributions and, through collective scaffolding, are often able to create a product that is beyond their individual abilities (Storch, 2002). Classroom interactions provide support for peers and the interaction patterns employed in pair work can leverage each other's competencies (Seo and Kim, 2011, Storch and Aldosari, 2013). These studies collectively show the importance of classroom interactions.

Classroom interactions are indeed important as with interactions, the educator can better understand students' learning process (Tsui, 2004). Classroom interactions stimulate students to participate in the classroom via collaborative learning (Guthrie & Carlin, 2004), and to develop a sustained behavioural involvement in learning activities, improving engagement (Kay & LeSage, 2009). Small group activities offer students opportunities to practice their language skills than in the teacher-led classroom environment (Storch & Aldosari, 2013). Interactions between teacher and students have the potential to shape the learning environment. Classroom interactions are primarily referred to as teachers and students communicating with each other to facilitate learning of lesson content, problem solving and task completion (Tsui, 2004). Verbal communication between the teachers and the students shapes the learning environment by influencing the type of talk that students engage in during learning in the classroom (Gee, 2000). The classroom talk or discourse or interaction, often guides students in making meaning of learning concepts (Duit & Treagust, 2003). When teachers facilitate effective discourse during their teaching or in instruction, they support the development of student understanding and provide a platform for the acquisition of conceptual learning (Mortimer & Scott, 2003).

Classroom interactions are understood in this study as communicative talk between teachers and students as well as among students. The content of the interactions is either language, content or activity driven aimed promote content or language learning.

1.2 Defining Communication and Collaboration skills

Research emerges on global issues affecting education and policies surrounding education respond and reflect upon these research. As mentioned earlier, the Partnership for 21st Century Skills (2013) was developed in response to educational research. The Partnership defined the skill of communication as the ability to articulate thoughts and ideas effectively in a variety of ways as well as the ability to listen effectively in order to make sense of the inherent knowledge, values, attitudes, and intentions of a given material. The Partnership defined collaboration as the ability to work effectively

and respectfully with diverse teams as well as the ability to exercise flexibility and the willingness to make necessary compromises in achieving a common goal form part of the collaborative skill. Assuming a sense of shared responsibility for collaborative work while valuing individual contributions is an attribute of the skill of collaboration (Partnership for 21st Century Skills, 2013).

Research centred on skills such as communication and collaboration in the 21st Century have impacted significantly on educational systems and policies in Singapore and elsewhere. In a study by Dede (2010), the 21st Century poses challenges and this spurs the crucial need for students to acquire competencies for work, citizenship and self-actualization. Preparing students to learn how to be critical thinkers, active and informed global citizens, effective collaborators, communicators and innovators will prepare students to be global citizens. In response, society's educational systems and policies define their objectives, curricula pedagogies and assessments to help students attain these competencies or educational outcomes (Wagner, 2008).

In response to research on the 21st Century skills, educational policies, such as the Ministry of Education, Singapore (MOE) policy developed a framework for the development of the 21st Century skills. Policies govern almost all aspects of education (Levin, 2008). Due to the globalised nature of education and policy development, research on the 21st Century skills such as communication and collaboration have been clearly embedded in the MOE policy as it is in many other countries. From a global perspective, Anderson-Levitt (2008) have claimed that issues relating to worldwide movements have the potential to shape the national and curriculum policy and that it will be readily agreed that no contemporary macro analysis of education policy is possible without considering both the processes and impacts of globalisation. Hence, the shift in educational policy in Singapore to incorporate 21st Century skills to prepare students for the globalized economy can be attributed to this.

The MOE, Singapore developed a 21st Century competency (21CC) framework to guide the development of its national curricula in response to the emerging research centred on the importance of these skills. The framework identified communication, collaboration and information skills as key 21st Century skills (MOE, 2017). The framework articulates the competencies that would enable students to grow into confident and concerned citizens with the necessary attributes and skills to learn continuously, work effectively in teams, exercise initiative, take risks and strive for excellence. The 21st Century skills and competencies set out in the MOE reads as “Globalisation, changing demographics and technological advancements are some of the key driving forces of the future. Our students will have to be prepared to face these challenges and seize the opportunities brought about by these forces.” (MOE, 2017, para 1). The challenges of 21st Century landscape steers educators to assume the critical role of equipping the next generation of students with the relevant skills and competencies which are needed to navigate and to find their bearings in this new digital era (Teo, 2015).

Recent emerging research on skills such as communication and collaboration has pushed education systems to specifically work towards equipping students with these skills. According to Kahn and Kyle (2002), the ability to communicate ideas is an important way for students to demonstrate understanding of concepts. Brookfield (2011) placed emphasis on the importance of nurturing good relationships through communication and described methods for teachers to have students become actively engaged in lessons while practicing communication skills. According to Fisher (2009), collaborative learning activities give students opportunities to grapple with ideas together through discussions and assignments, rather than working in isolation on similar tasks. Collaborative learning is a process whereby students work together, for example in small groups, relying on their social skills in order to achieve academic goals (Bhatia & Makela, 2010). Collaborative learning in small groups can motivate and academically engage students within appropriate social settings (Hamm & Adams, 2002). Increased interaction with the content material and with other students has been shown to bring about positive benefits (Johnson & Johnson, 1996; Nastasi & Clements, 1991). Helping students to collaborate

with others and to communicate their ideas effectively may help them meet the challenges of the 21st Century (Trilling & Fadel, 2009). School education in recent years plays a crucial role in enabling students with the skills of communication and collaboration in order to meet the requirements of a vigorously changing society (Chan, 2010). The skills of communication and collaboration are essential elements of interaction within a classroom (Bellanca, 2010).

With research findings centred on the importance of communication and collaboration skills, the policies surrounding education systems respond by reflecting on these skills. Teachers can provide opportunities for students to interact, communicate and collaborate so as to incorporate these imperative 21st Century skills in the teaching and learning process.

1.3 Defining Flipped Classroom Pedagogical Practice

It is imperative to define flipped classroom so that the discussion can proceed on common ground. The simplest definition for flipped classroom is that what had been done during class time, is shifted to home activities and what had been done at home is transferred to class. Researchers have come to term this flipping of what is done inside and outside the classroom the “classroom flip” (Baker, 2000) or the “inverted classroom” (Lage & Platt, 2000; Lage, Platt, & Treglia, 2000).

Drawing on student-centred pedagogical practices with teachers as facilitators of learning, flipped classroom can be conceived as comprising of four pillars – a flexible environment, flexible learning culture, intentional content and professional educator (Hamdan, et al., 2013). The flexible environment refers to teachers providing a variety of learning modes such as videos, podcasts, group work and work sheets to create a flexible learning culture. The shift from a teacher-centred learning environment to one that is student-centred defines a flexible learning culture. The third pillar of intentional content emphasizes the importance in the design of both the information in the digital tools as well as in written forms and the organisation of the classroom activities. It is also a reminder for teachers to do a continual

evaluation of delivery methods to match the content, knowing what to 'flip' and what to deliver directly. The last pillar, professional educator, emphasizes the importance of having the support of the teacher in class to guide students in group activities. This emphasizes the role of the teacher in the flipped classroom as facilitators of learning (Hamdan, et al., 2013). These pillars are meant to guide and clarify what it means to work as an educator implementing the flipped classroom pedagogical practice.

According to Bergmann and Sams, (2014) the flipped classroom pedagogical practice can increase the interaction and personalise contact time between students and teachers as it employs strategies that frees class time from direct instruction, allowing for an expanded range of class based learning activities. The flipped classroom is an instructional model where teachers assign a pre-class task to students. A pre-class task is a set of tasks assigned to students prior to lesson. These tasks are given in the form of printed or online materials. Students access the pre-class task, and then teachers maximize the face-to-face classroom time to guide students in actively solving problems, lead discussions, and enrich students' learning experiences (Hao & Lee, 2016). The flipped classroom is viewed as a pedagogical method that employs asynchronous video lectures and practice problems as pre-class tasks and active group-based problem solving activities in the classroom (Bishop & Verleger, 2013). Using class time for active learning versus direct instruction provides opportunities for greater teacher to student mentoring and peer to peer collaboration (Roehl, Reddy, & Shannon, 2013).

Based on professional development on flipped classroom pedagogies that I received as a teacher, flipped classroom can be adopted with or without the use of technology. On some occasions the pre-class task is designed with the use of ICT tools while on other occasions, it takes the form of printed materials. Hence, students either watch educational videos, engage with online or printed materials at home and utilize the time in class to work through problems, advance concepts, and engage in collaborative learning with the help of classmates and under the supervision of teachers (Chen, Wang, Kinshuk, & Chen, 2014; Lage, Platt, & Treglia, 2000). The concept of the flipped classroom can be carried out with or without the use of technology. However, the developing ease and availability of technology is making it

possible for teachers to use technology with the flipped classroom pedagogical practice more often for learning (Beetham & Sharpe, 2007, Greenhow, et al., 2009, Gough, et al., 2016).

The literature on flipped classrooms, explored in greater depth in Chapter 2, suggests that a range of positive outcomes can be achieved when applying flipped classroom pedagogical practice. The flipped classroom allows students to have the flexibility to engage with the lesson content even before entering the classroom. This can foster individual inquiry, collaborative effort, social interaction, reflection and independent learning skills (Abeysekara & Dawson, 2015). When students collaborate in groups and discuss the lesson content previewed before class, there were more opportunities for classroom interactions and communication (Gunawardena, 1995). According to Tucker (2012), instructors adopting the flipped classroom model assign the class lecture or instructional content as a pre-class task while students work through the concepts with a range of activities in class. According to Bishop and Verleger, (2013) flipped classroom means so much more than just rearranging a lesson, it is a change of mindset. It not only changes the learning environments; it changes how the students intend to think about their own learning. Flipped classroom takes the teacher-centred approach to learning, and calls for a more student-centred approach, expecting the students to take a more active role in their own learning (Krumsvik & Jones, 2016).

The focus of this study lies on the potential of the flipped classroom pedagogical practice in promoting classroom interactions between the teacher and the students as well as among students. However, most of the research on flipped classroom pedagogical practice focuses on higher education. There is little research on flipped classroom pedagogical practice on primary education, especially in the Singapore context, and on the potential of flipped classroom pedagogies in promoting classroom interactions.

1.4 Project Question and Aims

Given the positive outcomes identified in the research surrounding flipped classroom pedagogical practice and the lack of research in primary school settings, this research aims to

explore the implementation of the flipped classroom pedagogical practice in Singapore primary classes and the extent to which the practice can potentially contribute to classroom interactions.

To further the research aims, the following research questions were devised:

1. From a teacher's perspective, can the flipped classroom pedagogical practice contribute to classroom interactions and if so how?
2. What features and characteristics of the flipped classroom pedagogical practice can enhance the development of skills of communication and collaboration?

1.5 Significance of Study

The findings from this study aim to give a rich understanding of the flipped classroom pedagogical practice in primary school settings in Singapore. The findings will provide insights to the potential of this pedagogical practice in promoting classroom interactions in large classes as in the Singapore context. As mentioned earlier, the present literature surrounding flipped classroom focusses on higher education and there is limited research of this pedagogical practice in Singapore as well as in primary school settings. This study enriches our understanding of this pedagogical practice and sheds light on how primary classes in Singapore might adopt flipped classroom to enhance interactions as well as the skills of communication and collaboration which are emphasised for 21st Century education as outlined in the MOE policy. The findings may provide useful inputs for professional development training and sharing of good classroom practices for teachers as well as policy makers.

1.6 Summary

The research problem stemmed from the challenge of fostering interactions in a large class as in the Singapore primary school context. Interactions are important for teachers to understand the students' learning process and through these interactions, the skills of communication and collaboration can be developed. Two main research questions focus on

the potential of flipped classroom pedagogical practice on classroom interactions and the features of this practice in the development of these skills. In the following section I present an overview of each chapter.

Chapter 1 outlined the research background, provided definitions of key terms such as the skills of communication and collaboration, classroom interactions and the flipped classroom pedagogical practice. The aim of this study and the research questions were also outlined.

Chapter 2 explores the literature in the field of flipped classroom pedagogical practice and classroom interactions on learning outcomes. This exploration informed the research in defining the research aim and questions. The study aims to offer a further contribution by investigating an under-researched area of primary settings, particularly in Singapore. The readings also helped towards the design of this study, method of analysis as well as comparison with the findings and emerging themes in the later chapters. This chapter also provides the background of the Singaporean education system as well as the educational policies that govern the system.

Chapter 3 describes the methodology, including the theoretical framework for the research and how it was carried out. The method is explained to justify this qualitative study, data collection and data analysis procedures. A description of the procedure is therefore provided, including the relationships between the researcher and the researched and ethical considerations.

Chapter 4 provides a background of the school and participants. Each teacher's interview, classroom lesson observation and lesson planning notes are profiled, showing links to classroom interactions and the development of skills of communication and collaboration. The teacher's individual voices are explored while they are placed in the context of the framework of the flipped classroom pedagogical practice. A synthesis of the findings is also included in this chapter with four emerging themes.

Chapter 5 explores the four emerging themes – communication and collaboration, deep versus surface learning, role of the teacher as well as challenges and strategies. These were explored in relation to the relevant literature within the framework of the flipped classroom pedagogical practice.

Chapter 6 discusses the findings under two broad headings – the successes and the challenges of flipped classroom pedagogical practice with relevance to related literature.

Chapter 7 concludes the study with a brief discussion of the findings in relation to the research questions and of the implications for future research.

Chapter 2: Literature Review

2.1 Introduction

The purpose of this review is to explore the present literature surrounding the flipped classroom pedagogical practice and classroom interactions. This chapter first provides a background to the setting for this research. Since this study is based on the Singapore primary education context, an overview of the Singaporean education system and the Ministry of Education (MOE) policies are presented. These include key policies that currently impact on classroom teaching. These policies include those related to Singapore's drive for developing in its citizens the 21st Century skills of communication and collaboration. The next part of the chapter discusses the literature related to the importance of interactions in the classroom, which is central to my own use of flipped pedagogy and the focus of this research. I then explore the literature about collaboration and communication. Finally, I discuss research about the use of flipped classroom pedagogies.

Education policy in the Singaporean context has a significant influence on classroom practices. For this research, a key document informing the argument presented are the Ministry of Education, Singapore (MOE) policy statements available on their website. It includes the overarching policy that governs the education system in Singapore. The policy documents that govern the educational system in Singapore and how the policy sets the context for this research is the aim for this section. An overview of the discourses in these policies, the format and the structure as well as its formation are presented in the light of the focus of this study.

The policy sets the vision for the education system in Singapore. The vision is then cascaded to the Desired Outcomes of Education (DOE). The DOE is then translated into a set of developmental outcomes for each key stage of the education system. Since this research focusses on primary classrooms, those related to the primary educational levels are presented here.

The MOE had derived a framework for what it refers to in the policy as 21st Century competencies. The framework has three stages of competencies which will help the students embody the DOE. To realise its vision, the MOE has guiding principles in nurturing students

with flexibility and diversity in providing a broad based holistic education. What follows is a summary of these principles as well as the programmes provided for supporting teachers. A brief description of the Singaporean education system is provided in the next section.

2.2 The Singaporean Education System

The education system in Singapore is centralized and is organized by the MOE. The vision of the MOE is to help students discover their own talents and to realise their full potential and to develop a passion for learning that lasts through life (MOE, 2017). To realise this aim, the policy sets out the task for schools ‘to give our young the chance to develop their skills, character and values that will enable them to continue to do well and take Singapore forward in the future’. The education system is intended to be flexible and diverse with the aim to provide students with greater choice to meet their different interests and ways of learning (MOE, 2017). This aim is cascaded to the Desired Outcomes of Education (DOE). The DOE are attributes that educators aspire for every child to have by the end of his formal education in Singapore. These are ‘a confident person’, ‘a self-directed learner’, ‘an active contributor’ and ‘a concerned citizen’.

The MOE, Singapore has a vision for a 21st Century curriculum and that is ‘Thinking schools, Learning Nation’ (TSLN). The momentum generated from the TSLN vision led to the development of a framework for *21st Century competencies and student outcomes* (MOE, 1997). This framework articulates the core competencies and values that will enable the youth of Singapore to thrive in the 21st Century (MOE, 2017). Several major school initiatives were introduced under this new imperative. It mandates the use of information technologies, critical thinking and national education in the school curriculum (MOE, 2017). The rationale for this curriculum is spurred by a competitive nationalism that sees education as a social investment in preparing students to participate in a global economy (Koh, 2002).

The vision set out by the MOE forms the basis for curriculum package design adopted by all government primary schools in Singapore. The curriculum package incorporates several aspects of the TSLN vision and its accompanying attributes which educators are expected to

instil in students. Creative and critical thinking skills have been implemented in Singapore to encourage the incubation of a thinking work-force intended to sustain the competitive edge of the economy (Koh, 2002). In Singapore, the *Masterplan for ICT in Education* (MOE, 1997) was launched with the main goal to ensure that schools integrated ICT in their curriculum so as to develop a culture of thinking, lifelong learning, and social responsibility (MOE, 1997)

As mentioned in Chapter 1, the MOE, Singapore developed a *21st Century competency (21CC) framework* to guide the development of communication, collaboration and information, skills, enabling 21st Century skills (MOE, 2017). The MOE also developed a national curriculum centred on a detailed syllabus that is meant to help guide teachers in both planning and implementing successful pedagogical programs. Teachers are however, given the freedom to be innovative in their presentation of the material within their own classrooms but are also responsible for ensuring that the curriculum prepares students for high-stakes national examinations at the end of primary school. (MOE, 2017). Teachers were given greater flexibility and autonomy to develop students' potential interests, and life-long learning skills. The goal was to create a responsive education system with multiple pathways for different students (Mourshed et al., 2010; Gopinathan, 2007).

Having been a former British colony, Singapore's education system is based on a traditional British education system. Each child goes through six years of primary education and at the end of the sixth year, the students take the Primary School Leaving Examination (PSLE), where students' abilities in English, Mathematics, Science and their Mother Tongue language ¹ are assessed.

Footnote

1 Under the Bilingual Policy, all students are educated in English as their first language. The Ministry of Education ensures that the Bilingual Policy is met by students in Primary and Secondary schools- not only are they required to master English as their first language, they also have to learn their Mother Tongue as a second language. They are offered Mandarin Chinese, Malay or Tamil depending on their father's ethnicity.

The Singapore Education system's historical and cultural context influences teaching and learning practices. In recent years, a number of curricular and programmatic shifts directly influenced by the TSLN policy movements, support a more holistic, broad-based, and 21CC-oriented learning in Singapore schools and classrooms at the primary and secondary levels (Tan, Koh, Chan, Costes-Onishi, & Hung, 2017). Recent research studies as well as the Government's response to international and local research, then, have led to a focus on what is considered to be critical for its citizens in the 21st Century. This has led to a move towards student-centred, inquiry-oriented learning (Heng, 2013). Research in Singapore schools have shown that when classroom practices are more interactive, previously disengaged students show improvements in their motivation and engagement (Lee, Hung & The, 2016). This is especially relevant to primary classrooms in Singapore of large class sizes.

The Singapore example is one instance of how governments attempt to meet the challenges of the new economy via a change in education policy (Koh, 2002). Through these studies in relation to the policy, the flipped classroom pedagogical practice could potentially provide for student-centred learning with room for more classroom interactions and has features within its framework towards the development of the skills of communication and collaboration.

2.3 Educational Policy in Singapore

As mentioned earlier, the education policy in Singapore is an overarching policy that governs all sectors of primary, secondary and tertiary education settings. The policy includes the vision, the desired outcomes of education, 21st Century competencies, *nurturing students*, *enabling teachers* and *every school a good school* (MOE, 2017). I will now examine the policy as a whole and focus particularly on those that relate specifically to this study.

2.3.1 The Vision of the MOE

The vision of the MOE, Singapore states that the Ministry of Education aims to help students to discover their own talents, to make the best of these talents and realise their full potential, and to develop a passion for learning that lasts through life (MOE, 2017). This vision clearly states the need for the education system to make every child an individual with his or her

own talents and to aspire to be lifelong learners. The vision has risen as a response to research on societal demands for each individual to be distinct to compete in a competitive globalised environment (Mok, 2003). It sets a context and an underlying requirement for each individual who passes through the educational system in Singapore, to acquire essential skills to thrive in a globalised environment. As mentioned in the literature, the flipped classroom pedagogical practice is a framework that allows for independent learning where it provides an engaging learning experience, effective in helping students learn the content and increased self-efficacy in their ability to learn independently (Enfield, 2013). Hence, the flipped classroom pedagogical practice can be considered as one that is in line with the vision of this policy.

Under the Singapore vision for education, the policy also states as “We want to nurture young Singaporeans who ask questions and look for answers, and who are willing to think in new ways, solve new problems and create new opportunities for the future.” (MOE, 2017, para 7). Thus, individuals are encouraged to look for new ideas and to stay relevant in a changing society. One of the ways to do this, according to this policy document, is to be inquisitive and look for innovative ways in solving problems. The smallness of the city with limited resources underlie many of the education policy decisions, particularly in its emphasis on talent as the most valuable resource or human resources of the country (Gopinathan, 2007). The policy directs the move towards encouraging students to take charge of their own learning as it sets the stage for self-directed learning. There are many pedagogical practices that can enhance self-directed learning in the classroom. Studies have shown that the flipped classroom pedagogical practice has immense potential to develop self-directed learning skills in students. This will be explored later in the chapter.

Hence, in light of the MOE vision, the flipped classroom is one of the pedagogical practices that has the potential to provide for opportunities to promote independent learning, self-directed learning and for students to be inquisitive. With flipped classroom pedagogical practice, the teachers can design lessons that promote problem-solving activities and improve interactions in small groups. Next, I present the Desired Outcomes of Education (DOE).

2.3.2 The Desired Outcomes of Education

The vision is translated to the Desired Outcomes of Education (DOE). One of the DOE is for every child to be a self-directed learner who takes responsibility for his own learning. Another DOE is for every child to communicate effectively and to be an active contributor who works effectively in teams. This is in line with the vision of MOE as mentioned earlier.

The DOE is translated into a set of developmental outcomes for each key stage of our education system. The key stage outcomes spell out what the education service aspires to develop in our students through Primary, Secondary, and Post-Secondary education. The primary education focusses on skills such as to be able to cooperate, to have a lively curiosity about things, to be able to think for and express themselves confidently and to take pride in their work (MOE, 2017). While these policies set the context to the Singaporean education system, the research surrounding classroom interactions as well as the flipped classroom pedagogical practice is presented in the following sections.

2.4 Research on Classroom Interactions

Studies on classroom interactions have focussed on how they contribute to learning, student outcomes and engagement. A review of the literature on classroom interactions in relation to student learning outcomes, especially in large classes, is presented in this section. The role of classroom interactions in developing the crucial skills of communication and collaboration is explored amidst the Singapore Ministry of Education (MOE) policy and presented in this section as well.

2.4.1 Classroom Interactions and Student learning outcomes

The term classroom interaction refers to the interactions between the teacher and learners, and amongst learners (Ellis et al., 2006) as mentioned in Chapter 1. Several studies have reiterated the importance of classroom interactions. Studies of classroom interactions also focus on peer and group learning. According to Keppel (2006), peer

learning is one method to encourage meaningful learning and involves students teaching each other and learning from each other. Peer learning or peer interactions involve sharing of ideas, knowledge and experiences and emphasizes interdependence as opposed to independent learning (Boud, 2001). Activities in class can be student-led and communication among students allow them to learn with hands-on work (Educause, 2012).

Classroom interactions have great potential for positive learning outcomes based on the studies that follow. When teacher and students interact, they co-construct classroom interaction to communicate meaning and display intentions and behaviours in context (Gibbons, 2006). In studying classroom interactions, it is important to consider participants' contributions to the conversation. In fact, like other formal settings, classroom interaction is characterised by an unequal distribution of communicative patterns among the participants, with relatively pre-arranged turn-taking and thematic control belonging to the teacher (Margutti, 2006).

Recent studies have paid more attention to learner interaction, examining talk between teacher and students as well as the opportunities for learning. Within studies of learning, face-to-face interaction in the classroom is considered to be essential in that it is the primary medium for teaching and learning processes (Tsui, 2001). In a study by Mercer (1995), talk mediates classroom interactions and it plays a major role in the construction of knowledge. Students verbalize their experiences and understanding as a way of learning. As students talk through what they are learning, both they and their teachers may become aware of what they know, how they are coming to know it, and even how talk itself is an active catalyst in the learning process (Mercer, 1995). Descriptions of classroom interaction focus on the language used by the teacher, especially teacher questions and the learner responses elicited, teachers' feedback and turn allocation behaviour. These features were examined in light of how they affected interaction and the opportunities for learners to engage in learning (Hall & Walsh, 2002).

Numerous researchers have explored the benefits of interaction. Current research establishes that interaction is critical for learning and students who stay on task, attend to learning goals and participate actively in the learning experience show better academic achievement in elementary school (White, & Salovey, 2012). Kahn and Kayle (2002) noted that when students communicate, they show their ability in understanding. When interaction is present in the learning activity, students are not only more motivated to learn, but are also more attentive, participative and more likely to exchange ideas with others (Sims, 2003). Interaction influences student learning outcomes such as attitude and achievement (Haseman, Polatoglu, & Ramamurthy, 2002). Learning is viewed as encountering meaningful, complex, real-world situations rather than memorizing facts or solving simplistic problems that have one correct answer (Berg & Smith, 1996; Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010). In classroom interactions there is teacher-student interaction and student-student interaction (Lucero, 2012). Learning environments that are dialogically rich—embodying teacher– student and/or student–student dialogue—are known to develop critical thinking and deep conceptual understanding in students (Anderson et al., 2001). Interaction in the classroom has the potential to promote an active learning environment, facilitate the building of learning communities and provide greater feedback and promote student motivation (Markett, Sanchez, Webber & Tangney, 2006). Through interaction with the teacher and other students, the students’ interest and motivation can be simulated and maintained (Prammanee, 2003).

Research has focussed on the importance and benefits of classroom interactions. Simultaneously, studies have also shown the role of these interactions in promoting the skills of communication and collaboration. This is explored in the next section.

2.4.2 Classroom Interactions and skills of Communication and Collaboration

Drawing on research findings, classroom interaction can be a potential factor in developing the skills of communication and collaboration in learning communities. Since this study is based on the Singapore context, the place of classroom interactions in large

Singapore primary classes with a policy imperative to incorporate 21st Century skills of communication and collaboration is explored. As mentioned in Chapter 1, the MOE, Singapore developed a 21st Century competency (21CC) framework. The framework articulates the competencies that would enable students to grow into confident and concerned citizens with the necessary attributes and skills to learn continuously, work effectively in teams, exercise initiative, take risks and strive for excellence. The framework identifies communication, collaboration and information skills as one of the skill sets needed for the 21st Century (MOE, 2017). According to Happ (2013), in order to face the challenges of the future, educators agree on the importance of having students to possess such skills - defining, understanding and implementing the use of the skills of communication and collaboration and these are critical in education. Schools in Singapore are rapidly consolidating how and what to teach, and exploring new ways to cultivate the skills of communication, collaboration, creativity and critical thinking, together with innovativeness and adaptability (Heng, 2013).

Researchers have explored the importance of incorporating communication and collaboration in classrooms. Schools have responded to incorporating these skills by adopting core curriculum with more emphasis on problem-solving (Ananiadou & Claro, 2009). According to Laal and Ghodsi (2012), there is much discussion or interactions, elaboration of one another's ideas and mutual assistance amongst students with collaborative groups and student inquiry. They affirm that via collaborative learning, students are given ample opportunities for intellectual and social interactions. According to Dede (2010), the nature of collaboration is shifting to a more sophisticated skillset. In addition to collaborating face-to-face with colleagues, 21st Century workers increasingly accomplish tasks through mediated interactions with peers halfway across the world whom they may never meet face-to-face. Thus, even though perennial in nature, collaboration is worthy of inclusion as a skill because the importance of cooperative interpersonal capabilities is higher and the skills involved are more sophisticated than in previous years. Classroom interactions can support collaborative learning focused on reflection and analysis (Eiteljorg, & Pittman, 2008). According to Johnson and Marsh (2014), students can learn

the social skills of effective communication for collaborative learning in the classroom where group learning among students results from a teaching strategy that requires helping one another to create an atmosphere of mutual achievement, collaboration and support. Collaborative learning has numerous benefits and typically results in higher achievement and greater productivity, more caring, supportive, and committed relationships; and greater social competence, and self-esteem (Tan et al., 2006).

All these studies have reiterated the positive learning outcomes that can be achieved with improved interactions in the classroom. In this study, the research problem stemmed out of the lack of interactions in large classes, especially when didactic teaching approaches are carried out. Studies on classroom interactions in large classes are explored in the next section.

2.4.3 Classroom Interactions in large classes

There are numerous studies to show the importance and lack of interactions in large classes. According to Schell (2012), in large classrooms, engaging the students is a challenge even more so when using traditional approaches to teaching - which research has demonstrated to be less effective than more interactive methodologies. It is a prevalent assumption that class size has many effects on students' engagement, behaviour and attention (Fortes & Tchantchane, 2010). According to Jecklin (2007), increased class size may push educators to focus on the presentation of a large amount of information in theory formats with little time being set aside for active and collaborative engagement of students in the learning process. The active participation desired becomes more difficult to sustain with increasing numbers of learners. Larger classes apparently challenge the teacher's ability to promote individualized learning. These dimensions have a direct impact on students and decrease students' critical thinking and problem solving abilities (Jin & Cortazzi, 1998).

Researchers have found some challenges when dealing with large classes especially in conducting classroom activities that can potentially promote interactions. Finn et al. (2003) developed a theoretical and empirical case for why student classroom interaction is the key process that explains why smaller classes lead to better attainment. They conclude that students in small classes in the elementary grades are more engaged in learning behaviours, and display less disruptive behaviours than students in larger classes. The increased number of students per class, makes it difficult for the teacher to implement methods centred on dialogue and discussion. In considering large classes, the main problem is the lack of interaction and the consequent passivity in learning imposed on the students (Draper, Cargill, & Cutts, 2002). The structural affordances of high student to teacher ratio in efficiency driven classrooms seem to limit the flexibility and kinds of pedagogies that teachers enact (Crawford, 2002). According to Koile and Singer (2006), personal interaction between the teacher and students in large classes is almost impossible and effective learning strategies have to be explored to counter the challenge posed by large class sizes. They perceive that with increased interactions, the teachers can ensure the students are well engaged in the lessons. One way is to give students the ability to engage in hands-on activities that yield immediate feedback through interaction with teachers and peers (Koile & Singer, 2006).

Effects of class size on classroom processes tend to fall into two main camps. First, there are those concerned with teacher to student interactions. It seems likely that bigger classes will decrease the amount of time that can be spent on instruction and dealing with individual child. This is consistent with teachers' views (Anderson, 2000; Blatchford, Moriarty, Edmonds, & Martin, 2002). The second set of factors related to class size differences concerns students' classroom engagement. Finn et al. (2003) argue that the effects of class size on students' classroom engagement are more important than those on teaching. One main element of children's successful adjustment to school is likely to involve their productive engagement in class, as reflected in the extent of their work related interactions with teachers, other students and when working on their own. In small classes there will be more opportunities to engage children and keep them on task (Leithwood & Jantzi, 2000).

Classroom interactions are seen as pertinent in engaging the students in learning. These studies show that interactions and engagement may be impeded to some extent with larger class sizes. Research findings have supported the view that engagement, active learning time and time on task are key aspects necessary for better learning outcomes. Pedagogical practices that can improve interactions in the classroom can be vital in engaging the learners. Now, I shall look at the literature surrounding one of the pedagogical practices – the flipped classroom pedagogical practice which is the focus of this study.

2.5 Research on Flipped Classroom Pedagogical Practice

There are many pedagogical practices that can potentially increase interactions in the classroom. The flipped classroom pedagogical practice is one. The literature behind this practice is organized based on learning outcomes, role of the teacher and opportunities for communication and collaboration, especially in large classes as these factors are fundamental in promoting interactions in the classroom.

2.5.1 Learning outcomes

The emerging research on flipped classroom pedagogical practice has yielded several findings in relation to learning outcomes, particularly, in terms of student motivation and achievement. Based on the definition of flipped classroom pedagogical practice presented in Chapter 1, the concept of the flipped classroom pedagogical practice allows the freeing up of classroom time for active learning and this entails moving lesson content outside of the classroom (See & Conry, 2014). Central to the notion of the flipped classroom pedagogical practice is moving teachers' knowledge delivery outside of formal class and using class time for students to actively engage in knowledge construction through extensive interactions with peers and teachers (Bergmann & Sams, 2014 & Missildine et al., 2013).

As mentioned earlier in this chapter under the MOE's vision and the DOE, the flipped classroom has the potential to develop self-directed learners. Self-directed learning allows students to design their own learning goals, adopt appropriate strategies for learning and evaluate their own learning results (Wood, 2003). The flipped classroom pedagogical practice has also been shown to enable students to learn independently with greater engagement (Tucker, 2012). The flipped classroom can potentially afford students a vast array of learning resources and appropriate technologies where in class, students can apply the learning content to solve problems and participate in discussions (Hao, 2014). Self-directed learning strategies can benefit students in terms of the deliberate construction of knowledge and the use of effective learning strategies (McNamara, 2011). This kind of learning strategy applied in the flipped classroom provides a strong learning mechanism by which students can monitor their personal learning process and evaluate the most appropriate learning strategies for them. This also conforms to the theory proposed by Zimmerman (2008), that the integration of self-regulated learning into courses can improve students' learning achievements. The flipped classroom pedagogical practice has the potential to allow the students to experience active learning and receive personalized feedback based on their learning status, which can improve their self-efficacy (Smith, 2015).

Another DOE set by the MOE policy is for students to work effectively in teams. Based on the literature surrounding flipped classroom pedagogical practice, the practice allows for peer and group learning. The idea of a flipped classroom is to create a more collaborative learning environment where students are focused on working through problems (Findlay-Thompson & Mombourquette, 2014). The flipped classroom has potentially allowed for self-paced learning with the repeatability of the lesson videos as well as with the active learning activities chosen for classroom time, there are more opportunities for students to interact and learn from one another (Mok, 2014). In line with MOE's vision and DOE, several aspects of the flipped classroom pedagogical practice have the potential to provide opportunities for students to develop the requisite skills such as self-directed learning and collaborative learning. According to Bergmann and Sams (2014), flipped classrooms allow students to explore and make sense of their own learning through inquiry based learning, problem-

based learning and peer collaboration. In this aspect, flipped classrooms adopt a student-centred approach where the responsibility of learning lies on the students themselves, giving them an impetus to experiment (Sams, 2011). Though Bergmann and Sams (2014) had presented several learning outcomes of flipped classrooms, the idea of flipping content dates before the work of these two researchers. In a study by Baker (2000), he provided tertiary students with lecture notes on a web page, extended classroom discussions through online threaded discussions, and used online quizzes in his courses. His aim was to reduce time spent on lecturing and to give students a sense of responsibility for their learning. Similarly, in a study by Lage, Platt and Treglia (2000), course materials were modified for tertiary students and they were asked to read sections of a text and view videotaped lectures before coming to class. The aim was for students to take charge of their own learning. Hence, flipped classroom concept of sequencing content was evident in studies before the work of Bergmann and Sams.

As mentioned in Chapter 1, the flipped classroom pedagogical practice allows teachers to assign a pre-class task to students in the form of printed or online materials. Hence, the flipped classroom model uses digital tools at times and these can range from using online videos, teacher-created videos and other digital contents from various websites. The flipped classroom model sometimes, combines recorded digital instruction, usually in the form of a video, and appropriately organized classroom activities to support higher learning (Yarbro, 2014). Flipped classrooms are learning environments with potential to promote a shift from the teacher-centred one to the learner-centred one, as the learning tasks in flipped classrooms depend heavily on learner-driven preparation outside of formal class time (Flumerfelt and Green, 2013). Flipped classroom takes the teacher-centred approach to learning, and pushes for a more student-centred approach, whereby the students take on an active role in their learning (Bishop & Verleger, 2013). The purpose of the flipped classroom pedagogical practice then, is to enhance learning through a student-centred learning approach by utilizing technology as well as other tools to open class time for more interactive peer activities (Bishop & Verleger, 2013; Krumsvik & Jones, 2016).

Educators who have adopted the flipped classroom pedagogical practice have reported their students as being active learners. Research on flipped classroom in recent years has shown the active role of students as learners as they engage in the learning process prior to and during class. Pedagogical theories supporting flipped classroom have a common student-centred learning focus for teaching (Bishop & Verleger, 2013). This means that students are provided with more opportunities to take on a more active role in their learning. In studies conducted with tertiary students by Strayer (2007) and Gerstein (2011), the flipped classroom practice has been an effective tool to promote active learning which improves students' understanding and retention of information. The learners are able to demonstrate what they had learned and to apply the lesson content in a way that makes sense to them. As learners make sense of their learning, they create something that is individualized, and with application to the learners' everyday lives, it extends beyond the lesson. This is further evidenced by a study conducted by Hotle and Garrow (2015), where they reported that undergraduate students in a flipped classroom engaged in interactive activities that reinforce lessons learnt at home. These students were able to build upon the concepts viewed in the pre-recorded lessons delivered via direct instruction. The study reported that these undergraduate students were highly motivated to learn the content as they had the flexibility of learning it at home or out of the classroom, at their convenience. In a study conducted by Abeysekara and Dawson (2015), the flipped classroom allows students in tertiary education to have the flexibility to engage with the lesson content even before entering the classroom. This can foster individual inquiry, collaborative effort, social interaction, reflection and independent learning skills. This is further supported by a study carried out with high school students, where the flipped classroom encourages them to be active and not passive learners, participating well in the learning environment (Gough, DeJong, Grundmeyer & Baron, 2017). These studies show that students in tertiary settings have responded positively towards flipped classrooms as they have emerged as active learners.

Flipped classrooms have impacted learners in terms of achievement and engagement. Studies are showing positive results when flipped classroom lessons are utilized, often in student achievement and engagement (Danker, 2015; Yarbrow, 2014). Davies et al. (2013) found that university students enrolled in a flipped classroom section outperformed a simulation approach in an introductory class on spreadsheets. The study reported that students in the flipped classroom were motivated, engaged and showed an appreciation for the differentiated approach to instruction. In an engineering course, DeGrazia et al. (2012) found that students came to class better prepared when compared to those that utilized the familiar textbook reading approach. Similarly, research by Moravec et al. (2010) revealed that students in a biology class performed better on exam questions that were referenced in the homework videos in the flipped lesson. Student understanding was heightened with the flipped classroom when it was adopted by a group of educators in a medical school as they integrated anatomy in a system based curriculum (Nematollahi, St John, & Adamas-Rappaport, 2015). According to Gough, DeJong, Grundmeyer, and Baron (2017), making class time available for various teaching activities in a flipped approach, can engage students with higher order thinking. Students realized the value of preparation and took an active role in the formation of their own learning experiences. This paved the way to self-directed learning as well as authentic learning (Scheg, 2015). The Norwegian study done by Krumsvik and Jones (2016) looked at the performance levels of middle school science students in a flipped classroom. They did classroom observations, field notes and online test scores as data collection. Their in-class observations and test scores reported improvement in the students' performance. Similar studies have also reported students performing significantly better than those in non-flipped classrooms (Chao et al.2015; Schultz et al.2014; Tsai et al.2015). Though flipped classrooms had a positive effect on student engagement and achievement as reported in these studies, there are studies that reported no significant difference in student achievement between flipped and non-flipped classroom environments (Chen 2016, Clark, 2015). On the other hand, no study reported an adverse or detrimental effect of flipped classrooms on student achievement.

The flipped classroom pedagogical practice had received positive reviews among learners as supported by studies on student perceptions. In studies done on student perceptions, they reported positively to the flexibility and self-regulation that this teaching method affords (Helgevold & Moen, 2016; O'Flaherty & Phillips, 2015; Murray, et al., 2015; Strohmeyer, 2016,). Murray, et al. (2015) conducted the study on student perceptions of flipped classrooms on a university-level course. The study reported that students are generally positive towards the flipped classroom. In a doctoral dissertation conducted in the United States, Strohmeyer, (2016) looked at high school students lived experiences with the flipped classroom model. The results showed increased student engagement and achievement, as well as, a positive response to flipped classroom. Helgevold and Moen, (2015) conducted a single-group study where the purpose was to explore if the flipped classroom approach would increase students' engagement and involvement while in class. The results showed that students reported feeling better prepared for discussion groups and had greater participation. Contrary to these findings, there were studies that reported students being unreceptive towards flipped classrooms. Chen (2016) reported that some students resisted flipped classrooms learning as they did not get used to learning at home prior to lesson. Consequently, some of them skipped the pre-class tasks and came unprepared to the class. This resulted in negative impact on the group dynamics of the class based activities.

Studies have also shown that with flipped classrooms, students are engaged in the content and have the ability to access new content customized to their own time constraints. According to Tucker (2012), flipped classrooms afford the students the ability to customize how many times they play a video demonstration, access to various sources, and the ability to pace their learning. The ability to rewind and pause videos is mentioned often and students report liking the ability to learn at their own pace (Gough, DeJong, Grundmeyer & Baron, 2017). Similar results of students' gains in learning were found in arts discipline as shown in the Monash University's Peer Instruction in the Humanities Project (Butchart, Handfield & Restall, 2009). Anxiety among students were curtailed as

students received constructive feedback in lessons with the flipped classroom pedagogical practice (Strauss, 2012).

The literature surrounding flipped classroom as outlined above have shown various facets of learning outcomes in terms of student perceptions, engagement and achievement. In order to achieve these learning outcomes, the role of the teacher is crucial in a flipped classroom. According to Zuber (2016), teachers should be sufficiently trained in using flipped classroom in order to execute this pedagogical practice in its full potential. Central to the pedagogical practice lies the role of the teacher who drives the practice and research surrounding the teachers' role is explored in the next section.

2.5.2 Role of the teacher

Research on flipped classroom pedagogical practice in recent years has also identified the role of the teacher in contributing to the learning process and outcomes. In the context of the flipped classroom model, it opens up the possibility for the teacher to facilitate students as they engage in activity (O'Flaherty & Phillips, 2015). The flipped classroom frees up class time, allowing for more individual and small group instruction (Yarbro, et al., 2014, p.5). This opens up the opportunity for the teachers to apply the tools of scaffolding to assist students in task completion (Pea, 2004). According to Bergmann and Sams (2014), flipped classroom can provide opportunities for the teacher to address misconceptions or any queries by students to clarify concepts. This can increase teacher-student interaction and lead to more effective learning. As teachers observe their students in interaction with each other, the opportunity affords teachers to clear up misconceptions or repeat things when students struggle as the idea is to have a teacher to scaffold students as they engage in learning tasks (Bergmann & Sams, 2014). In the flipped classroom, video is one technology that can be seen as a tool for aiding teachers in providing scaffolding. A study by Bergmann and Sams (2014) reported that with creating the videos, teachers can condense and set parameters for learning content. Videos are intended to be short and concise, encouraging a teacher to reduce the amount of information presented to the students (Murray, et al., 2015). The instructional videos

are created and facilitated by the teacher. By recording videos, teachers are providing a tool for students to engage in direct instruction at a time, place and pace that is fitting for the students (O'Flaherty & Phillips, 2015; Murray, et al., 2015; Strohmyer, 2016). This facility provided by teachers within the flipped classroom pedagogical framework is highly relevant for tertiary students as it also introduces technological tools affording flexibility in how they interact with their instructional resources (Helgevold & Moen, 2015). Apart from videos, the teachers can also create and assign written materials for the students. Teachers provide these resources as an alternative to students who may not have access to technology at home. In a study by Hamdan, McKnight, & Arfstrom (2013), the students watch videos or read the written materials at their own pace prior to meeting in class where they come prepared to engage in classroom activities. Students are then expected to be ready to participate in a more dynamic interactive classroom. By removing the lecture or direct instruction from the classroom, the class time is opened up for more peer interaction and teacher guided assignments (Hamdan, McKnight & Arfstrom, 2013). The flipped classroom pedagogical practice allows teachers to customise their lessons to incorporate opportunities for students to communicate and collaborate in the classroom. Class time is spent by dealing with queries of students and allowing for students to learn via classroom interactions (Novak, Patterson, Gavrin & Christian, 1999; Simkins, Maier & Rhem, 2009).

The role of the teacher, not only lies in the design of the pre-class task such as the videos or written materials, it also involves the design of class-based tasks. According to Tucker (2012), the concept of flipped classroom requires students to watch videos at home or view printed materials online before returning to school the next day. The next day of school result in the students having the necessary background knowledge or know exactly where and why they require help in understanding the content. This allows the teacher to better gauge student understanding and result in students being grouped based on their mastery of the content. In a study by Baker (2000), through the use of grouping, the teacher has a better opportunity of targeting the specific gaps in student content mastery. Once the gaps close, the teacher can move on to the application of the

content for student learning. Helgevold and Moen (2015), recognized the role of the teacher as supporting flipped classroom's affordances. The presence of the teacher is a key benefit of the flipped classroom model (Gough, DeJong, Grundmeyer, & Baron, 2017). A skilled teacher is an expert in complex communication, able to improvise answers and facilitate dialogue in the unpredictable, chaotic flow of classroom discussions (Dede, 2010). This is evident when the teacher facilitates group work in flipped classrooms.

The role of the teacher is also seen in the organisation of collaborative activities in the classroom and studies have shown the learning outcomes derived from these activities. Bergmann and Sams (2014) reported that collaborative activities are organized by the teacher to encourage students to be more active in the classroom. These activities are usually project-based and designed for collaborative teamwork between the students (Gough, DeJong, Grundmeyer, & Baron, 2017). As these activities are taking place, the teacher is present to guide and support the students. This can be both in further understanding the content and in facilitating group collaboration. It also provides the opportunity for the teacher to evaluate the students' progress with formative assessment (O'Flaherty & Phillips, 2015; Murray, et al., 2015, Yarbro, 2014). The process of just flipping a classroom will not transform students' learning. According to a study by Houston and Lin (2012), a successful implementation of a flipped classroom would need teachers to review the lesson content before in-class activities to answer any questions and to make sure that the majority of the students have sufficient understanding of the material. Kachka (2012) recommends that during the in-class activities, the teacher can be deliberate to guide and increase the interaction with the students. The flipped classroom has a comprehensive instructional model that includes direct instruction, inquiry, practice, formative and summative assessments and many more elements. These instructional techniques give a focus to the process of learning. It is aimed to enable students to be more actively engaged with the lesson material and, ultimately, empower them to construct knowledge through their understanding (Bennett, et al., 2011).

Based on these studies, the teachers' availability, the creation or selection of videos, written materials, the design of student collaboration activities, formative and

summative assessment opportunities are fundamental to making the flipped classroom effective. These aspects have the possibility to create an environment that allows increased interaction for students with their teacher and their peers. Flipped classroom environments are explored in this study in their role in promoting interactions in the classroom. The development of communication and collaboration skills via interactions is pertinent and research surrounding these skills are explored in the next section.

2.5.3 Communication and Collaboration

Flipped pedagogies can provide opportunities for interactions. Communication and collaboration skills can be enhanced via these interactions. The emerging research on flipped classroom pedagogical practice has yielded several findings in relation to opportunities for communication, collaboration and interactions in class settings.

The flipped classroom promotes an environment which increases the interaction between the students and teachers and engages the students in learning through application and practice (Sams, 2011). The flipped classroom environment is characterized by face-to-face interactions between teacher and students as they engage and interact on classroom based tasks such as case studies and problems (Leckhart & Cheshire, 2012; Gerstein, 2011). There might be more room for communication and interaction if the students were given opportunities to collaborate in working groups to discuss the lesson content previewed before class (Gunawardena, 1995). Compared to traditional or direct instruction, flipping the classroom and applying peer instruction techniques can result in learning gains (Berret, 2012). Peer instruction can contribute to peer interaction in the classroom (Nicol & Boyle, 2003). According to Krumsvik and Jones (2016), the central notion of flipped classroom is reflected in its focus on the interaction between the individuals and the use of digital tools as it opens up class-time for more interactive activities and social learning between students.

Student attitudes towards flipped classroom pedagogical practice show how they perceive and participate in the lessons, especially the interactive nature of the flipped lessons. Studies show that students enjoy the more interactive nature and working together with fellow students and doing activities with the teacher present (Helgevold & Moen, 2015). Zappe, Leicht, Messner Litzinger and Lee (2009) flipped a large undergraduate architectural engineering course. Students' evaluation of the course indicated that the flipped classroom had a positive impact on student learning as the students perceived the method of teaching as being more effective and interactive than lecturing. Students also reported that they enjoyed the class and benefited from watching the lecture videos outside of class (Herreid, 2013).

Studies have reported students' attitudes towards the flipped classroom approach and they are varied (Murray et al., 2015; O'Flaherty & Phillips, 2015; Warter-Perez & Dong, 2012). By having the ability to interact with the video through scrolling, students are able to control the amount of information they receive (Gough, DeJong, Grundmeyer & Baron, 2017). This can be seen as a way of scaffolding the flow of information. The flipped classroom promotes personalized learning as students can pause, re-wind and re-watch the online video at their own pace - one of the major, evidence-based advantages of the use of video is that learners have control over the media with the ability to review parts that are misunderstood, which need further reinforcement, and those parts that are of particular interest. This has a positive effect on student learning and achievement (Gerstein, 2011). By taking control in interacting with the video, the students can be seen as mediating the amount of information they receive. The research centred on flipped classroom has shown positive learning outcomes in terms of student achievement, perception, self-directed learning and in promoting interactions with collaborative group work in the classroom.

As this study emerged out of the problem with large classes as in the Singapore primary school context, there are pedagogical practices that can address this problem. Studies have shown that pedagogical practices such as the flipped classrooms can help to counter

the challenges of large classes. According to Leckhart and Cheshire (2012), the flipped classroom's online material enables teachers to coach large classes and provide one-on-one tutoring supported by web based tools. As for its in-class teaching approach, small group discussions, peer-learning and inquiry-learning have been used to engage students in their learning, even for a large class size. In a large classroom with the implementation of a flipped classroom pedagogy and peer instruction, there was more classroom interactions and better student engagement (Schell, 2012). In a flipped classroom setup, there is increased interaction between the teacher and the student, and between students, despite the large class size. One evidence of this interaction is the increased time for feedback (Danker, 2015). Implementing a flipped classroom for a large class size may boost the students' academic attainment as it generally enables more focused teaching and learning to take place in the classroom despite the class size (Kachka, 2012).

The use of technological tools in teaching within flipped pedagogies have shown to aid learners in many ways. According to Hicks (2011), it is imperative for students and teachers to experience technology in the classroom to prepare for jobs in today's society. Schools can play the role of preparing students with the knowledge and skills they will need to collaborate and compete in an interconnected world (Wagner, 2008). In a study by Darling-Hammond (2010), flipping the classroom and infusing technology provides the teachers the opportunities and classroom time to model the skills needed for the 21st Century learner. Similar to this study, a study by Fulton (2012), reported that there were several advantages of flipped classroom pedagogical practice with the use of technology. Classroom time can be effectively used for interactive activities and the use of technology is flexible and appropriate for 21st Century learning. The students are able to learn at their own pace; the pre-class task gives an indication to teachers a better insight into students' difficulties and learning needs; teachers can customize and provide students with the lesson content for them to preview at any time of the day.

Based on the literature, the flipped classroom pedagogical practice has the potential to provide for opportunities for students in class to be able to work in teams and to contribute

towards the group task assigned by the teachers. Based on the study by Bergmann (2014), the flipped classroom pedagogical practice can potentially allow for students to learn independently and foster greater student engagement and higher levels of motivation as they collaborate in groups. One of the key stage outcomes specifies students to think critically and to be able to communicate their ideas (MOE, 2017). The flipped classroom has also allowed students to have the opportunity to come to class more prepared and were hence more confident of their ability to tackle the problems (Mok, 2014). The flipped classroom pedagogical practice has the potential to enable students, access to resources and connection with peers. With digital age technology, in some classes, the practice helps in moving passive learning tasks of knowledge delivery beyond formal class time and use learning activities to move constructive learning tasks of concept building within formal class time (Davies et al., 2013). Hence, the flipped classroom pedagogical practice has the potential to provide opportunities for the students to acquire the skills mentioned in the DOE as well as in the key stage outcome of education stated in the MOE policy.

The research on flipped classroom suggests that the practice can yield positive student learning outcomes, promote active learning and increase interaction between learners and teachers. Despite the positive findings of initial research into learning outcomes after resulting from the adoption of the flipped classroom pedagogical practice, research in terms of student achievement, motivation, active learning and peer instruction, much of the literature has focused on higher education. Most of the research into flipped classroom pedagogical practice is derived with university and high school students in tertiary educational settings. Moreover, there is little description as to how the practice has promoted classroom interactions. Research is still needed to understand how this practice has the potential to contribute to classroom interactions in primary classroom settings. Additional research is needed to understand how the practice can contribute to classroom interactions in a primary classroom in the Singapore context as with interactions, skills of communication and collaboration can be developed.

This study focussed to what extent the flipped classroom pedagogical practice can promote classroom interactions and enhance the development of crucial skills of communication and collaboration in the Singapore primary school context where there are large class sizes. This study was set in a primary school that had recently introduced the flipped classroom pedagogical practice as a teaching and learning strategy. This provided an excellent opportunity and site for the study of the impact of flipped classroom pedagogical practice on classroom interactions, in particular, skills such as communication and collaboration. The study, too will enhance knowledge and understanding of this approach in similar primary school settings. The methodology and theoretical framework for this study will be explored in the next chapter.

Chapter 3: Methodology and Research Design

This chapter describes the method used in this study. It discusses the theoretical framework, justifying the qualitative method of research and the research design. This is followed by the description of the research design which includes the selection of participants, data collection, data analysis and ethical considerations.

3.1 Theoretical Framework

The aim of this study is to explore the implementation of the flipped classroom pedagogical practice in Singapore primary classes and how it can potentially contribute to classroom interactions. The study is concerned with understanding how participants conceive a particular phenomenon such as the flipped classroom pedagogical practice. To understand a phenomenon, one must consider the experiences by the participants themselves (Smith, 2015). In this study, the focus is on how the participants – the teachers – perceive teaching and learning with the flipped classroom pedagogical practice. A search for a deeper understanding in participants' experiences require a research strategy that draws on qualitative methods (Marshall & Rossman, 1999).

As a deeper understanding of how teachers conceive flipped classroom pedagogical practice was sought for this study, a qualitative approach had been used. This had enabled rich data from qualitative interviews. The teachers' beliefs, values and thoughts provided insightful evidence on their approach to this pedagogical practice. Interviews also allowed for depth and detail of information (Cooper & Schindler, 1998). Hence, for this purpose, a qualitative research method of investigation was appropriate.

Due to the context of the study, it was appropriate to investigate the learning environments of flipped classroom pedagogical practice using qualitative research methods. Qualitative research delves into social complexities in order to truly explore and understand the interactions, institutions, cultural groups and even the everyday (O'Leary, 2013). A phenomenon such as the flipped classroom pedagogical practice

presents several social complexities when it is implemented in a classroom. The goal of qualitative research is to gain an intimate understanding of people, culture and situations through rich engagement and immersion in the reality being studied. How the pedagogy supports interactions among the students and the teachers is the focus of the study.

Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. Qualitative research involves the studied use and collection of a variety of empirical materials. Qualitative research aims to produce holistic understandings on the basis of rich, contextual and detailed data (Ormston, Spencer, Barnard & Snape, 2014). In order to develop a deep understanding of the potential of flipped classroom pedagogical practice, it was vital to study the practice in action. Through classroom lesson observations and interviews with teachers who have adopted this practice, the researcher can gather rich data on this practice within the classroom context.

Qualitative research is grounded in a philosophical position which is broadly 'interpretivist' in the sense that it is concerned with how the social world is interpreted, understood, experienced or produced based on methods of data generation which are flexible and sensitive to the social context in which data are produced. Hence, the broad methodological framework for this qualitative study was interpretive. For this study, the phenomenon of flipped classroom pedagogical practice and its potential contribution to classroom interactions can be studied in natural social context. Natural environments are favoured for discovering how participants construct their own meaning of events or situations (Ormston, Spencer, Barnard & Snape, 2014). In this study, interviews, lesson observations and artefacts that described routine and meanings in the teachers' response to the flipped classroom pedagogical practice formed the basis to the analysis. Accordingly, the research deployed a wide range of interconnected methods, with the aim to get a better understanding of the subject matter at hand (Denzin & Lincoln, 2011).

This theoretical perspective emphasises interaction as the basis of knowledge which aligns with the interpretivist view that interaction between people is essential to understanding meaning. For this study, the classroom was the “natural setting” where students and teachers interacted and these interactions formed the primary focus of this research. The idea of interpretive practice explores social reality and how people methodically construct their experiences. The researcher is “not an objective, authoritative, politically neutral observer standing outside and above the text, but instead is historically positioned and locally situated as an observer of the human condition” (Denzin & Lincoln, 2003, p. 39). This also emphasises the importance of the researcher, the interpretive, naturalistic approach to studying how people bring meaning to a phenomenon, and a focus on process. Hence, the interpretive theoretical framework was appropriate for this study as teachers bring meaning to the flipped classroom phenomenon. The data collection methods underlie the process for the research. Sound research methodology requires that data collection methods and analysis techniques be driven by the guiding questions of the overall study, the setting in which the study occurs, and the practical considerations of what is feasible for the researcher in that setting (Denzin & Lincoln, 2011).

The interpretive approach looks for culturally derived and historically situated interpretations of the social life world (Crotty, 1998). Qualitative inquiry has focused increasingly on the socially constructed character of lived realities (Denzin & Lincoln, 2005). These everyday realities are actively constructed through forms of social action. Because qualitative research is concerned with understanding how people think and how they develop perspectives, two of the most common data gathering methods are participant observation and in-depth or semi-structured interviews that explore themes or use open-ended questions (Bell, 2014; Kvale, 1996; Bogdan & Biklen, 1992). Qualitative approaches emphasise the importance of getting close to the researched. This is because one of the purposes of qualitative approaches is to try to depict the participants’ view of social reality (Kvale, 1996). Thus, techniques such as participant observation, unstructured or semi-structured interviews are commonly used. The researcher has several methods for collecting empirical materials, ranging from the interview to direct observation, to the analysis of artefacts and documents. As the way

teachers conceive of teaching and learning cannot be observed directly, this study used semi-structured interviews to explore teachers' understanding of flipped classroom and its potential contribution to classroom interactions. Teachers' design of lesson activities with the incorporation of the flipped classroom pedagogical practice were also examined. This formed the basis to the research design of this study.

3.2 Research Design

3.2.1 Situating Myself in the Research

My researcher role in this qualitative study was central to the data collection and analytical process. My passion and engagement with flipped classroom pedagogies, then, were important drivers for my choices about the research questions and approaches. My passion for flipped pedagogies came about because of my engagement with a teacher professional development programme in this area. Through this professional development, I developed my teaching approach and found an interest in a communicative style of teaching practice. With the experience gained from the professional development programme, I also developed a teaching approach that is more student-centred where I was able to design lessons with opportunities for students to interact with me and among themselves. Compared with teacher-centred didactic practices in the classroom, with the flipped approach, the students were interacting with me more in the large classroom environments. I was also involved in training colleagues in this approach as I shared my lessons with flipped classrooms during best practices sharing sessions. While I am clearly an advocate for flipped classrooms, this research has enabled me to systematically show how it can indeed contribute to enhancing primary school teaching and learning – in particular, to promote classroom interactions and develop communication and collaboration skills.

As an educator and researcher engaging in teaching and research with teachers and students, one needs to be mindful of the documented benefits and limitations, and the ethical dimensions, of researching one's own practice (Yates, 2004). While interpreting

the data collected, the researcher has to be cautious and reflexive. Reflexivity involves the active construction of interpretations of experiences in the field and a questioning of how these interpretations arise (Berg, 2007).

Qualitative research tools of semi-structured interviews, observations and artefact analysis were designed to gain a deeper understanding of this practice and how it was implemented in classroom lessons.

3.2.2 Selection of School

The school selected for this study was a primary school in Singapore which identified flipped classroom pedagogical practice as one of its core strategies to improve the teaching and learning processes as well as student learning outcomes and experiences. The school conducted workshops on the flipped classroom pedagogical practice. These workshops were part of the school's professional development programme for teachers and it was compulsory for all teachers to attend. The teachers who participated in the professional development programme on flipped classroom, are familiar with the flipped classroom pedagogical practice and they have the experience of implementing it in their lessons. The school has class enrolments of between thirty to forty students which is in accordance with the research problem of addressing interactions in a large class. The school was willing to host the research as well. Hence, purposive sampling was adopted in this study. Purposive sampling is an informant selection tool widely used in research as this technique is the deliberate choice of an informant, in this case, this school, due to the qualities the informant possesses. The researcher can decide what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Tongco, 2007). I chose one school for this study as with qualitative study, rich and descriptive data and analysis can be attained. Besides, it was important for me to keep the research within the scale of this Master study.

3.2.3 Participants

The research participants were teachers who participated in the professional development programme on flipped classroom pedagogical practice and who incorporated it in their lessons. Similar to the researcher, they too had participated in the training conducted as part of the school's professional development programme. They were selected based on their participation in the training of the flipped classroom pedagogical practice, their experience in delivering lessons via this pedagogical practice. As mentioned earlier, in order to gain rich and descriptive data within the scale of this Master study, three participants were chosen with purposive sampling.

There are six levels in the primary school from primary one to primary six. The flipped classroom pedagogical practice in most occasions involves the element of homework in the form of pre-class tasks. Hence, it was more appropriate to focus on upper primary students who are assigned with homework on a regular basis than for lower primary students in the Singaporean context. Therefore, with purposive sampling, the three teachers who taught upper primary levels of Primary 4 (age 9-10), 5 (age 10-11) and 6 (age 11-12) were chosen for this study. Moreover, the literature surrounding the flipped classroom pedagogical practice has focussed mostly on tertiary education. In order to cascade the findings to the primary level, the more appropriate group was the older group where, in this case, the upper primary students. Three teachers, each representing a level of Primary 4, 5 and 6 or who teach the upper primary classes were the participants for this research. They were interviewed and their lessons with the incorporation of the flipped classroom pedagogical practice were chosen for lesson observations.

3.3 Data Collection

3.3.1 Artefacts

Lesson plans by teachers consisting of lesson objectives and design of activities were collected for analysis. Lesson plans act as a window on the larger vision of education

shared by the group of teachers (Lewis, 2002). Hence these were collected from the school's shared folder. Teachers were requested to share screenshots of lesson resources from the school's e-learning portal. However, due to copyright issues, these were not obtained. The Ministry of Education, Singapore policy documents which were available on the public domain of the Internet were retrieved.

3.3.2 Interviews

Teachers were interviewed individually to obtain rich accounts on their experience implementing the flipped classroom pedagogical practice (Interview Questionnaire – Appendix 1). This was done in order to collect detailed accounts of participants' thoughts, attitudes, beliefs, and knowledge pertaining to a given phenomenon (Fielding, 1994; Speziale & Carpenter, 2003).

A semi structured, in-depth interview of 30 to 45 minutes was conducted and this was the main form of data collection. The interview sessions were recorded and the audio files were transcribed. The main function of the interview within the research agenda was to reveal the informants' understanding and perspectives relating the implementation of the flipped classroom pedagogical practice and student outcomes. It was therefore necessary to provide the opportunity for a discourse between interviewer and interviewee which "moves beyond surface talk to a rich discussion of thoughts and feelings" (Maykutt & Morehouse, 1994). In-depth interviewing is one of the most appropriate ways of gathering data on phenomena which are not directly observable (Mertens, 2014). A semi structured interview was appropriate as it attempts to seek descriptions of the interviewees' lived world with respect to interpretation of the meaning of the described phenomena such as the flipped classroom pedagogical practice. I took notes during the course of the interview especially of non-verbal cues. These notes provided substance and clarification of the interview transcripts.

3.3.3 Observations

Observations of one lesson for each participant, a total of three, were carried out with approval from the MOE, the school principal and the teachers. Each lesson observation lasted for about an hour. All three observations had teachers conducting a lesson, each with the flipped classroom pedagogical practice as part of the normal classroom activities or programme. Lesson plans were collected to analyse the data together with my observation checklist of the lesson (Classroom Observation Checklist - Appendix 2).

3.4 Data Analysis

Data analysis was carried out to present the outcomes of the discourse analysis of the data from two sources – fieldwork interview data conducted with three teacher participants and fieldwork data on observed classroom lessons. The discourses in these data gathered were analysed based on discourse analysis frameworks and themes drawn in the light of the focus of this study.

3.4.1 Discourse Analysis – An Overview

In research, we try to capture social realities. However, according to MacLure (2003), research is always a ‘fabrication of some kind, rather than a simple act of capturing a stand-alone reality.’ She notes that researchers are involved in fabricating social realities, despite how hard they try to impose methods that removes the researcher from the research or to control the threat posed by writing. In my research, I documented the lesson observation, teacher interviews, analysis of policy documents and lesson planning documents by the protocol. While I do not attempt to claim objectivity in this research, my analytical approach to the data has enabled me to step back from it by using a framework of discourse analysis, based on Gee’s (2004) model.

Linguistic forms of discourse analysis encompass both spoken and written languages. There are two distinctive forms of discourse analysis – analysis of spoken language and critical discourse analysis (Somekh & Lewin, 2011). Spoken language includes interviews, classroom talk and everyday spoken interactions. Conversation analysis is one that stems out of discourse analytic research. Though linguistic analysis provides an in-depth tool for understanding the complexity of conversation at a grammatical level, conversation analysis focuses primarily on issues such as turn taking and how ‘institutional’ talk builds upon the structures of ordinary conversation (Silverman, 2004). In my research, I understood that it was not only the activity of engaging in discourse that promoted classroom interactions but also the quality of that discourse.

For my research, I chose the most appropriate method of analysis to understand teachers’ perspective of the flipped classroom pedagogical practice and the features of this practice that can potentially develop communication and collaboration skills. Since my research focused on the role of flipped classroom pedagogical practice on classroom interactions in primary classrooms in Singapore, I was particularly concerned with interactions that happen within the classroom. In observing classroom lessons, I adopted a classroom observation checklist (Appendix 2). This is in line with an interaction analysis approach. Rooted in behavioural psychology, interaction analysis approaches have made significant contributions to classroom discourse analysis. These approaches employ observation instruments where analysts use tick boxes and record what they see at regular intervals (Walsh, 2011). However, such instruments only provide a partial picture of the realities that happen in the classroom in that they only measure what is observable and measurable. As contended by Nunan and Bailey (2009), these instruments can blind us to aspects of interaction and discourse that are not captured by schemes but that are important to an understanding of the lesson we are observing. In employing such instruments, as an observer, I may omit certain events that occur in the classroom that do not match the categories in my checklist and these may include overlaps, interruptions, false start to lessons, which are features of spoken discourse common in communicative interactions. In other words, interaction analysis assumes that classroom discourse progresses in a neat, linear, sequential manner, with participants following a

prescribed procedure (Seedhouse, 2004). In reality, this was not the case. Hence, even with the use a checklist and employing the interaction analysis approach to classroom discourse, another framework was necessary to analyse discourse in its entirety.

3.4.2 Classroom Discourse Analysis

Given the importance of formal education in children's intellectual and social development, classrooms have attracted the attention of a wide range of scholars over the past several decades. Researchers from education to linguistics to sociology have all brought their particular perspectives to bear on the inner workings of schools (Gee 2004). Almost all students pass through their doors, acquiring not only academic knowledge and skills, but all manners of socialization. In fact, most of them spend a significant portion of their early lives inside of schools, learning to read, write, and answer teachers' questions, learning how to respond, learning classroom rules and so on. At the heart of all of these activities are interactions among teachers and students, the currency of which is discourse (both verbal and non-verbal). Teachers use discourse strategies as these perform important functions such as, communicating information and instructions, as well as retaining control of interactions by initiating them with questions (Cloat, 2014). The goal of the present research was to understand the discourse strategies that teachers and students use in another aspect of classroom interaction, namely, negotiating a balance between teacher control over lesson content and student participation in educational interactions (Emanuelsson & Sahlström 2008). The study of discourse strategies underlying the balance between teacher control and student participation is also closely related to work in educational linguistics on the balance of teachers' and students' interactional rights, which include the roughly parallel concepts of setting the topic of discussion and having turns at talk (Heritage & Heritage 2013).

Another framework commonly used in classroom discourse analysis is referred to as discourse analysis approaches. These approaches analyse the structural patterns and functional purposes of classroom discourse. Sinclair and Coulter (1975) were among the earliest proponents of these approaches. However, analysing more deeply into these approaches show that these were developed and data drawn during an era of teacher-centred

classrooms. According to Walsh (2011), recent evidence suggests that in the contemporary student-centred classrooms, there is more ‘equality’ and the ‘formal, ritualized interactions’ between teachers and students are not so prevalent. Moreover, with fixed categories, the framework does not adequately capture the dynamic nature of classroom interactions. In the Singapore primary schools, teacher-centred pedagogical practices with large class sizes showed the potential to bring about a lack of classroom interactions. Hence, some aspects of this framework were of relevance, particularly to the Singapore primary classrooms.

Though there are frameworks to help me analyse interactions, teacher-student interactions are not rigid. The interactional patterns are dependent on pedagogical purposes (Van Lier, 2002). Hence with the flipped classroom pedagogical practice, the interactional patterns between teacher and student and among students were contextually driven and dependent on this pedagogical purpose.

In my study, I interviewed three primary school teachers in Singapore and observed their classroom lessons. How they deployed language to respond to the interview questions as well as how the students and teachers used language to communicate during the classroom observation, gave important insights to their identities relating to a particular social group. Because of this, James Paul Gee’s interpretation of discourse analysis seems to be most appropriate for my analysis. Gee (2014), looks at discourse analysis as one way to think deeply about the meanings we give to people’s words. He recommends paying attention to themes that emerge and to eventually organise the data according to these themes. However, the problem of discourse analysis from any perspective is the frame problem. The Frame Problem is explained as any aspect of context that can affect the meaning of an utterance. Context, however, is indefinitely large, making it difficult to conceptualize. Hence, no matter how much of the context we have considered in offering an interpretation of an utterance, there is always the possibility of considering other and additional aspects of the context. According to Gee (2014), these new considerations may change how we interpret the utterance. Therefore, any discourse analysis requires consideration of the multiple layers of context influencing the people involved and the language they use – a socially situated identity and a socially situated activity (Gee, 2014). In this thesis, I used Gee’s discourse analysis to examine

data gathered from the research participants. This approach was chosen because it enabled me to identify within the various texts of the data (interviews, observations and documents) the interweaving discourses at play around the teachers' use of flipped classroom.

3.4.3 Gee's Discourse Analysis

James Paul Gee, as sociocultural linguist and researcher provides a method for analysing language and its situated meanings. Within Gee's methods of discourse analysis, he describes social goods as "anything that a group of people believes to be a source of power, status, value, or worth" (Gee *Discourse Analysis* 2). He also states: "[S]peakers and writers use the resource of grammar to *design* their sentences and texts in ways that communicate their perspectives on reality, carry out various social activities...and allow them to enact different social identities" (Gee *Discourse Analysis* 5).

Gee defines discourse analysis as "the study of language at use in the world, not just to say things, but to do things" (Gee, 2014). Gee (2008) defines Discourse as being:

composed of distinctive ways of speaking/listening and often, too, writing/reading coupled with distinctive ways of acting, interacting, valuing, feeling, dressing, thinking, believing, with other people and with various objects, tools, and technologies, so as to enact specific socially recognizable identities engaged in specific socially recognizable activities. (Gee, 2008, p.155)

Based in Gee's aforementioned ideas about sociocultural literacy, he explains that "discourse analysis is one way to engage in a very important human task...to think more deeply about the meanings we give people's words so as to make ourselves better, more human people and the world a better, more human place" (Gee, 2014). Through people's beliefs and previous interactions, to historical, institutional and cultural settings, we have considered in offering an interpretation of an utterance. However, as mentioned earlier, there is always the possibility of considering other and additional aspects of the context, and these new considerations may change how we interpret the utterance (Gee, 2014).

As Gee claims, whenever we speak or write, we always build or construct seven areas of 'reality', namely, building tasks, building activities, building identities, building relationships, building politics (and the social distribution of goods), building connections, and building significance for sign systems and knowledge. Tools of language inquiry refer to the notions of situated identities, social languages, Discourses with a capital 'D' and Conversations with a capital 'C'. The notion of "Big 'D' Discourse" ("Discourse" spelled with a capital "D") is meant to capture the ways in which people enact and recognize socially and historically significant identities or "kinds of people" through well-integrated combinations of language, actions, interactions, objects, tools, technologies, beliefs, and values. The notion stresses how "discourse" (language in use among people) is always also a "conversation" among different historically formed Discourses (that is, a "conversation" among different socially and historically significant kinds of people or social groups). The notion of "Big 'D' Discourse" sets a larger context for the analysis of "discourse" (with a little "d"), that is, the analysis of language in use.

The concept of situated identities where we take on different identities of social positions in different settings and the concept of social languages where style of languages are enacted in to recognised different identities in different settings. Discourse with a capital 'D' is recognition. When language, action, interaction, values, beliefs, symbols, objects, tools and places are analysed together in such a way that others recognise the person with a particular type of identity, then there is Discourse analysis. In the classroom, the teacher assumes the identity of a teacher in a primary classroom and her language modalities delivered are appropriate to the content of the lesson and the age group of the students. The students assume the social position of one who is a learner in a classroom and participates in the lesson with that situated identity.

In adopting this meaning of discourse analysis to the Singapore primary classroom which I observed, the conversations between the teacher and the students and among students are analysed in situated identities.

A situated meaning is an image or pattern assembled on the spot as we communicate in a given context based on our construal of that context and on our past experience. These situated meanings do not reside in individual minds but are negotiated between people through communicative social interaction. Students require the assistance of experienced individuals to assist them in developing situated meanings. (Gee, 2014). As individuals develop relationships and conversations, these situated meanings continuously revise (Gee, 2014). These give rise to cultural models which in turn link to social practices of sociocultural groups. With these situated meanings and links to sociocultural groups, classroom interactions can be analysed. When teachers and students display situated identities and situated meanings, then there are classroom interactions.

Teachers bring their own social identities into the classroom, and the classroom provides a new space for constructing a new “situated identity” (Gee 2014) for a new social group. Attempting to analyse any amount of data from a sociocultural standpoint is challenging because of the myriad interpretations and influences at play. Given that this study is about how teachers interpret and employ a particular pedagogy and the multiple discourses that inform their practice and perceptions, it is apt for me to use Gee’s approach for discourse analysis. Gee’s building tasks “[provide] the methodological tools” to do a discourse analysis of the teachers’ interview data.

Therefore, any analysis requires consideration of the multiple layers of context influencing the people involved and the language they are using. Gee’s definition of utterance as communication that, in oral or written form, conveys “a who and what” (Gee, 2014). Specifically, Gee clarifies “a ‘who; is a socially situated identity,” and “a ‘what’ is a socially situated activity” (Gee, 2014). According to Gee, the primary function of human language is not only to communicate information, but to scaffold the performance of social activities and to scaffold human affiliation within cultures and social group institutions (Gee, 2014). Hence, in a classroom, the teacher facilitates the learning of students by participating in conversations with them and supporting conversations among them. This can be seen in the classroom vignette of all three teacher participants which will be elaborated in Chapter 4.

When they facilitated the groups, they interacted with the students by clarifying their doubts, asking probing questions and elaborating their responses. Beyond conversations, the teacher's relationship with the students and how they managed the social bonding among students can be observed with these conversations. By looking at how the students respond to the teachers' instructions and questions, as well as how the teacher elicits responses from the students gave me opportunities to look at how the teacher guided the performance of social activities in a classroom. Gee's (2014) model for discourse analysis provided insights pertaining to discourses in the classroom within a societal context and a cultural phenomenon. According to him, words have different and specific meanings determined by social and cultural groups. His idea of reflexivity shows the reciprocity between language and reality, where language constructs context and context constructs reality. How we speak creates a situation and discourse combines language, actions and interactions ways of thinking, believing, valuing, and using various symbols, tools, and objects to enact a particular sort of socially recognizable identity" (Gee, 2014)

The role of language in discourse is termed as social language. This social language has its own distinctive grammar. Grammar, which refers to how speakers and writers design their oral and written forms with patterns in them. Interpreters can attribute situated identities and specific activities to these forms. Conversation with a capital 'C' involves discourses as well as non-verbal aspects such as controversy, values and ways of thinking connected to the controversy and the symbolic value of objects and institutions. Both social languages and discourses can be tools of inquiry when we analyse language in spoken or written form. So analysing the conversations in a classroom, I was aware of the social implications as well. The teachers' word choice in her delivery of the lesson and their form of writings in the lessons uploaded in the portal reflected their social languages. Likewise, the students, as they spoke to the teacher and as they conversed among themselves, had distinct differences in the words they chose. This showed their situated identity as a student in the classroom when they spoke to their teacher and as a friend when they spoke to their peers. Both the teacher and students are representing a cultural identity to a group and that is to the school that they belong to.

According to Gee (2014), their social language is representative of the institution that they identify with.

When teachers and students engage in conversations, these can be analysed in the light of their social positions and their situated identities and what situated meanings are conveyed. Based on the interactions that occur in the classroom among students during group work, it the situated meanings of the students were continuously modified. Their responses were also based on sociocultural influences and situated meanings depending on the context in which language occurs (Gee, 2014). In analysing classroom interactions, the teacher displayed a situated meaning. With communicative social interaction with her students, the situated meaning was revised as well. Based on the classroom observation and interviews with the teacher participants, they displayed a situated meaning of the flipped classroom pedagogical practice. This will be further elaborated in the next chapter.

My analysis is based on Gee's seven building tasks. The seven building tasks I considered were; building tasks, building activities, building identities, building relationships, building politics (and the social distribution of goods), building connections, and building significance for sign systems and knowledge. Applying these seven building tasks in analysing the interview data of the teacher participants allowed me to analyse the utterances of the teachers in context. From this analysis, I developed on themes and related the findings of the analysis to my research questions.

3.5 Ethical Considerations

Studies involving a human sample have some ethical implications. Hence, it is important to establish trust with the research participants and this was achieved by ensuring confidentiality. Interview research comes with moral and ethical issues. Ethical problems in interviews arise because of the complexities of researching private lives and placing the accounts in public arena (Maunthner et.al, 2002).

This research followed the ethical guidelines required by RMIT University and was approved by the Design and Social Context College Human Ethics Advisory Network

(reference number 0000020341-07_16). Confidentiality was assured to all participants and the research process was explained and how the data will be presented, providing as much information on the study and its aims and objectives without influencing responses. Each teacher participant has been given a pseudonym. All transcripts and notes were handled with strict security. The names of the school and participants were disguised in all research data to protect their identity. Written permission was sought with the school Principal as well as with the Ministry of Education (MOE) with the Participant Information and Consent Form (PICF) via email. A synopsis of the proposed study was included with the PICF. A request to interview three of the teachers, teaching the three upper primary levels and who have been trained and have implemented the flipped classroom pedagogical practice was made with the MOE, Singapore. The interview questions were attached with the PICF as well. Once approval was granted by MOE, I met with the Principal in person to select the teachers. The teachers' permission was also sought with the PICF. Once teachers signed the PICF, I conducted the interviews and carried out the lesson observations. They consented and gave me a copy of their lesson planning notes and weekly lesson schedules.

3.6 Summary

The qualitative method of research for this study involved one primary school in Singapore with upper primary levels of Primary four, Primary five and Primary six with large class sizes. Interviews were conducted with one teacher representing each upper primary level and their lessons were observed. Data sources from three teacher interviews, three classroom observations and policy document analysis were gathered. Data from the interviews and policy documents were analysed with discourse analysis frameworks. The findings and analysis are presented in the chapters that follow.

Chapter 4: Findings and Analysis

4.1 Introduction

The aim of this chapter is to present the findings and analysis of the research data. Semi-structured interviews with three teacher participants, three lesson observations and lesson planning notes were collected. The fieldwork data was analysed in the light of the research questions. An overview of the Singapore, MOE policy was presented in Chapter 2 under section 2.3 and references are made to the policy in this chapter wherever applicable.

The data will be presented with a description of the physical layout of a typical primary classroom in Singapore. While there are minor differences between the classrooms of the teacher participants, the layouts vary only minimally. Next, the teacher participants will be presented. Each teacher participant will be introduced with their reasons or philosophical stance about flipped classroom pedagogies based on the interview data. As discussed in Chapter 3, the data from the interviews with the teacher participants will be analysed with Gee's (2014) discourse analysis of seven building tasks.

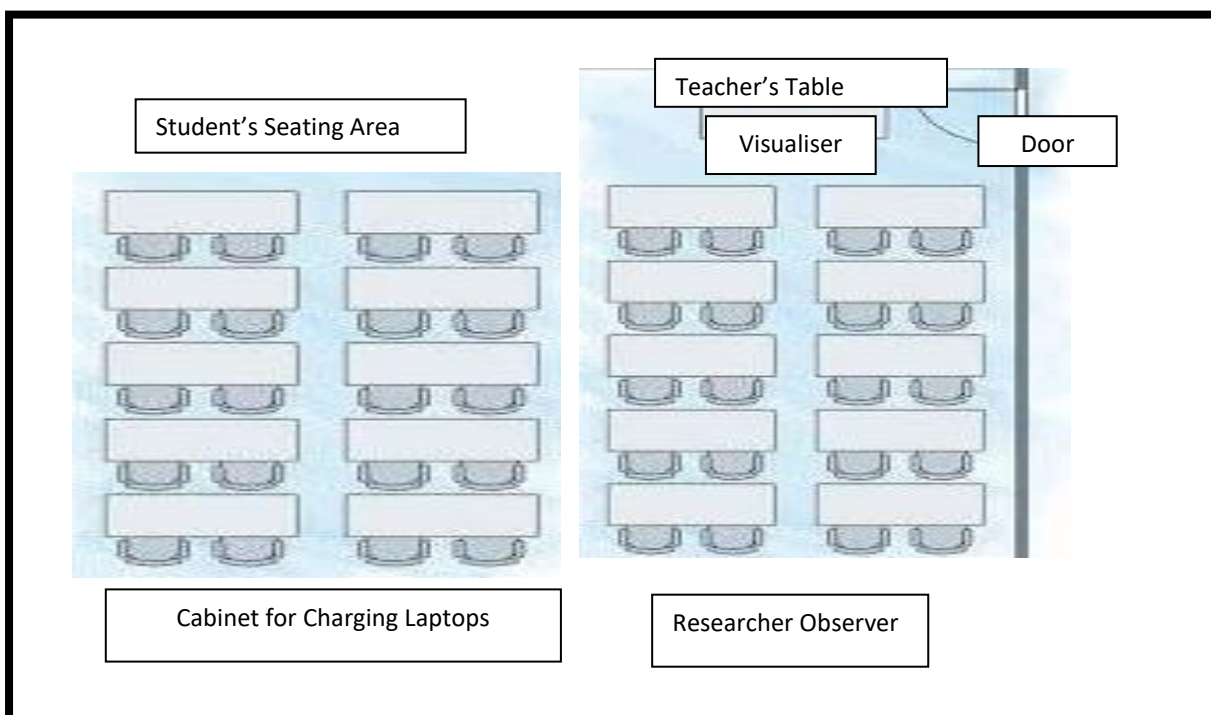
Then the vignette, which is a brief account of the flipped classroom lesson observed for each teacher participant will be presented. The vignette is reconstructed from detailed field lesson observation notes. Following this, an analysis of the nature of classroom interactions in flipped classrooms observed with data drawn from the vignette and the interview will be presented. These findings will also be analysed in relation to the development of communication and collaboration skills in flipped classroom settings. The role of the teacher in promoting interactions and in developing communication and collaboration skills will also be analysed with data from the interview and the vignette. The challenges encountered in the implementation of the flipped classroom pedagogies and the strategies adopted by the teachers to overcome these challenges will be presented for each teacher participant as well. Finally a synthesis of all findings will be presented as a summary.

The teacher participants are Gary, Katherine and Hannah. Each teacher participant had a unique experience in implementing flipped classroom pedagogical practice. Gary's experience

centred on the role of the teacher, the importance of being at the leading edge of contemporary teaching practice and using flipped classroom as a problem-solving strategy. Katherine’s experience centred on the nature and incidence of classroom interactions in small groups as well as in whole class teaching and learning. Hannah’s experience with flipped classroom pedagogies centred on allocating class time for deep discussions of lesson content.

Most Singapore primary classrooms have similar physical layouts to accommodate a large class size of forty students which is the average number of students in each class. The classrooms are equipped with a whiteboard, a screen, a projector, a visualiser (an equipment that allows for physical objects to be projected on screen and this is placed on the teacher’s table) and a cabinet at the back of the classroom with laptop charging facility. Certain classes are designated to be a “Bring Your Own Device” or BYOD classroom. This is a programme in the school where students are encouraged to bring their own laptops to the class for lessons. There are forty chairs and tables for the students. The teacher’s table is placed in front of the students’ seating area. Figure 4.1 illustrates the typical layout of a Singapore Primary classroom.

Figure 4.1 – A typical classroom layout of the Singapore Primary classroom.



4.2 Teacher Participant 1 - Gary

4.2.1 Profile

Gary is a Primary six (age 11-12 years) classroom teacher who teaches Math and Science. He has been in the teaching service for six years. He has been trained in the flipped classroom pedagogy and has implemented the practice in his classroom for the past two years. In Gary's view his philosophical stance and reasons for adopting the flipped classroom pedagogical practice is to incorporate problem-solving skills in the classroom.

Well I guess the main reason is so that we can use our classroom time more constructively. Instead of teaching content, we teach problem-solving (Gary Interview Transcript 1: 3-4)

In applying Gee's seven building tasks to the discourse, Gary has given significance to the word 'constructively' whereby using time constructively is to teach problem-solving skills rather than teaching content. He is establishing a connection between constructive use of classroom time and the teaching of problem-solving skills.

The concept of situated identities in Gee's (2014) discourse analysis is when we take on different identities of social positions in different settings. The concept of social languages where languages are enacted to recognise these different identities to reflect the situated identities (Gee, 2014). Gary's situated meaning of flipped classroom pedagogical practice is one that moves away from teaching content to one that teaches skills such as problem-solving. In Gary's view, these problem-solving skills are pertinent in order to stay relevant as an educator. Moving away from teaching content and by teaching problem-solving skills via flipped classroom pedagogical practice shows his perspective of 'socially recognizable identity and activity'.

We have to improve, in our teaching pedagogy with time and not be like ten or twenty years ago, just teaching content. We must adjust according to the time. (Gary Interview Transcript 1 : 10-11)

By using Gee's definition of discourse to the Gary's response, we can infer that he is aware of what is expected of himself as an educator in order to stay relevant. He expressed the need for teachers to improve with time and to stay current with pedagogies. Without doing so, teachers can be stagnant like "taxi drivers" and teaching will be a "sunset industry."

Gary helps to spearhead the practice with the other teachers in the Math and Science department by conducting sharing sessions in the school. In examining Gary's weekly lesson schedule, he conducts lessons with the flipped classroom pedagogical practice at least once every week. I observed one of his Science lessons which lasted for an hour and thirty minutes.

He had assigned the pre-class tasks and allowed the students one week to preview it. He conducted the flipped lesson on the following week. I had the opportunity to observe his lesson on that day. Gary conducted a lesson on food chains and food webs. He taught the concept of predator-prey relationship of insects, plants and animals. In this lesson, the students were asked to view a video (an internet resource) and read the accompanied notes from the school's e-learning portal on food chains and food webs. The objectives of the lesson were for the students to:

- Understand what is a predator and a prey, a food chain and a food web
- Form a food chain with the given animals

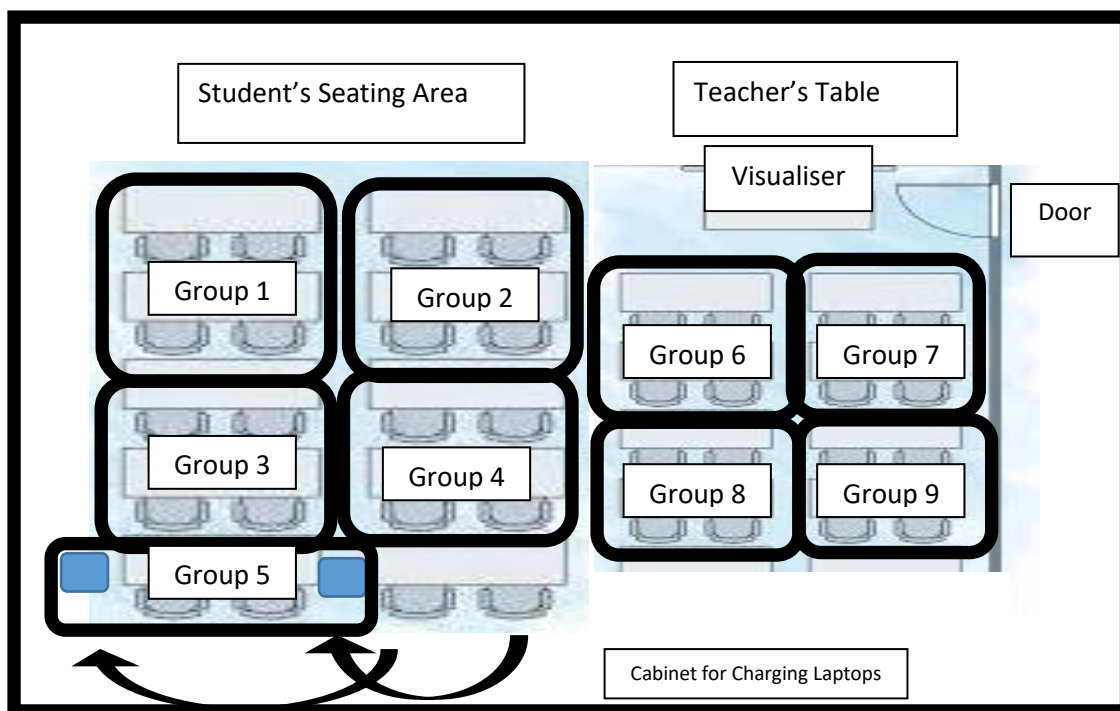
4.2.2 Classroom Vignette

Gary started the lesson by asking the students if they had viewed the instructional video that was uploaded on the school's e-learning portal, a week prior to the lesson day. Two students raised their hands and when Gary asked them on what they saw, each one of them gave their responses on the video. One of the students said that it was funny to see the animals attacking one another and the entire class laughed at his response. Gary then talked about the video, highlighting the key components of the clip as well the notes. Then he asked a question to the entire class "Why do you think a food chain starts with a plant?" A few students raised their hands. Gary asked one of them to answer and he

said, “Plants make their own food so they are called producers. So the food chain starts with the plants and ends with an animal.” Another student stood up and said, “Animals cannot make their own food, so food chains start with a plant.” Gary asked a few other questions to check for students’ understanding of a food chain. This question and answer session led by Gary lasted for about ten minutes.

Gary then instructed the students to sit in groups of four. The classroom layout was as follows during group work (please see Figure 4.2 – Classroom Layout in group work in Gary’s classroom). The students turned their seats to face their classmates, except for Group 5 where the students moved their seats to join the last two students in row 1. There were a total of nine groups in a class of thirty six students.

Figure 4.2 – Classroom Layout during Group work in Gary’s Classroom



Once, the students were in groups, they started to talk to each other. Most were randomly conversing about issues other than the lesson. There was more ‘off task’ noise than ‘learning noise’ in the classroom. To get their attention, Gary alerted the students

to pay attention. He requested the group leaders of each group to come forward to collect the worksheet for the group. Each group had a different worksheet. The students had to form a food chain based on the animals and plants given in the worksheets. Each worksheet had different animal and plant names. Gary showed a set of animal and plant names on the screen. Then he showed a food chain template. He formed a food chain and modelled what he expected the students to do. The worksheet had names of plants and animals with a few food chain templates. The students, in their groups are to fill in the names of the plants and animals into the template and form complete food chains. Each worksheet had four food chains. The students were told that they had to present their food chains as well as justify the order in which the food chains were formed. This was conveyed to the students before they started on their group task.

Gary then asked the class if anyone had not viewed the video or read the notes. About eight students raised their hands. While the rest of the class proceeded with the assigned task, the students who had not completed the pre-class task used the class laptops to access the video and notes.

I walked around the class to see how the students were getting on with the task. Group 1 had three members with one member being one of the eight students watching the video. The group leader prompted each member to work on a food chain. After one student completed his food chain, he looked over at his peer's food chain and made comments. Likewise, all the three students exchanged views on their food chains. I walked over to Group 2 where all the four members were busy doing their food chains. One student asked if he had sequenced the animals in the right order. Another student gave his response to his question. After creating their food chains, the group leader asked each student to present it. When each student showed his or her food chain, the others gave comments. I walked over to Groups 8 and 9. There were some students who did not know what to do and asked for help from the other members in the group. The students helped each other to form the food chains. Of those who had done the food chains, some were correcting each other's food chains by giving comments and to re-order the animals. Some students refused to make changes and refuted their comments. At this point, the

eight students joined their respective groups and started creating their food chains. Gary was with Group 5 where one of the students presented his food chain. He asked the rest of the members in the group if the food chain was correct and to give suggestions. Gary gave a few hints to get the student to re-order the food chain. He told the rest of the members to discuss each of the food chains and to give feedback. All the students were creating and giving feedback on the food chains. Gary then asked the students to come forward and to present their food chains to the class.

Each group came forward and placed their food chains on the visualiser for the rest of the class to see. Before they presented, Gary told the rest of the class to listen attentively to the presentations so that they can check to see if the food chains had been done correctly. The group leader presented the food chains while the other three members stood beside him. Once the presentation was over, Gary asked the rest of the class to give comments. Initially the students did not comment and Gary had to call on a few students at random to give comments. But as the presentations proceeded and with the Gary's probing, more students from the rest of the class participated in the discussion. After every presentation, Gary gave his views on the food chains. The students took notes of his comments and corrected their food chains. Once all the groups had presented, he summed up the session by reiterating the concept of a food chain. He then played a video clip on plant and animal eaters as a lesson conclusion. Once the video ended, Gary told the students to hand in the worksheets and to get ready for the next lesson.

With Gary's profile, classroom vignette and the interview, the next section will look into how the data responds to the research questions, primarily centred on classroom interactions and the skills of communication and collaboration.

4.2.3 Classroom interactions

The findings on the extent to which flipped classroom pedagogical practice had contributed towards classroom interactions based on the vignette is presented here. At the start of the lesson, Gary addressed the whole class and talked about the video and notes via direct instruction. Then he led a question and answer session with the students. The questions were

asked to check for understanding of factual knowledge of food chains. Most of the questions were closed questions with a few open questions. Not all the students participated in the session as there were limited opportunities for interaction in this session. Though there were open questions to elicit ideas from students, the students did not respond with an elaboration of their ideas.

During group work, the students worked on the given task. The group leader initiated the conversation by asking each student in the group to form their food chains and to talk about it. While forming their food chains, the students asked questions in the group as they were seeking affirmation from each other on their food chains. As the students discussed the food chains with each other, they made references to the video and notes of the pre-class task.

Gary approached each group and gave feedback on their food chains. He asked a few probing questions to the students in order for them to re-order their food chains. The students responded to his comments and clarified their doubts while some amended their food chains.

It is clear from the vignette that the students in Gary's class interacted with Gary and with each other. The interaction was in the form of answers to Gary's questions, asking questions to Gary and of each other, as well as providing feedback to each other about their work. Gary still needed to use probing questions to encourage comments and discussions from the students. His facilitation of some groups with probing questions did seem to enhance interactions within the group. Facilitating students while they are interacting during group work has also shown the evolving role of the teacher in building relationships as well as building activities as outlined in Gee's (2014) building tasks.

The group leaders also played a pivotal role in managing the responses of each student towards the food chains and to consolidate these responses for the class presentations. Though it was a group activity, the students had to create the food chains individually. Though the students had to work on their task individually, they had to be in a group to have an affirmation from the other group members that the task is done correctly. There were instances of interactions with the members in the group giving comments on each other's food chains. While talking to one another, the students made references to the information

from the instructional videos and notes given for pre-class tasks. The flipped classroom pedagogical practice framework does seem to have allowed for classroom interactions as these students contributed towards the task, both individually and as a group based on the vignette.

The potential contribution of flipped pedagogies in Gary's classroom experience towards interactions will now be explored based on the interview data. An analysis of Gary's interview data with Gee's discourse analysis is presented in Table 1.

In applying Gee's seven building tasks to the interview transcript of Gary, the analysis has led to several findings. With reference to Table 1, Gary expressed that there were incidences of classroom interactions when students were involved in group work, especially when problem-solving tasks are assigned to the groups.

...because flipped classroom is about teaching problem-solving so I usually have a worksheet or a problem ready for them to solve immediately after clarifying what they have learnt the night before. So the problem usually requires group work, and the problem usually requires some interactions and maybe even presentations.
(Gary Interview Transcript 1 : 28-31)

In applying Gee's seven building tasks to Gary's interview data, he is giving significance to problem-solving activity that can be carried out in flipped classrooms. According to Gary, there are much classroom interactions with the problem solving activity and this addresses the first research question. In this case, the problem-solving activity considered to be one of the features of the flipped classroom pedagogical practice has the potential in improving classroom interactions.. The relationship between problem-solving, group work and thence classroom interactions can be seen in the discourse. In Gary's view, with flipped classroom, his students work together via problem-solving activities in group work. As students converse with each other over the problem-solving activity, where in this case, the formation of food chains, there is much interactions in the classroom. As Gary facilitates the groups by asking probing questions, giving hints and offering feedback, the students respond to him, thus promoting classroom interactions. As mentioned earlier, the students talked about the

information given in the pre-class task, in this case, the resource video and accompanied notes while responding to the group task. In this way, the pre-class task also has a role in eliciting interactions in the group. Just by placing the students in group might not elicit interactions as much as if they were given a pre-class task and a class-based task within the framework of the flipped classroom.

When the problem-solving tasks are completed, the students present their tasks to the whole class. As mentioned in the interview, these group presentations contribute to classroom interactions as well. Based on the vignette, during such presentations, Gary requested the students to give comments to the group that presented. This too provided the opportunities for classroom interactions. Therefore, Gary, through facilitating the students during group work as well as during group presentations, has shown that the incorporation of problem-solving activities within the flipped classroom pedagogical practice does seem to have the potential to bring about classroom interactions.

Now, I shall look at how the data from the vignette and the interview inform towards the skills of communication and collaboration.

4.2.4 Communication and Collaboration skills

In giving significance to problem-solving skills, Gary explains as students engage in group discussions in trying to solve the problem, they develop skills of communication and collaboration:

usually they will have a problem to solve through interactions among themselves, through discussions, and then after which they need to present their answer. So the activity itself just naturally blends and lends itself to the 21st Century skills of communication and collaboration. (Gary Interview Transcript 1 : 33-36)

He is enacting the discussion activity in the classroom via the problem-solving strategy of the flipped classroom pedagogical practice. In applying Gee's building tasks, he is making a connection between the interactions and the development of communication and collaboration skills. In light of the second research question, the flipped classroom with its

problem-solving activity has the potential in eliciting classroom interactions. According to Gary, with these interactions, communication and collaboration skills can be possibly developed among the students. With discussions, he perceives that he is able to bring about the development of the skills of communication and collaboration. He is also making a connection between classroom interactions and development of these skills. He perceives that by promoting interactions in the classroom, he can help to build on these skills.

Gary perceives interactions as equivalent to communication and collaboration in the classroom based on the interview data. With group work, discussions and problem-solving activities, he believes that these skills can be incorporated in the classroom. With the inclusion of problem-solving activities, Gary seems confident that the students can communicate and collaborate. Students communicated with each other by providing feedback, offering suggestions, asking questions to clarify doubts and by comparing responses towards the group task. When they formed their food chains individually, they ask for feedback from the rest of the group members. Likewise, they gave their comments to the other members in the group. In this way, there were opportunities for developing communication skills among the students. When they consolidated their individual food chains for class presentation, there were opportunities to foster collaborative skills. All of these communication supported the collaborative approach to the group task which they had to complete.

The problem in the form of the group task is to encourage students to engage in discussions and to allow for more interactions to take place in the class. Hence, the features of the flipped classroom pedagogical practice that allows for the design of problem-solving activities does seem to have the potential to bring about the development of skills of communication and collaboration in the classroom.

According to Gary, the students were engaged in the lesson by them participating in the classroom discussions aimed at problem-solving. In Gary's view, the students may not be learning as much as from a didactic, teacher-centred approach that focuses on content delivery as they learn through participating in discussions. Gary states that by having students engaged in classroom discussions, the skills of communication and collaboration can be

fostered. Based on the lesson observation, the teacher had prompted students to participate in discussions. When each group presented their work he had asked the other students to express their opinions on the presented task. The students too participated in the discussions after listening to each presentation. In this process, the students may have the opportunity to learn from each other. In Gary's opinion, within the flipped classroom pedagogical framework, he was able to design his lesson with group work, discussions, problem-solving and collaborative activities. In this way, the practice does seem to have the potential to allow for classroom interactions as well as the development of skills of communication and collaboration. Now I shall present the challenges faced by Gary in implementing this practice.

4.2.5 Challenges

In Gary's view, implementing the flipped classroom did not pose any major problems.

individually there is not much of a problem because doing it for one class is simple enough. As long as most of them or ninety percent of them have the technology to do right, then it is fine. For the ten percent right, I can just show them the video the day before and after which the next day they can participate too. So it is not much of an issue. (Gary Interview Transcript 1 : 44-47)

However, he is expressing an underlying concern of technology not being accessible for all students.

One of the challenges faced by Gary with the flipped classroom pedagogical practice was to drive the practice as a programme in the department as mentioned in the interview.

The issue is how to drive the flipped classroom as a department, like a Math department, or Science department – how to have a group of teachers doing it together. (Gary Interview Transcript 1 : 48-50)

He attributes this to the fact that there are students of different ability groups in each class that makes it challenging to share resources across the classes and departments. Moreover, the videos are prepared with a common objective but the individual teacher for each class may have a different objective or emphasis.

Gary also expressed his belief that the practice is less suitable for lower progress students or students who are of lower academic level. Based on the vignette, there were students who had done the pre-class tasks but did not know how to form the food chains as much as the rest. Though he had students who came to class without doing the pre-class task, he says this problem can be managed. He has a few students in his class who do not have access to the internet at home, which makes it difficult for them to view pre-class task videos at home. For these students, he gets them to view the videos in class during the lesson while the others were working in their groups. In his opinion, in this way he is able to overcome this challenge.

4.2.6 Summary

In observing Gary's lesson, weekly lesson schedule, interview transcript, there are some findings on classroom interactions. Though the students were placed in small groups, individual tasks were assigned to each student. Based on the vignette, the students interacted within their groups to complete the task. The teacher expressed his belief that the nature of the task set as a problem-solving activity, can enhance interactions within the classroom. Hence, in Gary's view, the task design and the group setting in the classroom seem to allow for interactions to take place. He has attributed these interactions to be vital in the development of the skills of communication and collaboration. An analysis of Gary's interview data with Gee's discourse analysis is presented as follows in Table 1.

Table 1 - Gee's Discourse Analysis of Gary's Interview data								
Gee's seven building tasks								
No.	Data Extract	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
1.	Reasons for using flipped classroom “...the main reason is so that we can use our classroom time more constructively instead of teaching content, we teach problem-solving”	It seems like Gary has given significance to the word 'constructively' and according to him, using time constructively is using it effectively by teaching problem-solving than teaching content.	Gary is using discourse to show a contrast between content teaching and teaching of problem-solving. He views flipped classroom pedagogical practice as one that can be adopted to use classroom time more effectively and that is, to teach problem-solving skills.			He is giving a perception that classroom time has to be purposefully deployed and this cannot be achieved by just teaching content. What is deemed right is to teach skills rather than content as conveyed by the teacher here.	He is showing a connection between constructive use of class time and the teaching of problem-solving skills.	
	“..with technology right, kids could easily get the content and through sources like youtube and other websites. They do not really need a teacher. If we were to rely on classroom time just to teach content right, we will be out of job (laughs) like a taxi	He is giving significance to the need for a change – the role of the teacher to be evolving from one who delivers content to one who teaches skills.	The Discourse highlights the role of the teacher to stay relevant by adopting teaching strategies and pedagogies that is abreast with the current	In this Discourse, Gary, reflects on the role of the teacher. He perceives the teacher as someone who not only delivers content, but	He is expressing his relationship towards his learners in the classroom. He perceives that by just giving content knowledge, he will be not be able to secure	Through this Discourse, he is conveying the modern day knowledge acquisition by the students is via the internet. Hence the teacher has to be more than someone who		He is trying to privilege the teaching of problem-solving to content delivery in the classroom.

No.	Data Extract	Table 1 - Gee's Discourse Analysis of Gary's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	driver or whatever. We will be a sunset industry. So that's one reason why. We have to improve, in our teaching pedagogy with time and not be like ten or twenty years ago, just teaching content. We must adjust according to the time."		educational landscape. By adopting the flipped classroom pedagogical practice, the teacher is trying to convey that he is changing with the times.	one who teaches skills, in tandem with changing landscape of education and society. He identifies with a teacher who has to improve his or her own teaching pedagogy. The flipped classroom pedagogical practice is seen here as one that is innovative and adjust according to the time, as perceived by Gary.	the relationship as a teacher with this students. 'They do not really need a teacher' shows the Discourse of him expressing the need for change – from a content giver to one that teaches skills.	delivers content, one who imparts skills and scaffold learning. The teacher has to be do this, in order to stay relevant.		
2.	Impact of flipped classroom on Interactions "because flipped classroom is about	He is giving significance to the aspect of problem-solving that can be	Relationship between the problem-solving technique and		He is able to get his students to interact via his lesson design –		He is making a connection between flipped	

No.	Data Extract	Table 1 - Gee's Discourse Analysis of Gary's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	teaching problem-solving so I usually have a worksheet or a problem ready for them to solve immediately after clarifying what they have learnt the night before. So the problem usually requires group work, and the problem usually requires some interactions and maybe even presentations. So definitely, it has improved student interactions."	carried out within the flipped classroom framework. He perceives problem-solving, as one that requires group work and thence student interactions.	the flipped classroom pedagogical practice is also highlighted here.		with incorporating problem-solving techniques. Interacting with his students and facilitating interactions among students shows his role as a teacher, building relationships.		classroom and problem-solving strategies. He perceives the flipped classroom pedagogical practice as one that allows for or has the potential to be closely connected to building problem-solving skills in the classroom.	
3.	Impact of flipped classroom on 21st Century skills of communication and collaboration ".usually they will have a problem to solve through interactions among themselves, through discussions, and then after which	Again the significance is given to problem-solving. Through problem-solving, the students, in their groups, engage in discussions, thus developing the skills of communication and collaboration.	He is enacting the discussion activity in the classroom via the problem-solving strategy of the flipped classroom pedagogical practice. With discussion, he is able to bring				Again he is making a connection between interactions in the classroom and the development of skills of communication and	

No.	Data Extract	Table 1 - Gee's Discourse Analysis of Gary's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	they need to present their answer. So the activity itself just naturally blends and lends itself to the 21st Century skills of communication and collaboration."		about the development of skills of communication and collaboration.				collaboration. He perceives that by carrying out interactions in the classroom, it can build the requisite 21st Century skills.	
4.	Challenges faced with flipped classroom "..individually there is not much of a problem because doing it for one class is simple enough. As long as most of them or ninety percent of them have the technology to do right, then it is fine. For the ten percent right, I can just show them the video the day before and after which the next day they can participate too. So it is not much of an issue."	Here, the teacher expresses significance to the idea that there is no pertinent problems with conducting lessons with the flipped classroom pedagogical practice. In his Discourse, he expresses significance to technology – With technology, the students can easily access the resources.		Gee's I- statements are used to determine what identities are being constructed with language. By using I, we, us, and our to express a sense of belonging indicates a connection to the community of teachers, a particular social group in Singapore. His narrative		He is expressing an underlying concern of technology not being accessible for all students. However in this Discourse, he has expressed his strategies in overcoming the concern, though they are not long term solutions, but pragmatic ones.		

No.	Data Extract	Table 1 - Gee's Discourse Analysis of Gary's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
				includes hints that his identity built through this language is one of acceptance and affiliation with the community of teachers.				
	<p>“The issue is how to drive the flipped classroom as a department, like a Math department, or Science department – how to have a group of teachers doing it together.... sharing resources can be a bit tricky because let’s say I created a video and another teacher want to teach the same topic, however, my video may not be suitable for her class – she might want to emphasise on something else. So that is tricky and that</p>		<p>In this Discourse, he views flipped classroom as a strategy that can be implemented by sharing of resources by teachers, though there are challenges faced such as the resources might not be fully applicable to all classrooms, hence requiring customization.</p>	<p>In this Discourse, he assumes the role of a team player in a community of teachers. He expresses concerns of sharing resources within the department. The Discourse highlights the contrast of him as a classroom teacher and as a team member</p>	<p>By sharing resources on flipped classroom, he is showing his relationship with his group of teachers. However, this relationship of sharing resources can be impacted by the need to address differentiated learning in the classroom.</p>			

No.	Data Extract	Table 1 - Gee's Discourse Analysis of Gary's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	hinders us from sharing very freely. Might be we can still share but that is one problem that I can foresee."			in the department.				
	"I think it is not that suitable for lower progress students. But usually when I do flipped classroom, it is quite exciting because there is problem-solving involved, there is discussions involved, usually the students are quite engaged. I think usually when you just teach content knowledge, students minds may wonder off. When you give them an activity to do, usually they try to do their best.."	The significance is expressed on how the problem-solving aspect of lesson planning, being integrated in the flipped lesson framework, has implications to student engagement and differentiated learning.				By this Discourse, he is implicating the relevance or appropriateness of the flipped classroom pedagogical practice to higher or medium ability students. The distribution of social goods in his opinion seem to be towards students with medium and high ability in terms of academic achievement.		In this Discourse, he mentions the suitability of the flipped classroom pedagogical practice for high or even medium ability students as compared to lower ability students.

4.3 Teacher Participant 2 - Katherine

4.3.1 Profile

Katherine is a Primary four (age 9-10 years old) classroom teacher who teaches Tamil Language. She has been in the teaching service for twelve years. She is trained in flipped classroom pedagogy and has implemented the practice in her classroom for the past two years. Her philosophical stance on flipped classrooms is that she aspires her students to come '*prepared*' for the lesson and to be responsible for their own learning. In doing so, Katherine has given situated identities to the role of students in her class. With reference to Table 2–Gee's Discourse Analysis on Katherine's Interview Data, she has given significance to the term 'actively engaged' where she expresses that when students do the pre-class task, they are prepared for the lesson and are also responsible for their own learning. With the knowledge from the pre-class task, they can be actively engaged in the lesson.

I wanted my students to be prepared for the lesson beforehand. I wanted them to be actively engaged in the learning process and to be responsible for their own learning. This can only happen when they come to class prepared with prior knowledge or be ready with questions to apply that knowledge.
(Katherine Interview Transcript 2 : 3-6)

In applying Gee's building task to the interview data of Katherine, she is giving significance to students taking charge of their own learning by coming prepared for class. As they engage in the assigned pre-class task, they will come prepared for class and be ready with questions. In light of the first research question, one of the features of the flipped classroom pedagogical practice is for students to engage in the pre-class task. According to Katherine, as they do the pre-class task, they will come prepared with questions. As they ask these questions to the teacher or their peers, there is much interactions in the classroom. With Gee's building task, Katherine is also making a connection with flipped classroom and the activity of coming to class prepared with questions. These questions can be a feature of the flipped classroom pedagogical practice that has the potential in contributing to classroom interactions.

Katherine conducts her lesson in the Tamil Language classroom. The layout of the classroom is given in Figure 4.1. In examining Katherine's weekly lesson schedule, she conducts lessons with the flipped classroom pedagogical practice at least once every week for the Primary 4 level. The lesson that I observed lasted for one and a half hours. In examining her weekly lesson plan for that level, she had assigned the pre-class task and allowed the students two days to preview it. In the lesson that I had observed, she conducted a comprehension lesson. The objectives of the lesson were for the students to:

- Understand the comprehension passage
- Summarize the main points of the passage
- Answer the open-ended questions related to the passage.

4.3.2 Classroom Vignette

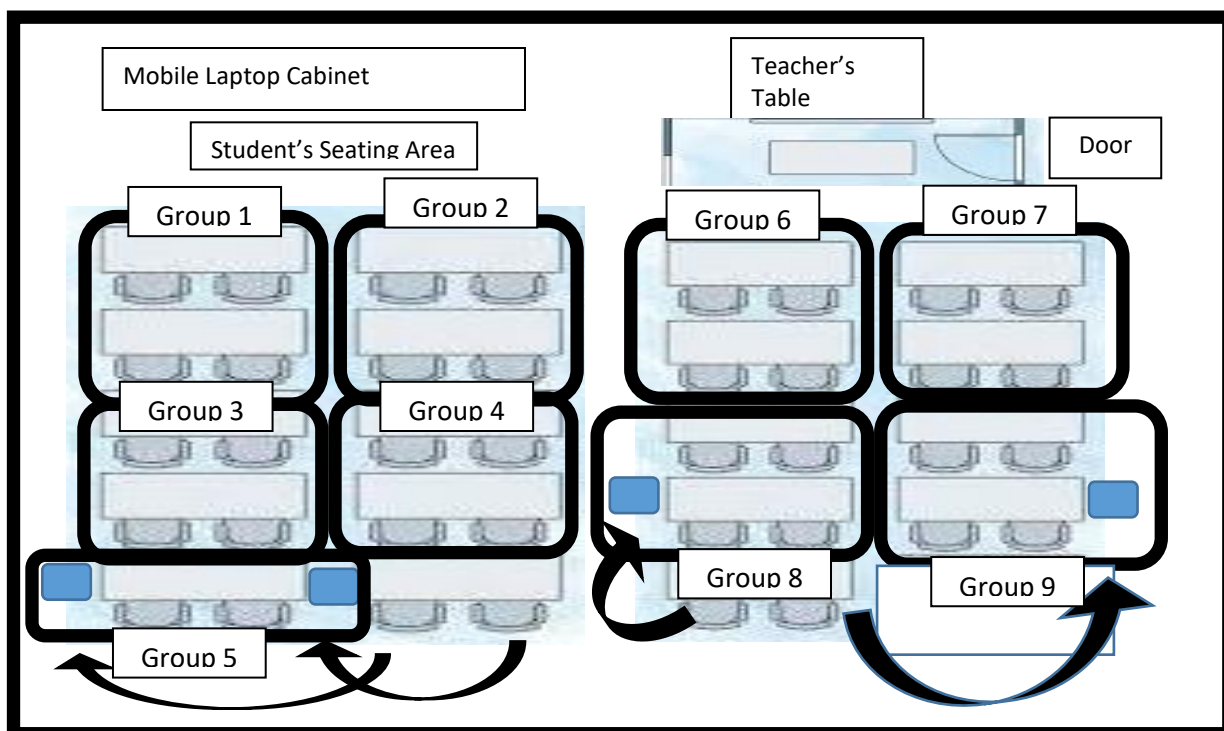
Katherine started the lesson by asking the students if they had read the passage that was given to them two days prior to the lesson day. There was some murmuring among them and none of them gave her a response. Some students occasionally turned around to look at me. They were quite wary of my presence in the class. I wondered if my presence will inhibit the interactions in the class. Nevertheless, I continued to observe the lesson. Katherine proceeded by asking a question on the passage. One student raised his hand and responded to her question. She then proceeded to ask a second question on the passage. No one responded and Katherine called on a student. He stood up but he did not know the answer. He remained silent. She then told him to sit and called on another student to answer. The student gave an answer. Katherine elaborated upon his answer. She proceeded to ask another question on the passage. She called on another student to answer and he gave a brief answer. Again she elaborated his answer to the class. Throughout the questioning session of the lesson introduction, the students listened intently to her without talking to one another. All her questions were knowledge questions aimed at testing whether the students had read and knew the facts of the passage. However, I felt that the students were a little shy or apprehensive to speak up in responding to her. Maybe, it could be due to my presence in the class as said earlier or the students may not have read the passage to give the answer that she had expected

them to. Katherine had to elaborate upon the responses given by the students who had responded to her questions.

Katherine then instructed the students to form their groups. When I asked her, she mentioned that she had grouped them based on their academic level. The academic level of the students is based on their test scores of the Tamil Language assessment conducted at the beginning of each year. Each group had a mixture of students from the lower, middle and high academic levels.

During group work, the students took their positions to face their groupmates. There were a total of nine groups. The classroom layout during group work is shown in Figure 4.3 as follows:

Figure 4.3 – Classroom Layout during Group work in Katherine’s Classroom



Once, the students were in groups, they started to talk to each other with most of them engaged in off-task conversations. Katherine alerted the students on the rules of group work.

Katherine turned on the projector and her laptop. She showed the five open ended questions of the passage on the screen. Each group was given a question to work on. Five groups were assigned with a question each. The remaining four groups were assigned with a task to summarize the main points in the passage. This was the pre-class task set for the students. In group work, they were to develop a consensus view of the task. Since there were four paragraphs in the passage, each group was assigned with one paragraph to work on.

Hence, the groups were assigned with the following task:

Group 1 – Question 1

Group 2 – Question 2

Group 3 – Question 3

Group 4 – Question 4

Group 5 – Question 5

Group 6 – Paragraph 1

Group 7 – Paragraph 2

Group 8 – Paragraph 3

Group 9 – Paragraph 4

She logged into the school's e-learning portal and clicked on the social learning wall application. She told the group leaders to type out their responses in that portal. The social learning wall is a page dedicated to this class where only members of this class can view this page. The page shows all the posts by the students in the class. Once a group posts its response in the page, all the other students in the class can view the post as it works like a newsfeed with posts being posted continuously by the various groups. Once Katherine had assigned the tasks to the groups, she asked them to proceed with the task. She asked the class if anyone had not read the passage or had not done their homework, to read the passage before joining in the discussion. I saw a few students – about 6 of them were reading the passage, while still seated in their seats. They did not move away from their groups or go to a corner to read the passage as they had done in Gary's class

where he isolated them to a corner to watch the pre-class task video. While these students were reading the passage, the other students in the groups started discussing their task.

The group leaders walked towards the laptop cabinet and took a laptop each. They brought the laptop to their groups and logged into the e-learning portal. They clicked on the social learning wall application of the portal to key in their responses for the task. I observed the group, seated closest to me, which was group 9, where the group leader started the conversation by asking them what was important in paragraph 4 of the passage. One student in the group gave his response. Another student interrupted his response and gave his opinion. While this was going on, the group leader told his group members to speak one at a time. He asked them, one by one to share their views. Once all of them had shared their views, he proceeded to type the responses on the portal. As he typed, he read out the post with some students in the group intermittently correcting him or asking him to amend the post.

I walked around to see what was happening in the other groups. Group 6 was discussing paragraph 1 of the passage. Katherine was with this group. One student in the group was reading the passage as he had not read the passage prior to the lesson. The group leader asked the other two students what he should post for this paragraph. The two students did not respond as they did not know how to approach the task. Katherine prompted them to speak with a probing question. Then one student spoke up. The other student then added on to what the first student spoke. Then the student who was reading the passage, quoted a sentence from the first paragraph, saying this is an important point in the paragraph. The group leader proceeded to type out their responses in the portal, asking them if it was correct. The students then read the post and added on to the post.

Katherine then moved to the group that was louder than the rest – group 5. The group leader expressed his concern that the group members had differing answers to question 5 and did not know which one to post. She facilitated the group by offering suggestions

and prompting them to think about the question, by highlighting the key words. The group then started to discuss the question again.

Group 1 was generally very quiet as two students had not read the passage and could not contribute to the task. I looked at the screen and out of nine groups, six groups had put up their posts for the tasks. Group 2 had completed their task and started to talk to each other – I can sense that their conversation was not focused on the lesson. Some groups were faster than the rest to complete the task. These are the groups with all of its members who had completed the pre-class task. Hence, they could get on with the task promptly.

Katherine moved to the groups that were louder than the rest – her movement gravitated towards noise. She offered suggestions on how they can approach the task. Once all the groups have posted their responses onto the portal, the teacher instructed the groups to look at the responses. After about five minutes, she requested each group to present their task. While group 1 presented, the other groups were quiet. She prompted the other groups to comment on group 1's presentation. One student, from group 6 gave feedback. Likewise, all other groups presented their task with Katherine prompting other group members to give feedback. She concluded the lesson with a short description of the moral values derived from the passage. She set a homework for the students to complete the five open ended questions on their own and to submit it the following day.

With Katherine's profile, classroom vignette and her interview, the next section will look into how the data responds to classroom interactions and the incorporation of communication and collaboration skills.

4.3.3 Classroom Interactions

The rich description of the classroom vignette has given some insights to classroom interactions.

On the lesson day, Katherine had grouped the students into groups of four with representatives from each ability group based on their academic level. Each group was

assigned with a task. Based on the vignette, when she grouped the students and assigned them group work, the students interacted with each other as well as with the teacher when she facilitated the groups. In comparison to the start of the class, when Katherine asked the students if they had done their pre-class task, only three students responded to her question. When Katherine addressed the class as a whole, not all students responded. This could be due to the students being shy to ask questions or to respond in the presence of a bigger audience. This was similar to Gary's class as well. But when they were in small groups, the students interacted with each other as well as with Katherine. They interacted by discussing, clarifying, explaining and demonstrating while they were engaged in the group task. When Katherine approached the group to facilitate, she interacted with the students by explaining, clarifying their doubts on the group task, asking probing questions to get them to think about the task as well as to elaborate on their responses. The students too, interacted with her by clarifying their doubts, asking for help on the task, assisting each other in the group to respond to the task as well as in consolidating their responses to post onto the portal. The students, in their groups, discussed the task and consolidated their responses to present to the class too. The students participated in the discussions by giving their responses to the given task. Through this activity, the students have interacted with each other as well as with Katherine. From this observation, the group setting of the classroom seems to allow for more interactions than the setting where Katherine addressed the whole class.

But just group work alone did not seem to bring about interactions as can be seen in certain groups. In the lesson, the students in certain groups did not interact as much as the others, though they were placed in groups. During facilitation, Katherine moved around the class and addressed each group by asking if they had any concerns. She reiterated the concept of summarising the main points of each paragraph, especially to the groups with lower ability students. However, not all students were interacting in the small groups. Further scrutiny of these students in my observation showed that these were the students who had not completed the homework task and that was to read the passage and summarize the main points of each paragraph. Katherine told these students to take some time to read the passage before joining in the discussion. Based on the observation, even after reading the

passage, the students could not contribute to the discussion or the group task as much as the other students who had done the pre-class task for the lesson

With the flipped classroom pedagogical practice, Katherine set a pre-class task and that was to read and understand a passage prior to her lesson. The students read the passage prior to the lesson and participated in the lesson activities by completing the task assigned by the teacher. In their small groups, the group leader and the other members interacted and exchanged ideas on the passage in relation to the task at hand. The flipped classroom pedagogical framework, allowing for pre-class task, seem to give the students the opportunity to participate in the lesson. So when Katherine mentioned about being actively engaged in the lesson, I attribute it to the fact that the students conversed with each other in their small groups with the aim of completing the assigned task. Hence, being placed in small groups and being prepared with the pre-class task seem to yield more classroom interactions as compared to whole class question and answer session.

Prior to observing the lesson, I had examined Katherine's weekly lesson planning schedule. The weekly lesson schedule gave an overview as to when the flipped lesson was incorporated in the syllabus. The lesson planning notes showed the lesson objectives and the sequence of the activities designed for the students. She had assigned a comprehension passage to the students prior to the flipped lesson. She had set a task to her students to read the passage and summarize the main points of each paragraph. During the interview, when asked whether the practice has contributed to classroom interactions, she had expressed that when the students asked questions on the passage as well as when they presented their task as a group, she could sense that they understood the passage, which was the objective of her lesson.

Well when I saw the pupils understanding the paragraphs in the passage, and they were able to ask questions and answer as a group. They were able to come up with the answer. My focus was on sentence construction and they were able to correct themselves before they actually posted it online. That's how I understood that that they got the passage. (Katherine Interview Transcript 2: 19-24)

In applying Gee's building task to the interview data of Katherine, she is making a connection between asking questions and understanding the content. She is giving significance to students engaging in the lesson by participating with questions and answering them after communicating with their peers. She is reiterating the activities of students asking questions, communicating with their peers, presenting the answers as indicators for her to know that the students have understood the content of the lesson. These activities of the flipped classroom pedagogical practice allow for opportunities for students to participate in the lesson by asking questions. These questions show the potential of the practice in contributing to classroom interactions.

The students asking questions and working as a group are indications of classroom interactions. These classroom interactions had given Katherine an assurance that her lesson objective was achieved and that was, the students have understood the passage. As per Gee's building tasks, and in Katherine's view, relationship between the group work and the flipped classroom pedagogical practice is highlighted as one that promotes classroom interactions.

Katherine had implemented the flipped classroom pedagogical practice by setting a pre-class task prior to her lesson as well as assigning group tasks during the lesson. During the lesson, when Katherine asked questions to the students in whole group instruction, they did not converse with her or among themselves as much as when they were placed in small groups. Students spoke to each other when placed in small groups with their peers as well as with the teacher when she facilitated the groups. The students worked in groups as they attended to the group task. In the process of teacher facilitation, she moved around the groups and communicated with the students on the task. This helped her to address the concerns of the students. Students working in groups, seeking clarifications from their peers seem to have contributed to the amount of classroom interactions in flipped classroom. As they worked in groups, they consolidated the responses of each individual in a group. This indicates the opportunities for communication and collaboration among the students. This leads me to my next research question which is to find out the features of the practice that allows for the enhancement of the skills of communication and collaboration based on the flipped experience of Katherine.

4.3.4 Communication and Collaboration skills

Katherine's perception of communication and collaboration skills based on the interview data showed that these skills can be developed in students with task design and opportunities for them to interact in class. According to her, the task assigned to the students and the classroom interactions that took place within the groups has helped to enhance the skills of communication and collaboration:

they were able to collaborate and communicate with each other and correcting each other as they went along and it was an open environment. (Katherine Interview Transcript 2:31-32)

In applying Gee's building task, Katherine is connecting the activity of the students correcting each other as communicating and collaborating. She is giving significance to the classroom environment as being open and receptive to feedback. This paves opportunities for students to interact, thus contributing to classroom interactions. The process of correcting each other in the group gives an indication to fostering communicative skills in group work. Since the group task is designed with a few students in the group responding to a particular question, there were opportunities for collaborative skills to be developed. An analysis of Katherine's interview data with Gee's discourse analysis is presented as follows in Table 2. With reference to Table 2, Katherine is giving significance to her class being an 'open environment' where students are receptive to each other's comments.

They are able to work in groups to accomplish the group task.

Well, they were able to sieve out information which was one of the 21st Century skills that I wanted them to have,

They were able to solve the problem as and when they came up with. That I believe is part of what I wanted them to achieve as 21st Century skills.

(Katherine Interview Transcript 2:33-35)

This quote shows Katherine's intent for building the skills of locating information and solving problems. Katherine is giving significance to the activity of the students working in groups to

solve a problem. In her view, this activity, has helped to contribute to the enhancement of communication and collaboration skills. This is similar to Gary's perception of incorporating problem-solving skills in the teaching and learning process. According to Gary and Katherine, the problem-solving feature of flipped classrooms allows opportunities for classroom interactions and the development of communication and collaborative skills.

Based on the classroom vignette, the students, in their small groups participated in discussions with the aim of completing the task. The group leader asked each student in the group to give his or her input to the task. When one student gave his input, the rest of the group members built upon or elaborated upon the input. In this discourse, Katherine is also expressing the role of her students, as building identities as facilitators to their peers during group work in the classroom. This showed the communication and collaboration aspect of the lesson. The consolidation of all their inputs before posting their response onto the portal showed opportunities for collaboration among the members. The setting of pre-class task allowed the students to come to class, prepared and to share their ideas among the group members. This feature of the flipped classroom pedagogical practice seemed to allow for the enhancement of the skills of communication and collaboration.

In examining the vignette, the teacher had asked each group to present their findings. During each presentation, the students listened to the presentation and with the teacher's probing, some students posed questions to the group leaders. Based on the data, such exchanges, do seem to allow for the development of the skill of communication in the classroom. Similar to Gary, Katherine is building a connection between classroom interactions and the development of skills of communication and collaboration.

4.3.5 Challenges

One of the challenges faced by Katherine in conducting a lesson with the flipped classroom pedagogical practice was that some students did not complete the assigned pre-class task prior to the lesson. With reference to Table 2, according to Katherine, in overcoming this challenge, she had to employ certain strategies:

when they come unprepared, the only thing they do is they will have to listen to their friends, their peers when they are actually talking about it, and as they are reading it together, with listening to their friends, they get into the momentum”
(Katherine Interview Transcript 2:46-48)

In this discourse, Katherine expresses the building of relationships among the students as they impart the content of the pre-class task to those who come unprepared for the lesson. By not being prepared beforehand for the lesson, the students were not able to participate or interact as much as compared to the classmates who had done the pre-class task. In light of the first research question, the feature of the pre-class task in flipped classrooms and students coming prepared for the lesson are crucial in contributing to classroom interactions. Based on the data, this hampered the students’ interaction process and their potential contribution towards the task. But Katherine’s view, based on the interview, was that the student learnt from the rest who had done the pre-class task. The idea of working together with their peers enhances the skill of collaboration with a common, intent or purpose and that is to, complete the group task. In my observation of the lesson, when students who had done the pre-class task interacted with those who did not to impart the contents of the passage, there were opportunities for interactions as well. Hence, in overcoming the challenge, the teacher had unknowingly helped to develop the skill of collaboration

4.3.6 Summary

In observing Katherine’s lesson, weekly lesson schedule and interview data, Katherine’s strong philosophical stance on teaching and learning is evident as she expresses her expectations of her students to be responsible learners. In addition, the students seem to have interacted better in small group setting as compared to whole class instruction setting. Even within the small group interactions, the students who had done the pre-class task participated better than those who did not do the pre-class task. Based on the data, the pre-knowledge that students brought to the classroom in accomplishing the task has allowed them to interact, communicate and collaborate with each other to some extent. An analysis of Katherine’s interview data with Gee’s discourse analysis is presented as follows in Table 2.

		Table 2 - Gee's Discourse Analysis of Katherine's Interview data						
		Gee's seven building tasks						
No.	Data Extract	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
1.	Reasons for using flipped classroom “...I wanted my students to be prepared for the lesson beforehand. I wanted them to be actively engaged in the-learning process and to be responsible for their own learning. This can only happen when they come to class prepared with prior knowledge or be ready with questions to apply that knowledge.”	Katherine has given significance to the word 'actively engaged' and according to her, coming to class prepared with prior knowledge or in other words doing the pre-class task, will allow the students to be actively engaged. She has a strong philosophical stance that is driven by her high expectations on students' learning through her teaching.	Katherine is using discourse to show the importance of students to be well prepared prior to the lesson by doing the pre-class task. A sense of tone that she scaffolds their learning through the assignment of the pre-class task can be seen here.	Katherine has clearly defined the role of students as being responsible for their own learning and to be actively engaged in the-learning process by doing the pre-class task.		She is giving a perception that with flipped classroom pedagogical practice, students can come to class, prepared for the lesson. Her perception of learners or her students should come to class prepared and to be ready with questions.	She is showing a connection between flipped classroom framework and being prepared for lesson by doing the pre-class task.	She is portraying a belief that when students come to class prepared by doing the pre-class task, they can be actively engaged in the lesson.
2.	Impact of flipped classroom on Interactions	She is giving significance to the aspect group work and students asking	Katherine perceives the act of asking questions and	Katherine perceives the role of students as	She is able to get her students to interact within	The group work assigned and the distribution of tasks among the	She is making a connection between flipped classroom and	She perceives group work as a sign of students being able to

No.	Data Extract	Table 2 - Gee's Discourse Analysis of Katherine's Interview data Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	<p>"..Well when I saw the pupils understanding the paragraphs in the passage, and they were able to ask questions and answer as a group. In fact they were actually grouped into fours or threes. And each group was given a question to work with. They were able to come up with the answer. My focus was on sentence construction and they were able to correct themselves before they actually posted it online. That's</p>	<p>questions within the framework of flipped classroom. By these two acts, she asserts that flipped classroom has allowed the students to achieve the lesson objective. Her perception of students' understanding the lesson is indicative of formative assessment.</p>	<p>working as a group as a sign that her lesson objective of students understanding the passage was achieved.</p>	<p>being able to work in groups and to ask questions. These can also refer to her earlier notion of being 'actively engaged' in the classroom and thus being responsible learners.</p>	<p>the group work assigned. The type of group work assigned also plays an important role in eliciting classroom interactions, where in this case, students interacted to find the answers to the questions on the passage. Relationship between the group work and the flipped classroom pedagogical practice is also highlighted here as one that promotes classroom interactions.</p>	<p>members where they helped one another to find the answers to the questions and to post in online, is highlighted as one that promotes classroom interactions.</p>	<p>group work as well classroom interactions. She perceives the flipped classroom pedagogical practice as one that allows for group work, thus bringing about classroom interactions.</p>	<p>interact and work towards a given task.</p>

No.	Data Extract	Table 2 - Gee's Discourse Analysis of Katherine's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	how I understood that that they got the passage."							
3.	Impact of flipped classroom on 21st Century skills of communication and collaboration "Well, they were able to sieve out information which was one of the 21st Century skills that I wanted them to have, they were able to collaborate and communicate with each other and correcting each other as they went along and it was an open environment.	The significance is given to problem-solving by sieving information from the internet as well by interacting with their peers during group work. Through problem-solving, the students, in their groups, engage in discussions, thus developing the 21st Century skills of communication and collaboration.	She is enacting the discussion activity in the classroom via the problem-solving strategy of the flipped classroom pedagogical practice. With discussion and retrieving information from the internet and other sources, she is able to bring about the development of the 21st Century skills of communication and collaboration.	The role of the teacher in adding value to the students in acquiring the skills of problem-solving via discussions with peers and retrieving information from the internet and other sources. The role of the students as they correct their peers also promotes interactions as perceived by Katherine.	The relationship between discussions, retrieving information and acquiring the 21st Century skill of communication and collaboration is evidenced by this Discourse.	In this Discourse, she understood the need for her students to acquire the 21st Century skills of communication and collaboration and the environment has to be conducive in imparting these skills. The underlying assumption that it is in the prerogative of the teacher to impart these skills as mentioned by the Ministry of Education, Singapore in the policy documents	She is making a connection between interactions in the classroom and the development of 21st Century skills of communication and collaboration. She perceives that by carrying out interactions in the classroom, it can build the requisite 21st Century skills.	The act of sieving information from peers, internet and other sources as a sign of students acquiring the 21st Century skill of communication and collaboration.

No.	Data Extract	Table 2 - Gee's Discourse Analysis of Katherine's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	They were able to solve the problem as and when they came up with. That I believe is part of what I wanted them to achieve as 21st Century skills."					that govern the educational system.		
4.	Challenges faced with flipped classroom "...Ok when it comes to flipped, I believe the basics will be to have a video or to actually have material online for them to refer to, but my challenge was that not all of them had computers at home or internet to	Here, the teacher expresses significance to being able to manage the problems in conducting lessons with the flipped classroom pedagogical practice. In getting students to interact with their peers during lesson, they can get access to the pre-class task which they did not carry out prior to the lesson. In his Discourse, he expresses	The significance is expressed on how the pre-class task aspect of lesson planning, being integrated in the flipped lesson framework, has implications to student engagement and differentiated learning.	Gee's I-statements are used to determine what identities are being constructed with language. By using I, we, us, and our to express a sense of belonging indicates a connection to the community of teachers, a	In this Discourse, the Katherine assumes the role of access of technology by all students as necessary for implementation of the flipped classroom pedagogical practice in lessons. In the absence of access of technology by all students,	She is expressing an underlying concern of technology not being accessible for all students. However in this Discourse, he has expressed his strategies in overcoming the concern and that was interactions among peers.	She is expressing a connection between technology access and being able to do the pre-class task. Another connection is the assigning of tasks which are technology based to the implementation of flipped classroom pedagogical practice.	.

No.	Data Extract	Table 2 - Gee's Discourse Analysis of Katherine's Interview data Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	<p>follow up with. So there was a period of time where I had to actually give them hard copies of the materials that they need to use and that was my greatest challenge. If all of them had computers, it will be easier for them to view in video form but that wasn't available here."</p> <p>"...when they come unprepared, the only thing they do is they will have to listen to their friends, their peers when they are</p>	<p>significance to technology – With technology, the students can easily access the resources.</p>		<p>particular social group in Singapore. In this Discourse, she understood that the challenge faced by her was specific to her class and hence, the way she approached the challenge was an individualistic approach.</p>	<p>the students may come unprepared for the lesson.</p> <p>The relationship between students and their peers as they interact to impart the knowledge of the pre-class task to those who come unprepared is mentioned in this Discourse.</p>			

No.	Data Extract	Table 2 - Gee's Discourse Analysis of Katherine's Interview data Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	actually talking about it, and as they are reading it together, with listening to their friends, they get into the momentum."							

4.4 Teacher Participant 3 - Hannah

4.4.1 Profile

Hannah is a Primary five (11-12 year olds) classroom teacher who teaches English Language. She has been in the teaching service for fifteen years. She has been trained in the flipped classroom pedagogy and has implemented the practice in her classroom for the past two years. She spearheads the practice and has conducted workshops for other teachers in the school. An analysis of Hannah's interview data with Gee's discourse analysis is presented in Table 3. Her philosophical stance on teaching suggests that teachers have to be competent in delivering a flipped classroom lesson. In Hannah's view the teacher's pedagogical experience, the design of classroom activities as well as the questioning techniques are vital for the flipped classroom pedagogical practice to be effective or in her words, "move forward" in the lesson.

how it contributes is, number one, the students already know what the lesson is going to be, what I am going to cover for the lesson, so they are pre-empted ... it really depends on me, at that point in time, how much I have planned for the lesson and what are my questioning techniques to move forward in the lesson. (Hannah Interview Transcript 3: 22-25).

With reference to Table 3 and based on Gee's building tasks, she is building identities. She perceives her role as a teacher who is able to draw on the knowledge of the students via her questioning techniques as well as her experience in planning and conducting the lesson. In light of the first research question, these questioning techniques are features of the flipped classroom that can potentially contribute towards classroom interactions. Her philosophical stance on flipped classroom is to allow her to have deep discussions of lesson concepts with her students. She mentioned in the interview, her reasons for implementing flipped classroom.

in terms of planning a lesson, I would like to effectively use my classroom time to work on deeper discussions of the concept.... and at a deeper level of discussion. (Hannah Interview Transcript 3: 5-6, 11-12).

With reference to Table 3 and as per Gee's building tasks, in this discourse, Hannah is building significance to deep discussions of concepts. She expressed that time is saved by not doing a 'tuning in' as this is done by the pre-class task activity. She is building activities and relationship between the idea of being prepared prior to the lesson and the ability to participate in deeper level discussions in the classroom. Hence, when the students are prepared with the pre-class task prior to the lesson, they will be able to participate in deeper discussions of the concepts during the lesson in the classroom. This idea seems to suggest that the flipped classroom pedagogical practice has the potential to allow for more classroom interactions with these deeper level discussions. This is similar to Katherine's reasons for adopting flipped classroom when she mentioned that she wanted her students to come to lesson prepared.

In examining her weekly lesson schedule, she conducts lessons with the flipped classroom pedagogical practice at least once every week for each class. I observed one of her lessons conducted for the Primary 5 level. The layout of her classroom to accommodate a class size of forty is given in Figure 4.1. She had assigned the pre-class task and allowed the students two days to preview it. I had the opportunity to observe her lesson that lasted for one and a half hours. In the lesson that I observed, she had conducted a situational writing lesson. This is a genre of writing where students are given a scenario where they have to craft their writing around the scenario. For example, in this lesson, the students were asked to write a letter of complaint to an authority, expressing their dissatisfaction over a discourteous staff in a retail store. To prepare the students for this genre of writing, Hannah, together with other teachers in the same teaching level had prepared an instructional video and this was shared with the students prior to the lesson as a pre-class task. The instructional video highlighted the components of situational writing and the format of writing for this genre. By watching the video as a pre-class task, Hannah hoped that her students will grasp the format and concept of situational writing.

The objectives of the lesson were for the students to:

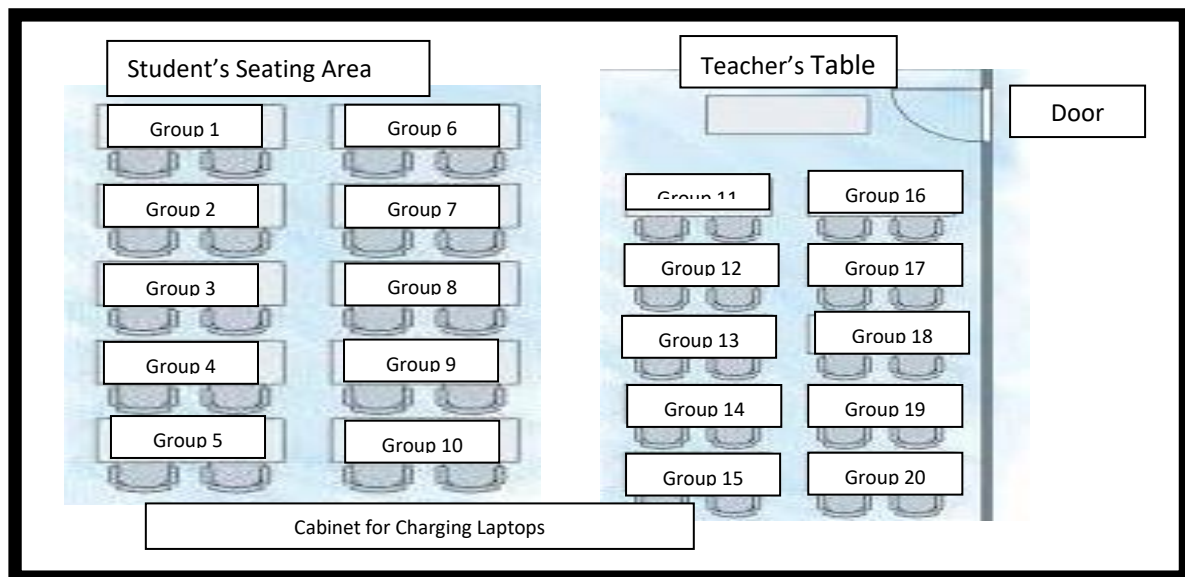
- Understand the scenario and the situational writing genre.
- Write a situational writing piece based on the standard format for this genre of writing.

4.4.2 Classroom Vignette

Hannah started the lesson by asking the students if they had viewed the instructional video that was uploaded on the school's e-learning portal, two days prior to the lesson day. Two students raised their hands and each one of them gave their opinions on the video. She then talked about the video, highlighting the main components of situational writing. She then proceeded to lead a question and answer session on the video. She began by asking a question. The question was "Who do you address the letter to?" One student raised his hand and responded to her question. Hannah then proceeded to ask a second question on the video – "What is the difference between a formal letter and an informal letter?" She called on a student. He stood up and gave an answer. Hannah elaborated upon his answer. She proceeded to ask another question on the video – "How do you sign off a letter?" She called on another student to answer and he gave a brief answer. Again, Hannah elaborated his answer to the class. Throughout the session of the lesson introduction, the students did not ask the Hannah any questions on the video, despite her asking the class if they had any doubts. The session lasted for about ten minutes. The questions that Hannah asked were mainly to find out about their understanding of situational writing format.

Hannah then instructed the students to work in pairs. During pair work, the students remained in their positions to face their classmates. There were a total of twenty groups or pairs in a class of forty students. The classroom layout was as follows during group work in Figure 4.4.

Figure 4.4 – Classroom Layout during Group work in Hannah’s Classroom



Once the students were in groups, they started to talk to each other. Again, the conversations were ‘off task’. To get their attention, the Hannah alerted the students to pay attention. She then numbered each pair of students as one and two. She instructed all the ‘number ones’ to get their laptops. Hannah showed four questions on the screen. The instructional video on the situational writing had four parts and each question focussed on one part of the video. The questions were uploaded onto the social learning wall of the class on the e-learning portal. She told the students to look at the questions and to post their answers onto the portal for the rest of the class to view. The questions were assigned as follows:

Row 1 (Groups 1 to 5) to work on question 1

– What are the different parts of a letter?

Row 2 (Groups 6-10) to work on question 2

– What is the difference between formal and informal writing?

Row 3 (Groups 11-15) to work on question 3

– What is the purpose of writing the letter?

Row 4 (Groups 16-20) to work on question 4

– How do you decide on the audience and context of the letter?

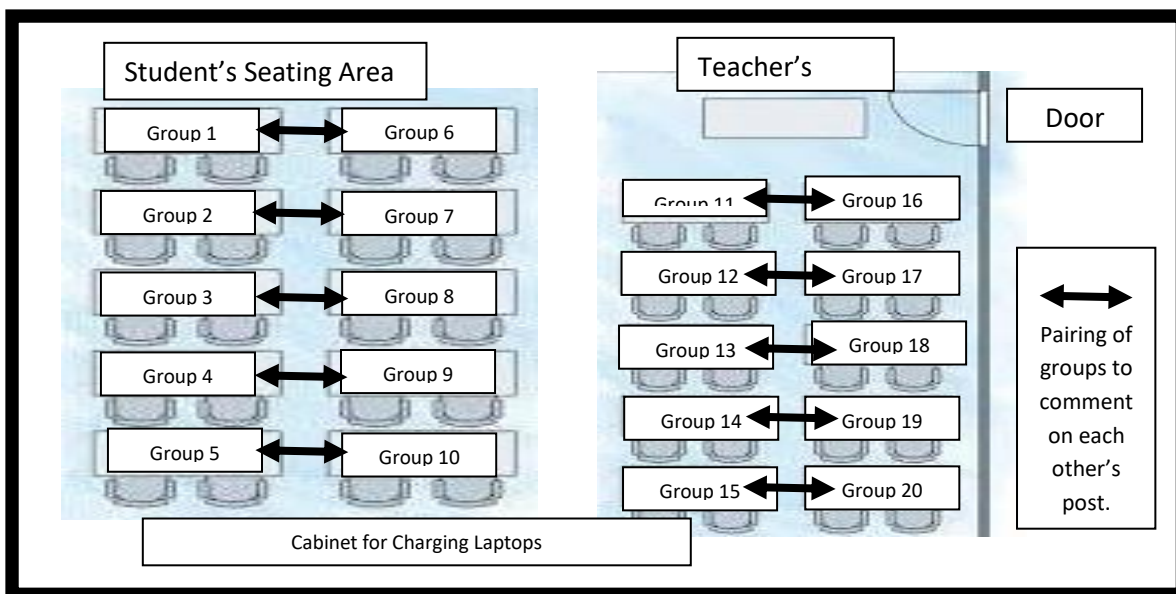
Once she had assigned the questions to the groups, the students started talking to each other. I walked around the class starting from groups 1 to 5, then from 6 to 10. The students started to discuss the question assigned to them. One student from Group 8 raised his hand and the teacher walked towards him. He told Hannah that he did not view the video at home due to technical issues with his home computer. The teacher then alerted the class by ringing a bell. Once she had their attention, she asked the class, how many students hadn't watched the video. Five students raised their hands. She instructed these students to come to the front of the class to watch the video on her laptop, similar to Gary's classroom. While these students watched the video, the rest of the students proceeded with discussing the question assigned to them. The paired students of these five students worked on the task individually while waiting for their classmate to join them after watching the video. I walked around the groups to look at how they interacted with each other. The students explored the question as a pair with one of them typing out the response onto the portal. The other student interrupted to add on or correct the typed response.

Some students raised their hands to ask for help. Hannah facilitated these students by asking probing questions for them to think about the question. When one student in the group responded, she asked the other student to comment on his response, then she gave her own feedback on how the question can be approached. I continued to walk around the groups. Some groups had students asking each other for affirmation if their answer was correct. They added onto each other's answers before posting onto the portal. Some groups had one student posting the answer with the other student not contributing as much as his or her pair. During the lesson, I asked Hannah about these students and she told me that they were lower ability students.

By then, the five students who had not viewed the video prior to the lesson completed watching the video in the teacher's laptop. They joined their pair to work on the

questions. Once all the pairs had posted their responses, Hannah asked the groups to comment on each other's response. The arrangement for the pairs to comment on their peer's response is shown in Figure 4.5.

Figure 4.5 – Classroom Layout during Group work for giving comments in Hannah's Classroom



Hannah reiterated the rules of posting comments and one of them being to start with the positive and then move on to areas of improvement. She gave an example to the students by saying that “you can start by saying this is a relatively good answer, however, you can answer better in this way,” and then to give their comments thereafter. The students began to comment on their peer's responses. I walked around the groups to see how they had approached the task. They talked to each other on what can they can comment on. Some groups felt that the answer was acceptable and that there was nothing much to comment on. The students spoke with each other to come up with the best possible response before posting onto the portal. Hannah once again facilitated certain groups by asking them probing questions in getting on with the task. The students were posting their comments onto the portal, affirming each other that the post is correct.

Once all the groups had posted their responses onto the portal, Hannah instructed the pairs to look at the posts. After about five minutes, she selected certain pairs, at random, to present their responses. While one pair presented, the other pairs were quiet. The teacher prompted the other pairs to comment on their presentation. A few students gave their feedback. Likewise, all other selected pairs presented their task with the teacher prompting other pairs to give feedback. Hannah wrapped up the discussion and presentations with her own comments for each question. She then showed the situational writing question on the screen. At this point, she told the students to take out their writing booklets and to start writing the situational writing piece, individually, for the rest of the lesson. For those who were unable to complete the writing, they will be given more time during the next day's lesson to complete it.

With Hannah's profile, classroom vignette and the interview, the next section will look into how the data responds to classroom interactions and the development of communication and collaboration skills.

4.4.3 Classroom interactions

Drawing data from the vignette, the amount of classroom interactions varies at certain segments of the lesson. In the lesson introduction, during whole group direct instruction, lesser students participated in the question and answer session as compared to small group activities. This is similar to Gary's and Katherine's experience. After the lesson introduction session, the students worked in pairs to complete the group task. The students shared their ideas with each other and consolidated their responses towards the task. This showed the quantity of classroom interactions during this activity.

During presentations, when one pair was presenting, the other pairs of students were prompted by Hannah to ask questions and to give feedback. This exchange among students also showed the amount of interactions taking place in the classroom.

In her view, the practice has allowed for better time management as students are made to view a video of lesson content prior to lesson. This allows the students to have prior knowledge of the content of the lesson.

so they have a prior knowledge as they come in. So I do not need to do a tuning in, I do not need to use the classroom time to do tuning in, I can just straightaway or zoom straightaway to the lesson proper (Hannah Interview Transcript 3:9-11)

Though she claims that the practice allows her to save time by not doing a “tuning in”, she did lead a question and answer session on the content of the video at lesson introduction.

Based on the vignette, she had students to post their responses online where all the students can view each other’s posts. She prompted students to give feedback on each other’s posts and this contributed to classroom interactions online as students continuously engaged in reviewing and responding to their peers’ posts. She is building a connection between her probing or questioning techniques and promoting interactions in the classroom.

During the group activities more students spoke with Hannah and with each other. Hence, in comparison to Katherine’s and Gary’s class experience, it does seem that when Hannah addressed the class as a whole, there were fewer opportunities for students to interact as compared to interactions during pair work.

In this lesson, classroom interactions have taken on a new meaning. On my study this far, I had always assumed classroom interactions as physical talk between students and their teacher well as among students. But in this class, the students interacted by giving feedback on each other’s posts and by reviewing them in the portal. The implementation of the flipped classroom pedagogical practice coupled with technology has, to some extent, allowed for classroom interactions in the form of discussions of lesson content.

In the aspect of integrating this practice with technology, it has contributed to classroom interactions in some ways. The primary motivation for integrating technology in education is that it supports students in their own constructive thinking, and engages them in cognitive operations that they may not have been capable of otherwise (Moore, 2014). In Singapore, the masterplan for technology integration was launched to develop a culture of thinking, lifelong learning and social responsibility as well as to equip the students with the critical

competencies to succeed in a knowledge economy. Beyond classroom interactions, the infusion of technology has also allowed for students to think critically and to practice social responsibility (MOE, 2017). This can be seen to some extent during the lesson when Hannah reiterated the rules of posting comments online so as to build a community of socially responsible learners. The infusion of technology and with Hannah's design and facilitation of activities in the lesson have contributed towards classroom interactions to some extent. Now, I shall look at how the data responds to the development of the skills of communication and collaboration.

4.4.4 Communication and Collaboration skills

The teacher's perception of incorporating skills of communication and collaboration lies in the teacher's own competency of delivering the pedagogy in the classroom. She cited time as a factor – since there is ample time for the teacher to engage in the concepts at great depth, she believes that the flipped classroom can be a platform for collaboration among the students.

*Again I think its dependent on the teacher's skill to see how the pedagogy has contributed to the enhancement of 21st Century skills, communication and collaboration, but surely if they are already given the resources to look through and to watch, the level of discussion would have gone one step higher and because you have already cut down on that part of the level one discussion, in terms of the time, can make use of the time further improve or rather further build on the communication platform or planning for a collaboration between the students.
(Hannah Interview Transcript 3:30-34)*

From the interview, in the teacher's opinion, she is enacting the discussion activity in the classroom via the students' acquisition of content through the pre-class task tasks. With discussion at a deeper level, she expresses that she is able to bring about the development of skills of communication and collaboration. These discussions can be considered as one of the features of the flipped classroom that can possibly contribute towards classroom interactions.

Based on the vignette, the teacher had asked each pair of students to give feedback on their peer's comments as mentioned earlier. Each pair of students worked as a group towards the task. In this classroom arrangement, there seem to be more interactions and this might present opportunities for fostering communication and collaboration among the students.

In examining my lesson observation notes, the teacher had asked each group to present their findings. During the presentation, the group leader presented the findings based on the assigned group task. The other students and groups listened to the presentation and with the teacher's probing, some students posed questions to the group leader. Such exchanges did seem to allow for opportunities for classroom interactions and possibly, the development of the skill of communication in the classroom.

In the design of the class activities, Hannah had arranged for the students to work in pairs. Each student had viewed the video prior to the lesson. Hence, each student would have come to class with his or her own pre-knowledge of the lesson. When the students exchange ideas, they collaborate and come up with one consolidated response to be posted in the portal. There were students in pairs who were unable to consolidate their responses. The teacher facilitated these groups to come up with the best possible answer to the task by asking them probing questions and clarifying their doubts. With that, the students put up their responses in the portal. Hence, with teacher facilitation and the students' own social responsibility of reaching a consensus with their peers, they communicated and collaborated towards the task. The value of social responsibility was also seen when Hannah reiterated the rules of posting comments online. In terms of teacher facilitation, Hannah is building identities as she views the role of the teacher as one who adds value to helping students give comments on their peers' presentations. Here, the flipped classroom pedagogical practice does seem to have the potential to allow for students to acquire the skills of communication and collaboration.

4.4.5 Challenges

One of the challenges faced by the teacher in conducting a lesson with the flipped classroom pedagogical practice was similar to that of Katherine and that is, some students (In the class of 40 about 5 students) did not participate in the discussions. These are the students who did

not view the video prior to the lesson. Based on my observation, these five students were not able to converse with their pair in responding to the task. They told the teacher that they had not viewed the video. Since the task or the questions were specific to the video, it was indeed impossible to respond to these questions without watching the video. In overcoming this challenge, the teacher told these five students to view the video at a corner in the classroom before joining in the discussions. In addressing this concern, Hannah acknowledged the fact that not all students will be ready with prior knowledge to participate in the lesson. Hence, she had to employ certain teaching strategies to overcome this challenge:

The challenges is, number one, is you may not get a hundred percent participation rate of all the students who will be ready for your class. Therefore, you will have different groups of students who will not be at the same level of starting level, starting point. So to address this, I believe, you still then need to do a differentiated instruction – the ones that have not watched the video, will have to take some time to watch it and then could only perhaps, move forward at a slower pace, than the ones who have. (Hannah Interview Transcript 3:46-48)

According to Hannah, the idea of differentiated instruction is feasible in overcoming this challenge of students coming to class unprepared. In this discourse, she understood that the challenge faced by her was specific to her class and hence, the way she approached the challenge was an individualistic approach and this can be seen in her justification of differentiated instruction.

One of the ways that she had implemented this was to move the group that had not viewed the video, to view it first at a corner in the classroom. This is one of the ways that the teacher tried to overcome the problem of students not doing the pre-class task. By moving them to a corner, the existing groups do not get distracted and can continue to interact and perform the tasks. During her facilitation of the groups, she addressed the students' queries and helped them with the group tasks by giving hints, asking probing questions and elaborating concepts as recorded in my lesson observation notes. The flipped classroom pedagogical practice does seem to bring about the employment of other practices such as technology

infusion as well as differentiated instruction. The practice alone, sometimes cannot bring about the-learning goals that the teacher wishes to achieve for her class.

4.4.6 Summary

In observing Hannah's lesson, weekly lesson schedule, interview transcript, the students interacted in physical talk as well as in the online platform. It does seem that they interacted more in small group setting as compared to whole class instruction setting and this is similar Katherine's and Gary's experience. Even within the small group interactions, the students who had done the pre-class task participated better than those who did not do the pre-class task. During presentations, in a whole group setting, the students interacted by giving feedback and asking questions, though this was prompted by the teacher. There was online communication in this lesson that added to the quantity of interactions in the class. Based on the data, the knowledge from the pre-class task that students brought to the classroom in accomplishing the task seem to allow them to interact, communicate and collaborate with each other. An analysis of Hannah's interview data with Gee's discourse analysis is presented as follows in Table 3.

No.	Data Extract	Table 3 - Gee's Discourse Analysis of Hannah's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
1.	Reasons for using flipped classroom "The reasons for me to use flipped classroom would be more, number one, in terms of planning a lesson, I would like to effectively use my classroom time to work on more deeper discussions of the concept. So the flipped would be getting them to watch a video or reading up on notes, usually it's a video, to share the stuff on what will be covered on the following day. So that's one, of really of utilizing my	Hannah has given significance to: - 'effective use of classroom time' as one that comes about by implementing flipped classroom. - Significance is also given to deep discussions that are possible with flipped classroom as students have knowledge of the lesson via pre-class task tasks. - Significance is also given to saving	Hannah is using discourse to show the importance of students to be well prepared prior to the lesson by doing the pre-class task. According to her in this Discourse, the pre-class task allows the students to have pre knowledge of the lesson that can allow for deep discussion during the lesson.	Hannah has defined the role of the teacher as one who is continuously learning and gaining classroom experience. The identity of a teacher who has to continuously learn and train as a learner is shown in this Discourse.	The relationship of flipped classroom and saving time during lesson by not doing a tuning in is expressed here. The relationship of students having pre knowledge of the content of the lesson and the possibility of having deep discussions of concepts during lessons is also expressed here.		She is showing a connection between flipped classroom practice of being prepared for lesson to participating in deep discussions during lessons.	She is portraying a belief that when students come to class prepared by doing the pre-class task, they are able to participate in deep discussions. In this Discourse, she portrays herself as one who needs more training in the conduct of flipped classroom pedagogical practice as potentially the teachers with more experience and training, can bring about an effective flipped classroom lesson

No.	Data Extract	Table 3 - Gee's Discourse Analysis of Hannah's Interview data Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	classroom time so, it is more to do with the time. Secondly, at least I would like my students to have a foundation of what I would be going through in class, so they have a prior knowledge as they come in. So I do not need to do a tuning in, I do not need to use the classroom time to do tuning in, I can just straightaway or zoom straightaway to the lesson proper and at a deeper level of discussion."	time by not doing a 'tuning in' in a lesson. - She has a strong reflective stance in her teaching philosophy as she constantly reflects on her competencies as a teacher in delivering lessons.						as perceived by her as well.

		Table 3 - Gee's Discourse Analysis of Hannah's Interview data						
		Gee's seven building tasks						
No.	Data Extract	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	"I still see myself as someone who is quite new to flipped and I think I'm still trying to gain enough classroom experience and pedagogical experience in flipped to make it more effective."							
2.	Impact of flipped classroom on Interactions "..Ok to me, how it contributes is, number one, the students already know what the lesson is going to be, what I am going to cover for the lesson, so they are pre-empted ok, that's one. How, to what extent, I	She is giving significance to the aspect of the potential of the flipped classroom strategy in allowing students to have pre knowledge of the lesson. Significance to the ability of the teacher in asking questions in eliciting their prior knowledge	Hannah perceives the effectiveness of her questioning techniques as pertinent in promoting interactions in the classroom.	Hannah perceives the role of a teacher as one being able to draw on the knowledge of the students via her questioning techniques as well as her experience in planning and conducting the lesson.	The relationship of what the teacher wants the students to know and what the students already know is synthesized by the flipped classroom pedagogical practice strategy as perceived by this teacher.	Acknowledging the fact that the teachers' competency is vital towards the planning and conduct of a lesson shows an underlying need for training. Besides this, when she mentions "this depends on the teacher" she implies the	She is making a connection between her questioning techniques and promoting interactions in the classroom.	Hannah expresses that those students who come prepared for the lesson are more privileged than those who did not.

No.	Data Extract	Table 3 - Gee's Discourse Analysis of Hannah's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	seriously think it really depends on the teacher, so that means, it really depends on me, at that point in time, how much I have planned for the lesson and what are my questioning techniques to move forward in the lesson..”	and to contribute to towards the lesson is also expressed in this Discourse.			The relationship between the teacher's ability in reaching out to the students and to draw their pre knowledge towards the lesson's objective is also seen here.	attributes of the teacher as well such as a caring, responsible teacher who takes an effort to reach out to the students and one who is concerned of the students' learning.		
3.	Impact of flipped classroom on 21st Century skills of communication and collaboration “Again I think its dependent on the teacher's skill to see how the pedagogy has contributed to the enhancement of 21st Century skills,	The significance is given to the teacher's skills in getting her students to discuss concepts at a deeper level with their pre knowledge gained from the pre-class task tasks assigned.	Hannah is enacting the discussion activity in the classroom via the students' acquisition of knowledge through the pre-class task of the flipped classroom pedagogical practice. With discussion at a deeper level, she	The role of the teacher in adding value to the students in getting students to discuss the lesson concept at a deeper level is expressed here. The role of the students in preparing for the	The relationship between discussions, classroom activities in acquiring the 21st Century skill of communication and collaboration is evidenced by this discourse.	In this Discourse, she understood the need for teachers to have the requisite skills in getting students to participate in deep discussions as well as the classroom activities planned. In other words, the	Hannah is making a connection between interactions in the classroom and the development of 21st Century skills of communication and collaboration. She perceives that by carrying out	The readiness of the students is a sign of their participation in discussions. The level of participation of the students is a sign of their acquisition of the 21st Century skills of communication

No.	Data Extract	Table 3 - Gee's Discourse Analysis of Hannah's Interview data Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	communication and collaboration, but surely if they are already given the resources to look through and to watch, the level of discussion would have gone one step higher and because you have already cut down on that part of the level one discussion, in terms of the time, can make use of the time further improve or rather further build on the communication platform or planning for a deeper collaboration		is able to bring about the development of the 21st Century skills of communication and collaboration.	lesson and their ability to participate in deeper level discussions.	The relationship between the teacher's competency in planning the lesson and the extent of classroom interactions is also expressed in this Discourse.	teacher's competency in planning and delivering the lesson has an impact to the students' acquisition of the 21st Century skills of communication and collaboration.	interactions in the classroom, it can build the requisite 21st Century skills. She is also making a connection to the act of students doing the pre-class task and being able to participate in deep level discussions.	and collaboration.

No.	Data Extract	Table 3 - Gee's Discourse Analysis of Hannah's Interview data						
		Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	<p>between the students.</p> <p>"Yes, definitely. Classroom activities do contribute to this. But again I feel that, no matter what, it is really dependent on the teacher's experience and level of skills, level of readiness to see the effectiveness of this."</p>							
4.	<p>Challenges faced with flipped classroom "...The challenges is, number one, is you may not get a hundred percent participation rate of all the students who will</p>	<p>Here, Hannah expresses significance to students who come unprepared for the lesson and how she manages the problem.</p>	<p>The planning of activities in differentiated instruction for the various learners with different abilities is shown in this Discourse.</p>	<p>Gee's I-statements are used to determine what identities are being constructed with language. By using I, we, us, and our to express a sense</p>	<p>In this Discourse, Hannah assumes the role of adding value to the lesson by addressing the concern of differentiated learners.</p>	<p>She is expressing an underlying concern of students not doing the pre-class task as well as acknowledging the fact that there are differentiated</p>	<p>She is expressing a connection between students of varying participation levels and the need for differentiated instruction.</p>	

No.	Data Extract	Table 3 - Gee's Discourse Analysis of Hannah's Interview data Gee's seven building tasks						
	Interview Data	Significance	Activities	Identities	Relationships	Politics	Connections	Sign Systems and Knowledge
	<p>be ready for your class. Therefore, you will have different groups of students who will not be at the same level of starting level, starting point. So to address this, I believe, you still then need to do a differentiated instruction – the ones that have not watched the video, will have to take some time to watch it and then could only perhaps, move forward at a slower pace, than the ones who have..”</p>	<p>The significance of differentiated instruction in addressing the problem of students with varying abilities to participate in the lesson.</p>	<p>The varying of activities for the different groups of students so that the entire class can work on a common pace as perceived by the teacher.</p>	<p>of belonging indicates a connection to the community of teachers, a particular social group in Singapore. In this Discourse, she understood that the challenge faced by her was specific to her class and hence, the way she approached the challenge was an individualistic approach and this can be seen in her justification of differentiated instruction.</p>		<p>learners in the classroom.</p>		

4.5 Synthesis of Findings

The focus of this study is the potential of the flipped classroom pedagogical practice in promoting classroom interactions and its features in enhancing the skills of communication and collaboration. This was analysed in depth with various sources of fieldwork data.

Though each teacher had different reasons for adopting this practice, the consolidated view was their intention to use classroom time effectively to hold discussions of lesson content, to improve their teaching pedagogies and to stay relevant in the globalised environment. As mentioned in the interviews, the practice had helped the teachers to 'save time' and had allowed their students to be 'prepared' for the lesson. By being prepared for the lesson, the teachers hoped to engage their students in the lessons as responsible learners. The notion of saving time during lessons was by not doing a tuning in of the lesson or to go through lesson content as this had been covered in the pre-class task. The teachers had also expressed their opinions on time invested in classroom activities to have deeper discussions of content as compared to going through content in the classroom.

The flipped classroom pedagogical practice has the potential to allow for the design of class-based activities that helped to foster classroom interactions and the potential development of communication and collaboration skills which was unanimously agreed by all the teacher participants via the interviews. With this practice, students engaged in 'problem-solving' and 'corrected each other' in an 'open environment' where they communicated and collaborated in fulfilling the group tasks.

As can be seen in all the three lessons, the teachers had assigned pre-class tasks to their students. Students who had done the pre-class task were able to participate better in class or group discussions as compared to those who did not. All three teachers devised an individual approach to deal with those who come to lessons unprepared or not doing the pre-class task.

However, in close scrutiny of the lessons showed that some students did not participate as much as the others in classroom discussions. These were later clarified with the teachers who did mention of the challenges in implementing this practice. In the opinion of the teachers, the ability of the students to participate in the discussions was sometimes hampered by them not being prepared for the lesson as much as their classmates. This can be attributable to

students in the lower academic level who were not able to contribute ideas as much as their classmates who were in the middle or higher ability groups.

On the whole, the flipped classroom pedagogical practice allowed teachers to set a pre-class task for their students so that class based activities can be carried out with students having prior knowledge of the content. With this prior knowledge, students seemed to interact better with their peers in approaching group work tasks. Nevertheless, the practice has its own challenges in fulfilling its initial objectives.

In examining the findings for all three teachers, some key themes were emerging. They were, the role of the teacher, challenges and strategies, communication and collaboration and deep versus surface-learning. These key themes will be analysed in great depth in the next chapter.

Chapter 5: Emerging Themes

5.1 Introduction

The aim of this chapter is to present the themes that have emerged from the analysis of the data, in light of the research questions and existing knowledge or literature. The purpose of this study was to explore the potential of flipped classroom pedagogical practice in promoting classroom interactions in Singapore primary classrooms. Unlike previous studies that looked at flipped classroom implementation in tertiary settings, this study explored the overall learning experience afforded by flipped classroom on interactions in primary classrooms. In the previous chapter I analysed a range of qualitative data to explore the flipped classroom pedagogical practice and how it might promote interactions in a primary school setting. From this analysis four themes emerged. They were:

- Communication and collaboration
- Deep versus surface learning
- Role of the teacher
- Challenges and strategies

These themes will be discussed with relevance to the research questions and existing literature as the chapter progresses.

5.2 Communication and Collaboration

Teacher participants have designed lessons that provide opportunities for students to interact in the classroom. Via these interactions, the teachers believe that they can help to build communication and collaboration skills in the classroom. As mentioned in Chapter 2 under MOE policy, the MOE, Singapore developed a 21st Century competency (21CC) framework. This framework identifies communication, collaboration and information skills as important skills for students to acquire in teaching and learning (MOE, 2017).

The teachers in this study designed flipped classroom lessons by assigning group work in their lessons. They agreed that collaboration among students can be seen as they worked in their small groups. Collaboration in schools requires cooperative learning group experiences to

occur in classrooms on a regular basis. Increased interaction with the content material and with other students brings about positive benefits (Swan, 2001). Based on the interview data, the teachers mentioned that when students communicated in collaborative groups, there was much interaction in the classroom. When students work in groups to accomplish a task such as a problem-solving task, they interact. The teachers voiced that via these interactions, they were able to incorporate communication and collaborative skills in the classroom. Collaboration and communication skills increase opportunities for student engagement in the classroom (Roehl, Reddy & Shannon, 2013). With much research reflected in present literature on the benefits of communication and collaboration skills, the role of the teacher in incorporating these skills is imperative.

The teachers in this study expressed that classroom interactions offer opportunities for them to develop communication and collaboration skills among their students. In order to face the challenges of the future, implementing the use of skills of communication and collaboration are critical in education (Happ, 2013). Collaborative learning compared with individualistic efforts, has numerous benefits and results in higher achievement and greater productivity, more caring, supportive, and committed relationships; and greater social competence, and self-esteem (Tan et al., 2005). With collaborative groups and student inquiry, there was much discussion or interactions, elaboration of one another's ideas and mutual assistance amongst students. This was evident in the classroom vignettes as the students communicated with each other in small groups by asking questions and offering feedback. This was facilitated by all the teachers in this study. The students are given ample opportunities for intellectual and social interactions in collaborative learning (Laal & Ghodsi, 2012). Schools have responded by adopting core curriculum with more emphasis on problem-solving (Porter et al., 2012). In this study, the teachers have incorporated problem-solving and group presentations with the flipped classroom pedagogical practice prevalently in their lessons. This is to encourage students to engage in discussions and to allow for more interactions to take place in the class. Kahn and Kayle (2002) conveyed that student presentations are necessary for organisational and critical thinking skills. It is important for teachers to have students to

become actively engaged in lessons while practicing good communication skills (Bernstein-Yamashiro & Noam, 2013). Therefore, the assignment of group tasks and the teachers' facilitation offer opportunities for the development of communication and collaboration skills within the flipped classroom pedagogical practice.

Collaborative learning requires students to make individual contributions, while practising necessary social skills (Li & Lam, 2013). Collaboration is a key component to be used in learning environments to foster each individual student's motivation in order to achieve personal goals and to develop students into lifelong learners (Watters & Ginns, 2000). Curriculum that is designed to permit collaborative play among students as they move through the various stages of development affords them varying opportunities to learn and practice important skills such as communication and collaboration (Armstrong & Elkind, 2005). Leonard (2003) defines collaborative learning as a strategy where interaction plays a fundamental role in the development of the learner's cognitive abilities. Based on the literature surrounding communication and collaboration skills and with data drawn from the vignettes and interviews, It was evident such communication and collaboration activities in accomplishing the group task have led to increased interactions in the classroom.

5.2.1 Interactions in Group work setting in the classroom

The teachers in this study were clear in what they wanted their students to learn in terms of skills such as collaboration and communication. In the design and delivery of their lessons, the teachers incorporated group work activities in their lessons to improve the interaction process between them and their students.

All three teacher participants incorporated group work and group presentations in their lessons. Students worked on the assigned tasks in their small groups before presenting them to the whole class. In addition, group leaders were tasked with ensuring that all members contributed ideas and feedback in the group discussions. This is a key teaching strategy that facilitated student to student interactions. Though flipped pedagogy by itself may not

contribute towards group work, the discussions centred on the pre-class task does contribute towards classroom interactions. When assigning groups, these groups may function without a leader. Based on the data from the classroom vignette, the leader helped to facilitate the group discussions by assigning time for each member to speak and by offering suggestions. When the students discussed their task in groups and prepared for the presentation, there were a lot of interactions between them as well as with the teacher. According to Moore (1989), social interactions in class include student–instructor interaction and student–student interaction. The student–student interaction is also called peer interaction, which refers to the interaction between one student and another individual student or group of students (Moore, 1989; Zha & Ottendorfer, 2011). In a study by Miller, Topping and Thurston (2010), with peer tutoring, student led presentations and collaborative group work, the students were often able to explain things to each other in ways that the teacher had not considered (Miller, Topping & Thurston, 2010). As students communicate their ideas effectively and collaborate with others, this may help them embody the skills of the 21st Century (Zhao, 2010). In all the three lessons observed in this study, the students assisted one another in completing the group tasks by asking questions, seeking clarifications, providing suggestions and by encouraging one another. These promoted interactions among the students and provided opportunities to foster communication and collaboration skills.

One factor in incorporating skills of communication and collaboration is the assignment of groups in the classroom. Doll et al.(2014) looked at strategies that help to keep collaborative learning a highly effective method of learning. They analysed several factors such as how to prepare students for group work, the teacher’s role in the learning process, group size and composition, and scaffolding collaborative work on complex tasks. This was evident in all three lessons observed in the study as teacher participants reiterated the ground rules of group work and provided scaffolding to the groups.

The three teachers in this study set a pre-class task for their students. With the flipped classroom pedagogical practice, the pre-class tasks or content were intended to prepare students with the common foundation of knowledge required for effective active and

collaborative learning in the classroom (Boucher, et al., 2013). Drawing on data from the vignette, the students referred to the contents of the pre-class task when they discussed the class-based group task. The pre-class task is a vital feature of the flipped classroom in promoting interactions

Based on the fieldwork data, I asked all the teacher participants about how they had grouped the students. Katherine had grouped her students based on like academic ability. In both Gary and Hannah's classrooms, the students were seated in roll order. However, during the interview, Gary mentioned that the flipped classroom may not be suitable for lower progress students – referring to lower ability students based on academic tests. Grouping was also based on factors other than academic ability. A pragmatic approach to grouping was observed in all three classrooms where students were placed into two groups – one who had done the pre-class task and the other, who had not. The group that did not do the pre-class task were asked by the teachers to do the task in the classroom. In guiding or helping the group, the students engaged and interacted with each other. With communication and collaboration, students can learn from each other. Flexible grouping of students encourages students to build personal connections by working with different individuals within the community or classroom (Broderick et al., 2005). In a large class size of about forty students as in the situation of most Singapore primary classes, placing students in small groups can allow for more interaction to take place among groups and within groups.

Based on the interview data, Hannah proposed for differentiated instruction to counter the challenge of students with differing abilities. Flexible grouping of students allows for differentiation of instruction which in turn addresses the diverse ways in which a teacher can deliver instruction to students. Differentiated instruction and flexible grouping of students are useful strategies in classrooms (Tomlinson, 2001). Drawing on the lesson observation data, the teachers facilitated the groups during group tasks. It was observed that the teachers offered suggestions and leading questions in their facilitation more to lower ability groups as compared to other groups. These were the groups of students who approached the teacher with more queries pertaining to the task. As the teachers walked around the class and

observed the groups working on the group tasks, they offered to facilitate those groups that needed help and those who were not progressing with the task as well as the other groups. Groups that were more independent in completing the task had students communicating with each other. Hence, there was differentiated instruction with varying levels of facilitation which led to different amounts of interactions in the classroom.

Differentiated instruction by the teachers to the students in various ability groups, grouped mainly by academic ability as well as by groups that have done the pre-class tasks and those who had not, had allowed the students to work with each other. Schlechty (2011) reported that cooperative learning is not just about putting children in a group to work but about creating classroom activities and projects that help to promote independence, individuality, communication, social skills, and accountability. My observation data in this study illustrated that all teachers actively devised activities aimed at mastering lesson content and improving group processes. Cooperative groups in the classroom will enhance the culture of the classroom by motivating the students into doing their personal best. Tomlinson (2001) believed that guiding students to assume a growing sense of responsibility is essential in a differentiated classroom and a large part of being successful in a classroom. He also asserted that to assume homogeneity within any given classroom will lead to failure.

In cooperative groups students come together to solve problems and strategize solutions. This was observed in the lessons in this study when students worked together in groups. Fisher (2009) stated that in order to improve student achievement and increase motivation, schools should develop collaborative learning activities to allow students to work together. Many students enjoy working in groups and collaborative learning mirrors the way in which adults solve problems in the real world. This is in line with the MOE, Singapore policy where the policy defines the desired outcomes of education (DOE) for every child to be “an active contributor who is able to work effectively in teams” (MOE, 2017). Group work and differentiation of instruction were seen in all three classrooms, though some were more strongly evident than others. Such differentiation helped to increase classroom interactions as students interacted in groups toward the group tasks.

When students are placed in groups to work on a task, they learn from each other. In Katherine's lesson, the students worked in groups to look for answers to questions pertaining to a comprehension passage. The students working in groups helped each other in getting the best possible answer to each question. The students who did not know the answer learned from the other members in the group and this was observed in the lessons. Peer learning is one method to encourage meaningful learning and involves students teaching each other and learning from each other (Danker, 2005). It involves sharing of ideas, knowledge and experiences and emphasizes interdependence as opposed to independent learning (Boud, 2001). Gibbs (2005) stated that essential collaborative skills learned become the foundation for a vital community, working together with others from diverse backgrounds, solving problems, assessing for improvement, and celebrating their achievements. Marzano (2010) believed that cooperative group work is an important instructional activity. Cooperative learning groups have a positive impact on students in many ways, including student achievement, interpersonal relationships and attitudes about learning. Tangney, et al. (2001) considered that collaborative learning was an approach to learning in which students not only construct their own knowledge as a result of interaction with their environment but are also actively engaged in the process of constructing knowledge for their learning community where in this case, it can be referred to the student's groups. In all three lessons in the study, there were episodes of exchanges among students and their teachers on their responses towards the group tasks. Based on these exchanges or interactions, the students modified their responses to the task as they consolidated the various perspectives by the rest of the students and the teacher. By this, there were opportunities for collaboration via cooperative groups with enhanced interactions.

The group task in the lessons observed took the form of a problem. In the process of solving group task-based problems, the students interacted with the teacher as well as among themselves. In this way, according to Gary, he is able to develop collaborative and communicative skills among his students. A curriculum that encourages problem-solving, learning through social interactions, and exploration is needed to build communication and collaboration skills (Pappas, 2009). These features such as problem-solving activities are

apparent in a constructivist classroom (Kotzee, 2010). These lessons allowed the students in Gary's class to investigate and experience learning with their classmates, seeking each other's opinions before reaching a consensus in responding to a problem. In doing so, the learners are developing and exhibiting skills of communication and collaboration. Lessons, like the one that I observed in Gary's classroom where problem-solving activities were introduced, the activities offered opportunities for the development of communication and collaboration skills. In Gary's lesson, he had set a problem-solving task to students to form food chains and food webs. By setting a problem, the students were able to interact and work collaboratively to accomplish the task. As a teacher, Gary understood the need for these skills to be incorporated as well as to be a facilitator for his students. This was evident when Gary communicated with his students in small groups.

In all three lessons that were observed, there were class presentations. According to Baker (2000), many educators' desire to change their instructional practice from a traditional whole group teaching to a more active, student-centred practice through the use of class presentations, discovery activities, experiments and group projects. In the lessons observed in this study, each group of students presented their consolidated responses to the classroom task. After every presentation, they sought to get feedback from the teacher as well as from their peers. Upon the feedback they modified their responses and in some instances, they justified their responses as being correct. In such exchanges, there seem to be interactions as well as opportunities to foster communication and collaboration skills among the students. This was further reiterated by the interview data which also suggests that the teachers perceived classroom interactions as avenues to promoting communication and collaborative skills. The ongoing practice of these key collaborative skills creates a classroom with opportunities for high levels of participation on the part of all students and establishes a positive climate for teaching and learning. This was evidenced by Gary when he mentioned in the interview that collaborative learning via problem-solving activities engaged the students in his lesson. In such engagement, the students interacted among themselves as well as with the teacher. This was also observed in his lesson when students worked in groups to solve group tasks. Since group tasks were assigned in all three lessons observed in this study, the

evidence from the research data clearly shows that with group work, there were classroom interactions. And via these interactions, opportunities for communication and collaboration skills can be fostered among students in the classroom.

5.2.2 Interactions via online communication

Learning can take various forms and in a flipped classroom. The potential of interactions via online communication in providing opportunities for learning as well as to help foster communication and collaboration skills among students will be discussed in this section. Online communication by the students was particularly evident in Hannah's and Katherine's lessons where students had to post their responses online. There is extensive research into the importance of interaction in online learning environments. Researchers investigate the social interaction in online learning environments and in particular study the effects of interaction to learning. In general, the literature indicates that social interactions play a fundamental role in the development of cognition and make positive contributions to students' learning process (Park & Fitzgerald, 2005; Zha & Ottendorfer, 2011).

During the observation of lessons in this study, when group leaders posted the group responses online, the teachers asked the rest of the groups to offer feedback on the responses. Such online interaction was another facet of communication and collaboration that I observed in the lessons. This is another avenue where teachers can enhance interaction processes among students in the classroom. It was observed that students in their groups interacted to consolidate a response towards the group task. Once consolidated, they typed out their responses online in the school's e learning portal – social learning wall. The wall showcases all the responses of the students in the classroom and as an observer, I can see the thread of discussion. This further evidenced the number of interactions present in the flipped classroom. Tu and McIsaac, (2002) indicated that an individual learner can learn more effectively through the support of others. Collaborative learning theory also places great emphasis on the extent and quality of the exchanges that occur among students in a given

environment and stresses that students can broaden their knowledge base through interactions with other learners (Dringus & Ellis, 2005; Macfadyen & Dawson, 2010).

Hence, in introducing group work in the classroom, complementing the pre-class tasks, the teacher participants have tried to incorporate skills of communication and collaboration. Via these skills, there was an increased amount of interaction between the teachers and the students as the teachers facilitated the groups by asking leading questions and offering feedback. The feature of designing the pre-class tasks complementing the class-based group tasks will be explored later in this chapter. Interaction between the students was also evident as they communicated and collaborated by asking questions and offering comments to give a consolidated response to the group task. The flipped classroom pedagogical framework allowed the teachers to design pre-class tasks and classroom tasks to incorporate communication and collaborative skills with interaction processes – both face-to-face and online. Such interactions provide opportunities for learning as well as avenues to foster communication and collaboration skills

5.3 Deep Learning versus Surface Learning

The fundamental aim of any lesson is for teachers to ensure learning takes place in the classroom. All teachers stated that they were able to dedicate more time for classroom activities with flipped classrooms as lesson content had been introduced prior to the lesson via pre-class tasks. Drawing on data from the interview, teachers perceived students' learning at a deeper level with flipped classrooms, as a result of the richer discussions via the classroom activities as compared to the non-flipped classroom where more time was spent on introducing lesson content in the classroom with whole group or direct instruction.

According to Nijhuis, Segers, and Gijssels (2005), the level of learning can be characterized as being either deep learning or surface learning. Deep learning occurs when students showed interest in and searched for meaning in the learning task as they worked to integrate the individual parts of the task into a meaningful whole. Surface learning occurred when students

only engaged in the content enough to get the questions on the task correct. Students who only develop surface learning spend more time memorizing and reproducing information. They do not seek out further connections, meanings, or implications of the information learned. Based on this definition of deep and surface learning, I will now explore and discuss lessons conducted by the teacher participants.

5.3.1 Classroom activities towards deep learning

In all three lessons in this study, the teachers asked questions on the pre-class tasks at lesson introduction. Most of the questions were aimed at testing students' factual knowledge of the lesson content. Here, a few students responded to the questions. They engaged with the content only to get the answer right. Hence, there was surface learning at the lesson introduction. However, as the lesson progressed, opportunities for deep learning were present. The contents of the lessons observed will be discussed in this section with relevance to deep or surface learning.

In Gary's lesson, the objective was for the students to form food chains and food webs based on their own prior knowledge as well as the information from the resource video or the pre-class task. Hence, they were trying to make connections and meanings of the information learned to the task. This may have provided opportunities for deep learning. In Hannah's lesson, she requested the students to view a resource video on situational writing and to do a piece of writing as an evaluation. Similar to Gary's lesson, the students are tasked to transform the knowledge acquired from the resource video to the task. In Katherine's lesson, she had students look out for the answers for the questions from the passage. Here, they only engaged in the content enough to get the questions on the task correct. Though this may seem as surface learning, the lesson developed further when the students sought feedback from the teacher and the other students during the presentation of their answers. In this exchange, where deep discussions took place, the students sought to modify their answers as they integrated the various perspectives from the teachers and the other students. Such discussions provided opportunities for deep learning.

The notion of experimentation provides evidence of deep learning as students seek out further connections, meanings, or implications of the information learned to the task. The flipped classroom pedagogical practice puts the responsibility for learning more on the shoulders of the students while giving them greater opportunities to experiment. Activities in class can be student-led, and communication among students can become the determining dynamic of a session devoted to learning through hands-on work (Danker, 2015). The learners are able to demonstrate what they have learned and to apply the material in a way that makes sense to them. As learners make sense of their learning, they create something that is individualized, and with application to the learners' everyday lives, it extends beyond the lesson. This is the highest level of learning under Bloom's Revised Taxonomy of Learning (Gerstein, 2011). Based on students' works in the lessons observed, there were evidences that the students may have acquired knowledge from the pre-class task. They may have been given opportunities to have applied the acquired knowledge to the class task. These may have provided opportunities for deep learning. In Hannah's lesson, the students presented their own piece of writing once they had learned the content from the resource video. This is similar to Gary's lesson as they connected the information learned from the resource video in forming the food chains. Hence, in a flipped classroom setting, when students make connections from the content learned in the pre-class task to the classroom task, there is individualisation and application of knowledge in learning. This provides opportunities for deep learning or a higher level of learning under Bloom's Taxonomy of Learning. Hence, in all three teachers' implementation of the flipped classroom, there was evidence of opportunities for deep learning to take place.

Such deep level learning may have been possible due to the allowance for personalised learning in the flipped classrooms. According to Gerstein (2001), the flipped classroom promotes personalized learning as students can pause, re-wind and re-watch the online video at their own pace. This is one of the major, evidence-based advantages of the use of video where learners have control over the media and the ability to review parts that are misunderstood, or those that need further reinforcement. There may be those parts that are

of particular interest too. This is also applicable to text or non-video resources. In lessons delivered by Gary and Hannah, they had set a pre-class task in the form of a video while in Katherine's lesson, she had set a written text. The allowance for repeated viewing of the pre-class tasks do aid the students to learn the content deeper as compared to if it was introduced during classroom time. Hence in all three lessons, there were opportunities for both surface learning and deep learning with deep learning in most collaborative tasks.

5.3.2 Deep learning with problem-based group tasks

Though all three teachers implemented a flipped classroom pedagogical practice in their lessons and agreed on its purpose, they each had differing views on the practice. Based on the interview data, Gary mentioned that the practice allowed him to introduce a problem or a challenge for the students to overcome or solve. In problem-based learning within the flipped classroom, the teacher's role now moves to that of being a facilitator by initiating classroom discussions to ensure that all the students achieve understanding for meaningful and effective learning (Goh, 2012).

During small group activities when students worked on a problem, he approached the groups with leading questions in order to get them to think more deeply about the tasks. The students in their groups interacted with Gary as well as among themselves to respond to the leading questions such as "Do you think a cow is herbivore and if so, can it be placed after an animal?" Such questions spurred a discussion between the students and they consolidated their responses to provide the answers to the group task. With such facilitation as well as with the setting of appropriate tasks, there was much interaction in the classroom.

Katherine also showed a strong commitment towards her students' learning as she mentioned that she wanted them to be actively engaged in the lessons. She wanted them to think about their tasks by asking questions. Similar to Gary, she set a task in the form of a question where students had to find the answer, or in other words, she set a challenge of answering questions after reading a passage. Problem-based learning, such as this, is a

method of teaching and learning that engages students and begins to develop the skills necessary for 21st Century workplace (Hmelo-Silver, 2015; Kumar & Natarajan, 2007). When students experience learning by problem-solving they develop new understandings and gain new ways of doing things (Capobianco & Tyrie, 2009). By exploring options to find the answer, the students in Katherine's classroom interacted with each other as well as with the teacher. She too facilitated the students during group work by addressing their queries and providing feedback on their responses. Hence, both Gary and Katherine introduced a problem or a challenge as a task in their lessons and assumed the role of a facilitator. By facilitating group discussions, the teachers provided opportunities for deep learning.

The flipped classroom can create much deeper interaction between the teacher and student as they engage and interact on case studies, and discuss particular problems with problem-based learning (Leckhart & Cheshire, 2012; Gerstein, 2011). This was evident in Gary's lesson when he had set a task in the form of a problem as mentioned earlier. When students discussed the solutions to the problem, they engaged in discussions and there was much classroom interactions. When the students explored various possibilities to the problem with feedback from the other students and the teacher, they are given opportunities to engage in deep learning. It was important that the class-based learning activities were purposefully designed with the inclusion of exploratory learning through guided inquiry-based activities or problem-based learning. As mentioned earlier in the chapter on the inclusion of problem-solving activities in the classroom, these activities helped in engaging the students. In Gary's lesson, he introduced a problem as a task.

In examining the interview data with Hannah, she mentioned that she implements the flipped classroom pedagogical practice to allow for deeper discussions of lesson concepts. When students seek the answers to the problem, they engaged in deep discussions that led to more classroom interaction. The student-centred learning approach emphasizes engaging learners to structure their learning to include applying their current class work or experience when they collaborate to solve problems, and make sense of their learning. With this approach, students become active learners (Lea, Stephenson & Troy, 2003).

However, in a study comparing traditional assignment-based learning environment and a problem-based learning environment investigating the influence of the environment on student level of learning, the evidence showed that the students from the problem-based learning environment showed significantly more surface learning and significantly less deep learning than the students in the assignments-based learning environment. An analysis of the factors that contributed to these results led the researchers to conclude that communication in the problem-based environment needed to increase. (Strayer, 2007). As mentioned earlier in the chapter, in Gary's lesson, there was problem-based task assigned to the students. This was further reiterated from the interview data when Gary mentioned that by introducing a problem, his students are better engaged in the lesson. However, based on the study by Strayer (2007), teachers needed to communicate the ideas behind problem-based learning environments and give students more feedback as they process the learning tasks. This shows the importance of interaction and communication in the classroom in the form of teacher facilitation to set opportunities for deep learning to take place in the classroom.

As for Hannah, she views the flipped classroom practice as one that allows her to save time for greater depth of lesson. According to her, the time saved in the classroom for content delivery can be channelled to activities that can allow for opportunities for the students to learn concepts more deeply. Similar to the other two teachers, she too had set a pre-class task as well as tasks for groups during classroom lesson time. She facilitated the groups or pairs by asking thought provoking questions and facilitating them to think deeper about the tasks assigned. Iyer (2013) reported that cooperative learning promotes thought provoking and interactive environments for the students. Again, this approach of facilitating the groups has promoted classroom interactions. Therefore, the setting of a problem in the group task has allowed for opportunities for students to interact in the classroom.

In all the three lessons observed in the study, the amount of feedback given by the teachers and the other students does play a vital role in ensuring opportunities for deep learning in the classroom. The vocabulary of active and deep learning needs to be highlighted here as it is

an essential in-class instructional method in the flipped classrooms. Active learning is the involvement of students in their own learning and encompasses a variety of instructional techniques in which students participate in activities during class time that involve deep learning than passive listening (Zappe et al., 2012). The core elements of active and deep learning are student activity and engagement in the learning process (Prince, 2004). The flipped classes were a successful way to engage students on a deeper level and increased the students' curiosity and engaged them to develop higher-order thinking skills (Danker, 2015). The opportunities for deep learning were present in all the lessons observed when students were engaged in the group tasks.

5.4 Role of the Teacher

This section explores three different aspects of teachers' role that emerged from the data. The teachers' role as a task designer, a facilitator and one who exercises a locus of control in the teaching and learning process in the classroom. As a task designer, the teachers' role is to design the pre-class task and as well as the in-class activities. The teacher engages the students via these tasks. As a facilitator, the teacher aids individual as well as group work in the classroom by asking probing questions, giving feedback and clarifying doubts. The teacher exercises control in the classroom to allow students to take ownership of their own learning.

5.4.1 Task designer

The design of the pre-class and class-based tasks had been fundamental to promoting interactions in the classroom in all three lessons observed in this study. In Gary's classroom, he had assigned a pre-class task that complemented the classroom task. When students carried out the pre-class task and brought the knowledge to the classroom task, there was a lot of interaction among the students during the group task. The students worked with each other to give a consolidated response to the group task. The nature of the task is crucial in promoting interactions in the group. Fisher (2009) suggested that group learning activities should require students to grapple with ideas together through discussions and assignments, rather than working in isolation on similar tasks. He believed that such interactions are key element in learning environments to foster academic and social growth among students.

In Katherine's classroom, she assigned a pre-class task and that was to read a comprehension passage while the group task was to respond to questions based on the passage. Similar to Gary's design of task, Katherine's pre-class task also complemented the classroom task. The nature of the class-based task advocated that the students carry out the pre-class task so as to respond to the class-based ones. The role of the teacher in designing task with these parameters is crucial in flipped classrooms. The data from the interview and classroom vignette suggested that when students did the pre-class task, they were able to contribute to the group task better than those who did not. In all the three lessons, the pre-class task was designed as such that the students cannot participate in the group work task without doing the pre-class task. So when students come to class without doing the pre-class task, teachers have to look into strategies that can allow them to do the task in class so that they too can contribute to the group task.

This was also similar to Hannah's classroom where she had set a pre-class task for the students to view a video on situational writing. The classroom task was to respond to a set of questions related to the video. The data from the lesson observation notes showed that the students who viewed the video contributed more to the classroom group task as compared to those who did not. Besides, the students made references to the content of the pre-class task as they approach the class-based group tasks. The design of the pre-class task is thus crucial in promoting interactions.

Based on the lesson observation data, the design of the classroom tasks in complementing the pre-class task was crucial in bringing about classroom interactions. The research data suggests that the framework of flipped classroom pedagogical practice allows for the design of these tasks. Hence, a flipped classroom has the potential in promoting interactions among the students as they participate to accomplish the tasks assigned.

The teachers who participated in this study had strong philosophical stances underpinning their roles as teachers. This was evident from the interview data when they mentioned the

reasons for carrying out flipped classroom pedagogical practice in their lessons. They all shared a common stance to ensure that their students learned and were well engaged in the classroom. In a flipped classroom lesson, they expected their students to have done the pre-class task. With the knowledge gained from the pre-class tasks as well as with the student's own pre-existing knowledge, the teachers hoped that the students would be better prepared to contribute towards the group tasks. As explained in Chapter 4 under findings and analysis, the teachers who participated in this study designed flipped lessons that were primarily aimed at engaging their students. This was also evident in the interview as well as in the lesson when Gary introduced problem-solving tasks in the classroom to engage his students. The teachers acknowledged that in order for their students to be well engaged in their lessons, the lesson had to be designed with activities that allowed for such engagement. Thus, they recognized engagement as central to understanding and improving students' learning (Ryu, 2015). With flexibility in designing engaging classroom activities within the flipped setting, they aimed at achieving their lesson objectives.

5.4.2 Role as a Facilitator

The implementation of the flipped classroom pedagogical practice to enhance engagement of students in the learning process calls for teachers to take on the role of a facilitator. According to Bellamy (2015), a facilitator refers to the teacher allowing the student to become the leader or the teacher to his or her peers. The teacher takes a backseat to the directing of the learning and only steps in to guide or assist in the students' learning process. Such a facilitative role was evident during the lessons observed in the study. For example, in all three lessons observed, the teachers facilitated the students during group work. As the students worked on their group tasks, the teachers approached each group to guide them. In Katherine's lesson, she asked the students leading questions to guide them in answering the comprehension questions. In Gary's lesson, he clarified their doubts and asked probing questions to get the students to form the food chains. The facilitative role may also be a response by the teachers in this study towards the MOE policy of incorporating new pedagogies in the teaching and learning process.

The lesson observation data revealed that the teachers took on the role of facilitators. A facilitator is one who designs lessons based on the flipped classroom pedagogical framework with collaborative activities and one who facilitates group activities in the classroom (Kim, 2014). To achieve engagement, learning should occur within collaborative teams (Kruger, 2005). It is clear from the classroom vignette that the teachers had assumed the role as facilitators as they designed collaborative activities in the classroom and facilitated the groups during group work. The teachers' understanding of their roles in a flipped classroom was not only to provide knowledge, but also to facilitate the activities in the classroom (Carpenter & Pease, 2012). This was evident in this study when teachers acknowledged their role, not only as content providers but as facilitators and guiders in group work setting too. There is a shift from a centre-stage role to that of an encouraging partner in student learning (Renfro, 2014). Hence, teachers in this study understood their roles well by assuming the role of a facilitator and engaging their students in the learning process. This was clearly evident when they communicated with their students during group work activities.

Another important observation made as mentioned in Chapter 4 is the design of the pre-class task that showed the teacher's role shifting from a content provider to that of a facilitator or an engaging partner in learning. In Gary's lesson, he asked the students to watch a resource video on food chains and food webs with examples of predator and prey relationships. After watching the video, the students learned the concept of food chains and food webs. They explored the various possibilities of predators and prey, forming multiple food chains and food webs. From here, the role of the teacher, though seen as providing content to some extent, allows for opportunities for learning at a deeper level. With the design of classroom task of forming other food chains and food webs, complementing the resource video, Gary took on the role of an engaging partner in learning. This can be clearly seen as Gary offers comments and feedback on the student's food chains and food webs. For example, when he looked at the completed food chains, he asked probing questions to the students to get them to think about the predator and prey relationships of animals. The students modified their food chains upon Gary's probing of facilitation. This leads to my next observation of 'coaching'.

In the lessons that I observed in this study, the students presented their tasks while the teacher's role was shifted to that of a resource person, observer and a facilitator. The data from the lesson observation notes showed that when each group presented, the teachers assumed the role of facilitators and encouraged the rest of the students to give feedback to the group. Such a role is called 'coaching' (De Bruijn & Leeman, 2011). This was evident in Hannah's lesson where her pre-class task was to watch a resource video on the components of situational writing. With this knowledge, the students had to produce a piece of situational writing as a lesson evaluation activity. Here, Hannah's lesson objective was for the students to be engaged in the learning process with the teacher as the partner. She offered comments and feedback as they drew on the content from the resource video and applied it to the classroom task. The 'coaching' element was clearly evident in this lesson as well as in Gary's lesson too.

As facilitators, the role of the teachers in building the bond between themselves and the students is crucial as it can be a factor in fostering interactions in the classroom (Bondy, 2007). Liu (2013) placed emphasis on nurturing good relationships between students and teachers through communication. This was evident in all the three classrooms when teachers, in facilitating students' learning, communicated with their students in ensuring that the students are engaged in their lessons. The bond among students is also crucial in ensuring interactions take place in the classroom (Glazer, 2005). This was also seen in the lesson observations. The students in all three classrooms communicated with each by asking questions, offering feedback and giving suggestions during group work. Therefore, group work and task design were crucial in the flipped lessons in promoting interactions in the classroom.

In a flipped classroom setting, teachers took on the role of facilitators while allowing the students to work on the tasks. This was evident in all the three lessons observed in the study. The teacher's role was to step in and to guide according to the group's needs. Based on the flipped classroom pedagogical practice, the introduction of content prior to lesson aided the interaction processes in the classroom as evidenced by the research data. Based on the

research data, in assuming the role as a facilitator, the teachers in this study have contributed towards classroom interactions. The data has clearly evidenced that within the framework of the flipped classroom pedagogical practice, the teachers as facilitators have set the environment with opportunities for classroom interactions.

5.4.3 Locus of Control

Within the flipped classroom pedagogical framework, the setting of the pre-class task by introducing lesson content prior to the lesson, helps to devote time to other activities in the classroom. This was reiterated by all the three teachers during the interview. However, all three teachers started their lessons with content delivery via whole group or direct instruction. During these whole group instruction, the interactions between the teacher and the students were limited. Data from the classroom vignettes show that the teachers somewhat dominated the classroom discussions during whole group instruction. Though the teachers in this study understood that the time spent on whole class instruction and content delivery is lesser than the time allocated for group work and interactions, the teachers still did much content delivery during lesson time. By doing so, the teachers were exercising a locus of control to some extent. This locus of control of the teachers impeded some of the interaction process in the classroom. This does suggest that changing pedagogical practices in the classroom can be difficult if some practices such as content delivery are deeply engrained in teachers.

Based on the interview and my observations of the lessons, the teachers realised the need to shift to student-centred engaged learning. According to Bergmann and Sams (2014), the flipped classroom can promote an environment that increases the interaction between the students and teachers and engages the students in learning through application and practice. In this aspect, flipped classrooms uses a student-centred approach as it focuses on student learning and it places the responsibility for learning more on the shoulders of students than teachers while giving them opportunities to experiment (Sams, 2011). This was reiterated by Katherine in her interview when she mentioned that she implemented the flipped classroom pedagogical practice as she wanted the students to take responsibility of their own learning.

To attain a higher and conceptual level of thinking, the students need to take responsibility for their own learning and become active knowledge seekers (Goh, 2012). However, the teachers with strong engrained practices still had a stronghold of doing content delivery in class. This is in conflict with student-centred or even self-directed learning environment for the students. With reference to Chapter 4 under section 4.2, all three teachers in the study did some form of content delivery during their lessons. During content delivery, the interaction process between the teacher and students was reduced compared to when the students were engaged in group work. The shift from whole group instruction to that of student-centred practices is easier said than implemented in the classroom. Hence, in the design of the flipped lessons, the teachers may need to reflect on the stronghold they have on their practices. In other words, teachers need to reflect on how much control or the lack of it can foster interactions in the classroom. Fisher (2009) suggested that teachers move past their concerns of classroom control and individual accountability and increase the amount of small-group and peer-to-peer work. Fisher cited the work of Mueller and Fleming (2001) to illustrate that student engagement increases when opportunities for students to collaborate are increased. Collaborative opportunities facilitate achievement through oral language development and increased attention to tasks while also providing a sense of purpose and motivation (Mueller and Fleming, 2001).

It is evident that with the flipped classroom pedagogical practice, the teachers in this study were able to assume the role of a facilitator, the role of a task designer to design engaging lessons and enhance interactions in their classrooms. The teachers in this study expressed in the interview that via these interactions, they were able to incorporate the essential skills of communication and collaboration. However, with their stronghold on engrained practices such as direct or whole group instruction, the opportunities for classroom interactions can be lessened. Teachers have to continually reflect on their teaching practices to improve their teaching competency.

5.4.4 Improving Teaching Competency

The research participants understood that as teachers, they have to be equipped with relevant skills and training in order to be competent to carry out lessons that engage their students well. They mentioned in the interviews that as teachers, their role is dynamic and they have to continuously keep abreast with current professional knowledge and introduce lesson pedagogies in ways that coincides with the students' interest so that they will be well engaged in their lessons. For example, Hannah mentioned that she still needs training to be competent in carrying out flipped lessons. Vygotsky (1997) asserted, "Education is realized through the student's own experience, which is wholly determined by the environment and the role of the teacher then reduces to directing and guiding the environment" (p.50). This is reiterated in the Singapore MOE policy where teachers are supported with programmes that help them to develop professionally to cater to the goals of the education system. Hence, the need for teachers to set the environment for students to be engaged is a critical component for learning effectiveness. Flipped classrooms also draw on concepts such as active learning and student engagement (Gilboy, Heinerichs & Pazzaglia, 2015). The data suggests that all three teachers showed a commitment towards the learning of their students and for them to be well engaged in their lessons. The research data also suggests that the students were engaged in the lessons observed in the study. This is further evidenced in the analysis of data presented in Chapter 4. All three teachers asserted that via the flipped classroom pedagogical practice, they can achieve active engagement of students in their classrooms.

The teachers who participated in this study view their role as dynamic and evolving. Gary expressed that teachers have to keep abreast with the times. This is resonated in the MOE policy as "The MOE has improved and increased the range of opportunities for teachers to develop their professional capabilities. Besides updating themselves on changes in content and teaching methods, teachers will also pick up skills that will enable them to be more creative and innovative and also to pass on these skills to their students" (MOE, 2017). The domain of enabling teachers in the MOE policy has clearly delineated objectives for teachers to incorporate new ideas into their teaching pedagogies. This was further reiterated by Gary in his interview when he mentioned that "teachers have to improve, in their teaching

pedagogy with time and not be like ten or twenty years ago, just teaching content.” It is pertinent for teachers to be at the leading edge in their profession, informed by research and fostered through government policy of education.

In order for teachers to ensure learning take place in the flipped classroom setting, they have to overcome challenges with strategies that are most appropriate for their students. This brings me to my next theme as the challenges faced by teachers in the delivery of the lessons in a flipped classroom setting and the strategies to overcome these challenges will be discussed.

5.5 Challenges and Strategies

Every pedagogical practice comes with challenges, specific to teachers and students in contexts. Teacher participants in this study expressed certain challenges in the implementation of the flipped classroom pedagogical practice as well as the strategies they had adopted to overcome these challenges. The aim of presenting this theme is to discuss the challenges that were uncovered by this study and how the teachers overcame these challenges. The limitations of flipped classrooms is also discussed in this section.

5.5.1 Not doing the pre-class task

All three teachers’ interview data as well as the lesson observation notes indicated a common challenge in the flipped classroom pedagogical practice. The common challenge was to deal with students who did not do the pre-class task and come unprepared for the lesson. This hampered the students’ contribution towards the group or collaborative task. This was evidenced in the lesson observation notes. The fundamental essence of flipped classroom is for students to do the pre-class task and to participate in class activities. With the knowledge gained from the pre-class task as well as their own pre-existing knowledge of the lesson content, it is hoped that these students will contribute towards the group task.

Based on the interview data of all teacher participants and my lesson observations, they had various strategies in handling these students. Gary mentioned that due to the nature of task

design that entails interaction, students are somehow compelled to participate in the class discussions. Katherine mentioned that those students who come unprepared will listen to their peers and learn from them. Hannah mentioned that she adopts differentiated instruction to address the two groups in her class – students who are prepared and those who are unprepared for her lesson. Hence, teacher participants expressed different strategies in dealing with students who come unprepared for class by not doing the pre-class task. Though differentiated instruction primarily refers to teachers creating different levels of expectations for task completion within a lesson as explained by Waldron & McLeskey (2001), the notion of differentiated instruction referred to by Hannah doesn't quite conform to this. According to Tomlinson & Kalbfleisch (1998), differentiated classrooms are responsive to students varying readiness levels, varying interests, and varying learning profiles.

As mentioned earlier, the nature of the design of the task entails interaction. With this, the pre-class task is designed to complement the group task in the classroom. In Katherine's class, the pre-class task was for the students to read and understand a comprehension passage. The group task in the class was to answer a set of questions based on the passage. Hence, without reading and understanding the passage, the students will not be able to answer the questions. In Hannah's class, the students were tasked to watch a resource video based on situational writing. The group task in the class was a set of questions directly related to the resource video. Hence, similar to Katherine's lesson, it is almost impossible for the students to participate in the group task without doing the pre-class task.

In a study by Herreid and Schiller (2013), it was reported that students new to the method may be initially resistant because it requires that they do work at home rather than be first exposed to the subject matter in school. Consequently, they may come unprepared to class to participate in the active learning phase in the classroom-based activities. Herreid and Schiller (2013), expressed that in order to solve this problem, a short quiz either online or in class or by requiring homework that references information that can only be obtained from the outside reading or videos could be given. The homework either in the form of readings or videos must be carefully tailored for the students in order to prepare them for the in-class

activities. (Herreid & Schiller, 2013). The pre-class task design as well as the design of class based tasks is crucial to conduct a flipped lesson that will allow educators to realise their lesson objectives and to motivate students to come prepared for the lesson. In a study by McGarr (2009), it was reported that the majority of teachers prefer online videos over reading materials to accomplish the goal of preparing students out of class for in-class active learning. Their students preferred videos too. Video podcasts are audio-visual files distributed in a digital format through the internet using personal computers or mobile devices (McGarr, 2009). With reference to these studies, teacher participants can consider factors such as quizzes, video podcasts and digital format resources in designing the pre-class tasks. They can also look into student's preference for the type of pre-class task assigned whether it is a video or a written text.

The teachers in this study adopted various strategies in dealing with students who came to class without doing the pre-class tasks. However, based on the lesson observation notes, these strategies may or may not have been effective in lessons. In Katherine's class, she had asked the students to stay in their own places or seats and to take some time to read the passage before participating in the class tasks. The students were not isolated from the rest to read the passage. The students were instructed to listen to the discussion by their peers who had read the passage and to learn from them. Despite reading the passage and listening to their peers, they did not contribute towards the class-based tasks as much as compared to those who had done the pre-class task. In Gary's class, the students who had not done the pre-class task, proceeded to a corner in the classroom to view the resource video. This strategy was more effective than that of Katherine's. When students who did not do the pre-class task gather as a group, they share common ideas upon watching the resource video. They discussed the content of the video before proceeding to their individual groups to carry out the group tasks. Though they did not contribute as much as those who had done the pre-class task, they did so to a limited extent as the lesson progressed. In Katherine's class, she did not isolate the students who did not do the pre-class task, hence they could not contribute much to the group task. They depended on the other group members who had done the pre-class tasks to get the task done as was observed in the lesson. The flipped classroom depends heavily on students preparing outside of class (Knight & Fink, 2002). The introduction of lesson

content occurs outside of class and the engagement occurs inside the classroom (Lage, Platt & Treglia, 2000). Hence, in dealing with this challenge effectively, the teachers can provide opportunities for more interactions and better engagement of students in the classroom.

5.5.2 Challenge in engaging the young and access of technology

Another challenge lies in engaging students in the lessons. When asked about the reasons for implementing the flipped classroom pedagogical practice, Gary mentioned in the interview that he did so to better engage his students – to keep abreast with the current times and embrace technology so that students will find the lessons engaging. Hence, there is a challenge to make lessons engaging for the young. The flipped classroom is one of many ways where lessons can be engaging with the use of technology. For many educators, the flipped classroom is synonymous with the use of internet technology in general and videos specifically (Overmyer, 2012). Though flipped classroom can be implemented without the use of technology as well, the use of videos and online portals does seem to offer opportunities for student engagement in lessons. A study by Lage, Platt, and Treglia M (2000), reported the benefits of using technology in teaching as consistent with the goals of a flipped classroom. As observed in the lessons, at lesson introduction, when the teacher participants asked questions to the whole class, there was not much student engagement as compared to when they were in small groups and using technology where the students interacted more. There is extensive literature on the effect of instructional video podcasts, which have been shown to have a positive impact on student attitudes, behaviour and participation (Bolliger, Supanakorn & Boggs, 2010; Fernandez, Simo & Sallan, 2009; Hill & Nelson, 2011). This was evident in all three lessons observed in the study where students interacted and engaged in small groups as they embraced technology via online portals and instructional or resource videos. This is further reiterated by a study on flipped classroom – flipping the classroom employs easy-to-use, readily accessible technology in order to free class time from teaching content. This allows for an expanded range of learning activities during class time. Using class time for active learning versus teaching of content provides opportunities for greater teacher-

to-student mentoring, peer-to-peer collaboration and cross-disciplinary engagement (Roehl, Reddy & Shannon, 2013).

These studies show the role of technology in flipped classrooms that may help to engage the young. However, based on this study, not all students had access to technology outside of class. This hampered the students in doing the pre-class tasks. This may be one of the reasons as to why students come unprepared for the lesson. One of the challenges faced by teachers on the implementation of the flipped classroom pedagogical practice as mentioned by Gary in the interview, is the sharing of video resources. This was attributed to students of differing abilities in various classes that impedes the sharing as resources. The resources may be appropriate for one class and might not be, for another class. As mentioned by Hannah, teachers can adopt differentiated instruction to address the various learners.

Drawing on data from the interview, though there were challenges in the implementation of the flipped classroom pedagogical practice, the teacher participants generally were in favour of this practice and did not seem perturbed by the challenges. They were contented with the strategies adopted to overcome these challenges, though the strategies might or might not have been effective in ensuring learning objectives are met.

5.6 Summary

In analysing the research data in Chapter 4, four themes emerged. The first being communication and collaboration. The skills of communication and collaboration are vital in enhancing discussions and interactions in the classroom. Class based task design that promotes interactions via problem-solving activities can help to build on these skills, as mentioned by the teacher participants. Literature shows that communicative and collaborative skills are vital during problem-solving activities. When students work in small groups to solve a problem, they interact with knowledge gained from the pre-class tasks as well as from their pre-existing knowledge of the content. As they interact and share ideas, they learn from each other, thus building on communication and collaboration skills.

Within the flipped classroom pedagogical practice, there are avenues where opportunities can be created for deep learning as opposed to surface learning. This is the next theme that emerged in the analysis. Opportunities for deep learning occurs when seeking connections, meanings, or implications of the information learned. Surface learning occurs when students only engaged in the content enough to get the questions on the task correct. Students who only develop surface learning spend more time memorizing and reproducing information. Based on the research data, it was evident that task design helped to create opportunities for deep learning. The introduction of problem-solving activities do seem to lend opportunities for deep learning as compared to activities that are designed for students to merely look for factual knowledge. When students collaborated in small groups to consolidate their responses towards the group task, there were evidences of classroom interactions. The design of the pre-class task where students transform the knowledge towards the class based activities also show opportunities for deep learning.

The next theme is the role of the teacher as a task designer, a facilitator and one who continually seeks to improve his or her teaching competency. Data suggests that in the flipped classroom pedagogical practice, the teachers' role is still evolving. The role of the teacher is crucial in designing the flipped classroom learning experience, including pre-class tasks and class-based tasks. The design of the tasks can be a contributing factor in engaging the students, thus leading to increased interactions in the classroom. Teachers who adopt flipped classrooms, attempt to take on a more facilitative role, particularly during group work. Students are led to discover their own learning with minimal interference from the teacher. The teacher in the facilitative role asks leading questions and offers feedback on student responses to help them with the task. However, it is clear that the delivery of content is a deeply engrained part of teachers' practice and difficult to abandon completely.

There are several challenges faced by teachers as well as learners in a classroom setting to ensure learning takes place. This brings me to the last theme that emerged in the analysis of research data – challenges and strategies. One of the main challenges faced by teachers who

implemented the flipped classroom pedagogical practice was that students who come to class unprepared as they did not do the pre-class tasks. Teacher participants in this study had various strategies such as differentiated instruction and peer learning in dealing with this challenge. A review of the literature acknowledges these challenges and offers strategies that are somewhat related to task design. Alternative pre-class tasks to ensure transcending of learning, embracing technology to entice students to learn better are some of the strategies. The teachers in this study adopted some of the strategies to ensure continuous engagement and learning take place within the flipped classroom implementation.

It is evident that the primary objective of all three teachers who participated in this study was to deliver engaging lessons for their students. The implementation of the flipped classroom pedagogical practice was a response to designing engaging lessons with collaborative work groups. With problem based learning and differentiated instruction within the flipped classroom framework, the teachers in this study hoped to heighten student engagement and interactions in the classroom. Via these interactions, the teachers believed to have incorporated the skills of communication and collaboration.

The extent to which the flipped classroom pedagogical practice is able to elicit classroom interactions in a primary school setting will be discussed in relation to the research data in the next chapter.

Chapter 6: Discussion

6.1 Introduction

The primary focus of this study was to explore if the flipped classroom pedagogical practice has the potential to bring about more interactions in the primary classroom in the Singapore context. Present literature has focussed mainly on the implementation of the flipped classroom pedagogical practice in tertiary settings and very little research has been done in the Singapore context. With teacher interview data, lesson observation notes and Singapore educational policy documents and through a thematic analysis of the data, I set out to answer two research questions:

From a teacher's perspective, can the flipped classroom pedagogical practice contribute to classroom interactions and if so how?

and

What features and characteristics of the flipped classroom pedagogical practice can enhance the development of skills of communication and collaboration?

Taking into consideration the limited amount of research on flipped classroom pedagogical practice in primary classrooms and to find out if the practice can bring about more interactions, I have with this study tried to address the research questions by exploring the practice and its implementation in a Singapore primary school context. In this chapter, I will discuss the core findings of the thematic analysis as presented in Chapters 4 and 5 and the practical implications of those findings. I have organized this discussion to first, present the successes of the participant teachers' flipped classroom pedagogical practice, particularly where this had a positive impact on classroom interactions and the entire learning experience of students. Next I will present the challenges and limitations that the teachers faced when using this practice and how this may have influenced students' learning experience. These challenges also revealed some key findings for future research. The discussion in this chapter contributes insights into

flipped classroom pedagogical practice and its potential for promoting classroom interactions and the development of communication and collaboration skills.

6.2 Celebrating Successes

6.2.1 Improving Classroom Interactions

As mentioned in Chapter 1, flipped classroom pedagogical practice is one of the strategies to improve classroom interactions in a large primary class in the Singapore primary school context. In the Singapore context, each primary class comprises between thirty and forty students. Interaction among students or between teacher and students can be limited in a large class when didactic, teacher-centred pedagogical practices are adopted. These can present lesser opportunities for classroom interactions. With lack of interactions, opportunities for communication and collaboration skills may not be evident. In this study, the teachers were able to interact with many students when they were placed in small groups. To create a learning environment and enhance students' learning in large classrooms, the teacher can create a small class atmosphere in a large class setting, encouraging class participation and promoting active learning with associated activities. These consist of moving around the class and dividing the class into small groups (Nakabugo et al., 2008). This was consistent in this study when the large class was divided into small groups where classroom interactions were heightened when teachers interacted with the students in groups. The interactions among students within the groups were also evident. There was also online communication among students when they posted their responses onto the school's e learning portal. The thread of communication in the online posts contributed to the interaction process. Hence, by encouraging the students to interact with one another via the online portal as well as with physical classroom talk, flipped lessons to some extent have moved to a student-centred pedagogical approach.

6.2.2 Transition of Knowledge from Pre-class tasks

The students who had done the pre-class activities contributed to the group interactions more than those who did not. However, placing students in small groups cannot alone bring about classroom interactions. The flipped classroom pedagogical practice with its framework, allowed teachers to set the pre-class tasks. With knowledge from the pre-class tasks, the students interacted in small groups to accomplish the tasks assigned. The placing of groups, the task design and the onset of pre-class tasks within the framework of the flipped classroom pedagogical practice, contributed to the success of the classroom interactions in the participant teachers' classrooms. The design of the pre-class task complementing the class-based task was crucial in allowing students to transform the knowledge gained towards the tasks. This was also seen when students in small groups referenced their comments to the pre-class tasks when they interacted with their peers during group work in the classroom. By contributing towards the completion of the group tasks, the students interacted with each other in the group. Based on the classroom observation data, the students who did not do the pre-class task did not interact as much as the students who did the pre-class tasks. Therefore, the students who did the pre-class tasks interacted better in terms of quantity and quality of interactions as compared to those who did not do the pre-class tasks. As shown in the interview, the teachers agreed that they were able to develop skills of communication and collaboration via these interaction. This contributed to the success of the flipped classroom pedagogical practice.

Flipped classroom pedagogical practice is about shifting the teachers' focus for how and when students are prepared to learn (Strohmyer, 2016). What I have found in this small study is that many students are open to trying new learning methods and were enthusiastic about it as most of the students were receptive to the idea of viewing and learning lesson content at home. This can be seen in most students who had done the pre-class task and were able to contribute towards the class task, referring to the content of the pre-class task. This is consistent with previous research on flipped classroom showing that there is an understanding of key elements of flipped classroom among students to make it successful (O'Flaherty & Phillips, 2015). By learning the lesson content

at home, students were able to participate in class discussions and this greatly contributed to classroom interactions as compared to those who did not do the pre-class task at home. Only a handful of students did not do the pre-class tasks and this showed that majority of the students have adapted to the flipped classroom practice of learning content at home or outside of class. This shows that it is feasible to implement the flipped classroom practice in the primary settings as most of the research focussed on implementing this practice in tertiary settings. Close scrutiny of the students' interaction processes through the class observations revealed that they were able to relate to the lesson content learnt at home via the pre-class task. As illustrated in Chapter 4 under section 4.2, when the students talked about content of the pre-class task, and used the knowledge gained to solve the class-based group task, it was evident that the flipped classroom strategy was effective in promoting interactions.

6.2.3 Teacher Competency

The teachers' competency of understanding the flipped classroom pedagogical practice and designing their lessons with appropriate tasks have also contributed to the success of this practice. The teachers received this pedagogical practice well and have implemented it within their classroom as much as they can and this had contributed towards its success. The setting of the pre-class task complementing the class-based task, the design of small group task in the form of a problem to allow for students to work on the solutions shows the teacher's competency in designing flipped lessons. The professional development programme on flipped classroom had allowed for teachers to plan and design effective flipped lessons. During the interviews, one teacher expressed a need for more training on this practice to deliver better planned lessons. This is reiterated by Gee (2008) as he notes that as educators, we must be attuned to the constantly shifting social and cultural landscapes, particularly with regard to technology and how it is changing students and education (Gee, 2008, p. 2).

When they spoke of the challenges in the implementation, they were not perturbed by them. They understood the need to implement the flipped practice and its benefits in contributing

to the learning process of the students. Therefore, based on this study, the teachers were receptive towards the flipped classroom pedagogical practice.

In sharing their experience with implementing flipped classroom, the teachers acknowledged that the lessons were engaging for their students. With flipped lessons, they were able to spend more time in class-based activities and have deeper discussions of lesson content. This was evidenced in their lessons when group work was carried out with students working on problem-solving tasks. As students transform the knowledge from the pre-class task to the group task, they were able to understand the purpose of the resource videos or written texts as supporting them in being prepared to participate in class. This type of experience is a start to establishing a flipped learning mind-set. In practical terms this may mean that if teachers choose specific activities to be flipped, the students' expectations for their role in being an active learner are already established.

As seen in the lessons, the teachers addressed the students' queries in their understandings of lesson concepts. While addressing their queries, the teachers in this study were observed to ask probing questions. The students worked in groups in answering the probing questions. In doing so, the teachers were able to promote collaborative learning and promote interactions among students. Simultaneously, these probing questions also allowed for opportunities for deep learning in the group. The classroom discussions and the presence of the teacher to guide the groups are features of the flipped classroom that contribute towards promoting interactions in the classroom. The flipped classroom model in this study had also shown the importance of the teacher's presence in the classroom to facilitate the dialogue or discussions. In the individual interviews, the teachers all mentioned that with flipped classroom the students were well-engaged in their lessons. When addressing these experiences towards a better understanding of flipped classroom, we can see the importance of knowing the intent of the content before flipping (Ainsworth, 2006, Murray, et al., 2015). This can be seen in knowing how much to prepare for discussion or iteration in class, or how a subject is best understood by the students. Therefore, the teachers' competency of understanding and delivering lessons with the flipped classroom pedagogical practice and designing their lessons with appropriate tasks have contributed to the success of this practice.

6.2.4 Fostering skills of communication and collaboration

An aim of this study was to explore how a flipped classroom pedagogical practice might contribute to developing the skills of communication and collaboration. As illustrated in the findings from this study in Chapter 4, when the students were placed in small groups, they worked on a task in the form of a problem. As they communicated with each other and consolidated their responses to find the best possible solution to the problem, there were opportunities for collaboration. For example, within the group, when the one student gave his input towards the task, the other students gave feedback on his input. Based on the feedback, the student responded with an amended explanation. Likewise, there were opportunities for collaboration among groups too. For example, when each group presented their task and the solution, the other groups were asked by the teachers to give comments and feedback. Upon this feedback, the students worked on their solutions again. The thread of discussion in the online portal also showed that the students were receptive to feedback from other groups as they amended their responses based on the feedback.

The features of the flipped classroom pedagogical practice of setting pre-class tasks, working on tasks in small groups and making room for more class-based activities have helped the teachers in promoting the skills of communication and collaboration in the classroom. Communicating and collaborating with each other in small groups, and with the whole class, not only contributed towards classroom interactions, but these have allowed the students to develop these 21st Century skills specified in the Singapore MOE policy (MOE, 2017). These are the attributes of success of the flipped classroom pedagogical practice.

6.2.5 Fostering Independent Learning

Based on research, as discussed in Chapter 2, a flipped classroom has the potential to allow students to have the flexibility to engage with the lesson content before entering the classroom. This can foster individual inquiry, collaborative effort, social interaction, reflection and independent learning skills (Abeysekara & Dawson, 2015). When it comes to flipped classroom, the students are aware of what they have done at home via the pre-class task can be relevant for them when it comes to class-based tasks. The students'

experiences with doing the pre-class task, showed that these resources were able to work as learning tools. In the classes of the teachers who participated in my study, I found that the resources used in the pre-class task functioned as a scaffolding tool. In line with the previous research findings (Murray, et al., 2015), the content of the resources were useful by providing students with the information they needed for the class-based tasks. Flipped classroom requires a change in how and where students learn (Bishop & Verleger, 2013). In this case, the finding here is transforming of knowledge where the students were able to make connections from the pre-class task resources to the class-based problem tasks. They recognise the video resources or the written texts as tools of instruction. A flipped classroom needs to make the connection between the videos or written texts and the in-class activities (Bishop & Verleger, 2013, Yarbro, 2014). It is the combination of the two that set the ground work for a successful flipped learning experience. This bridge may mean that the pre-class resources carry the potential for being recognised by the students as a method of instruction instead of their teacher in the classroom. This is consistent with previous research where flipped classrooms are recognised as learning environments with potential to promote a shift from the teacher-centred one to the learner-centred one, as the learning tasks in flipped classrooms depend heavily on learner-driven preparation outside of formal class time (Flumerfelt and Green, 2013). This supports the use of flipped learning as a mindset with great potential for enhancing student learning (Krumsvik & Jones, 2016).

Although research shows increasing advantages and usage of flipped classroom in several subjects, teachers should reflect on their intentions with the lesson and evaluate if it fits with this model (Yarbro, 2014). As mentioned earlier, one of the teachers in the interview expressed that she needed more training in implementing flipped classroom. With training and support, the teachers can become more competent and confident in making decisions on which lessons to flip and how to design the pre-class and class tasks. Now I will discuss the challenges of the flipped classroom pedagogical practice.

6.3 Addressing the Challenges

There were several challenges identified in the implementation of the flipped classroom pedagogical practice in the Singapore primary classroom setting in this study. Though via the interviews, the teachers only mentioned one pertinent challenge, there were more than one that were apparent.

6.3.1 Students not doing the pre-class tasks

As mentioned previously in Chapter 5 under 5.5.1, all three teachers who participated in the study cited students who did not do the pre-class tasks before the lesson as a challenge. This challenge is also mentioned in the literature surrounding flipped classroom. As Tucker (2012) mentioned in his study, students new to the method may be initially resistant because it requires that they work at home rather than be first exposed to the subject matter in school. Consequently, they may come unprepared to class to participate in the active learning phase of the course. Based on the lesson observation notes from this study, these students were asked to view the pre-class content in class before joining the rest of the students. The teachers mentioned that in this way they were able to curb the challenge of students not doing the pre-class tasks. The teachers did not view this as an inherent problem. Though the students viewed the videos or read the written text which were pre-class tasks during the lesson, they did not contribute to the group work discussion as much as those who did the pre-class outside of class or at home.

Upon close scrutiny of the students who did not do the pre-class tasks, the teachers mentioned that the students did not have computers or internet access at home. Nielson (2012) discusses concerns with accessibility of instructional resources being provided online in the implementation of flipped classroom in lessons. On the other hand, these students may be given alternative resources such as written materials. Therefore, the success of the flipped lesson lies in the students who do the pre-class tasks as the content from the pre-class tasks is essential in carrying out the in-class tasks. In relation to this study, the students will interact better at class-based group tasks if they had done the pre-class tasks. The amount of classroom interactions can be lesser if the students did not do the

pre-class tasks as they may not participate in discussions as much those who had done the pre-class tasks. This calls for the school as a whole to look into this issue of ensuring all students have access to technology either at home or after/during school. Schools can open explore the idea of opening up their computer laboratories after school to ensure better technology access for these students.

6.3.2 Teachers' engrained practices

Teachers in this study mentioned in the interviews that the flipped classroom pedagogical practice allows them to have more time in the class for class-based activities. Through these activities, they mentioned that that they found that they were able to have deeper discussions of lesson content with students during class. The findings in this research suggest that flipped classroom has the potential to allow students and teachers to focus class time on skills development, problem-solving and active learning of concepts (Roehl, Reddy & Shannon, 2013). The opportunity to engage with videos or other resources at home before class resulted in more time being available during class for practice and deeper levels of cognition (Ladner, Beagle, Steele & Steele, 2004). Though this is the basis towards the implementation of flipped classroom, the teachers in this study did much content delivery with direct instruction as observed in their lessons. All three teachers began their lessons by going through the content of the videos or texts set in the pre-class task. During this direct instruction, very little exchange or interaction took place between teacher and the students and almost negligible amount of interactions among students. The students responded to the teachers' questions with minimal elaboration of responses. The teachers dominated the entire discussion at lesson introduction. This may be attributable to students feeling inhibited to express their opinions in the presence of their classmates in a large class or because teacher-student interactions such as these are "normal" in their classes. The locus of control of the teacher was inherent throughout lesson introduction in all the lessons observed in this study. Though the teachers mentioned in the interview that they need to evolve from just content delivery to developing skills such as problem-solving in the classroom, they had a stronghold on their teaching practices such a direct instruction of content delivery. Nielson (2012) discusses concerns with lack of adapting to the classroom environment to reflect the

flipped classroom's ability to support student-centred learning, allowing students to learn at their own pace and use of direct instruction to provide instruction with disregard to individual student learning.

During lesson introductions, apart from content delivery, the teachers in this study also engaged in some form of lesson evaluation. They asked questions to the students, addressing the class as a whole, to find out if they had learnt the content that was given to them as pre-class tasks. The students, as mentioned earlier, did not respond as much as they did during their small group discussions. In the presence of a large audience, where in this case is a large class of about forty students, it can be an intimidating experience for the students to express their responses. Since the content delivery had been done with the pre-class task, the teachers can utilize classroom time for small group discussions and activities to building up skills such as problem-solving, teamwork and skills of communication and collaboration. Lesson introductions, then, might be better used to provide an overview of the learning to be undertaken, then move into the interactive class-based activities planned for the lesson.

The teachers in this study demonstrated that they were receptive to adopting the flipped classroom pedagogical practice and have welcomed the initiative with enthusiasm as evidenced in their interviews. However, the engrained practices have posed a dilemma in adopting the 'new' and to forgo the 'old'. The 'new' referring to the flipped classroom practice and the 'old' referring to content delivery with direct instruction.

6.3.3 Teacher and student support

There are inherent challenges in introducing any new initiatives in the classroom. Flipped classroom pedagogical practice was introduced to the primary school in this study for teachers to adopt as the practice was in tangent with the Singapore MOE policy of building independent learners. Though the policy states to incorporate skills in the classroom, there are bound to be challenges in adopting any new initiative in the classroom. In doing so, the teachers need support in terms of training, follow up discussions, lesson observations, reviews and constant feedback or reflection. The school can work with the staff to draw up a structured plan in adopting a pedagogical practice. The school leaders together with other

stakeholders such as the teachers, parents and the community can work together towards the implementation of any new initiative. As for the flipped classroom pedagogical practice, the teachers need much support as this practice demands a shift from conventional direct instruction with teaching of content in class to that of building up of skills such as working in small groups and problem-solving. As for the parents of students, they too might need time to adjust to this new strategy as they coach their children at home with homework. They might need a new set of skills to handhold their children to learn content from the videos or texts assigned in the pre-class tasks.

The students too, need time and space to adapt to new a way of learning. As mentioned earlier, if teachers choose a lesson to be flipped, the students are required to take on a responsibility towards their own learning, to carry out the pre-class tasks and to engage with their peers. The students also have to adapt to doing homework in a different approach as opposed to the usual way of doing so. The students are encouraged to adapt to doing homework and to bring the knowledge from the homework to the class-based tasks. In all the lessons observed in this study, group work or pair work was assigned. The students engaged in a new set of skills pertaining to group work - skills such as communicating in a group, collaborating with the other members in the group, consolidating group responses towards the tasks, social skills of working in a group are some of many. The physical space in the classroom is also best designed to be conducive to adopting this pedagogical practice. In the classrooms I observed, there were space constraints when the students moved to small groups and for the teachers to move through the groups to facilitate them. This is a consideration for schools and Government when implementing pedagogical practices that involve interactive activities such as these.

In the course of this study, online communication was found inherent in one of the lessons observed. This suggests that it is also important for students to learn a set of skills pertaining to online communication – of posting comments onto the school’s e-learning portal and to be able to give feedback on other groups’ responses. The students also need to learn the ethics of online communication before the lesson can be implemented. Hence, it is important

that the school as a whole comes together with structured support plans in order for any new initiative to be implemented in the classroom.

6.4 Summary

The findings in this study strongly suggest that there is much potential for flipped classroom pedagogy as a strategy to enhance classroom interactions. With support, time and space, teachers can design effective lessons with flipped classroom pedagogical practice. The students too, with support can adapt to a different way of learning from videos or written texts set in the pre-class tasks. Flipped learning has the potential to engage learners in a more interactive technology-supported student-centred learning environment. Or, even simply as a teaching tool for teachers to integrate various learning modes from videos to texts to small group learning. The flipped classroom pedagogical practice in primary classrooms has the possibility to support learners in building skills in collaboration, communication and utilizing digital or non-digital tools as resources. This study is one of the few that contributes to this space. Findings from this study that illustrate the potential of flipped classrooms in promoting interactions are the setting of pre-class tasks complementing the in-class group tasks, the facilitative role of teachers during group work as well as the opportunities for teachers and students to interact with each other during group work and group presentations. A factor to consider when it comes to flipped classes is how the teachers are well supported to undertake this practice. But first, more research needs to be conducted to gain more information about flipped classrooms in primary schools in the Singapore context as well as in other settings. This will be discussed in the next chapter.

Chapter 7: Conclusion

7.1 Introduction

The purpose of this study was to explore the potential of flipped classroom pedagogical practice in promoting classroom interactions. The findings of this study could potentially contribute to our understanding of how flipped classrooms are implemented in the primary school settings. Based on the findings, this chapter outlines the key messages and implications for policy, practice and research. Limitations for this study as well as possibilities for future research will be discussed in relation to the findings.

As outlined in Chapter 1, the research problem arose out of a concern of teachers addressing a large class in Singapore primary classrooms where there is an expectation in the curriculum policy set by the Ministry of Education (MOE), Singapore to incorporate 21st Century skills of communication and collaboration. The flipped classroom pedagogical practice is one of many classroom practices with the potential to allow for classroom interactions and for creating a conducive environment for the essential skills of communication and collaboration to be incorporated in the lessons. Though the flipped classroom pedagogical practice has shown positive learning outcomes in the literature, most of the research had focussed on tertiary education. There is little research on this practice in the primary education, especially in the Singapore primary classroom context. This study with its findings, provides insights to the possibility of incorporating this practice in the Singapore primary classroom and its potential to bring about more classroom interactions, especially with large class sizes.

7.2 Research Aims and Questions

The aim of this research was to explore the implementation of the flipped classroom pedagogical practice in Singapore primary classes of ten to twelve year olds and how it can potentially contribute to classroom interactions and the enhancement of communication and collaboration skills. In the Singapore context, each primary class comprises between thirty and forty students. As an educator, it is a challenge to interact with every student in the class. In a large class, interaction can be limited if didactic,

teacher-centred pedagogical practices are adopted. These can present lesser opportunities for classroom interactions and a perception that communication and collaboration skills are not strongly evident.

Though there are many pedagogical practices that can enhance classroom interactions, the flipped classroom pedagogical practice was chosen for this study as my passion and engagement with flipped classroom pedagogies were important drivers for my choices about the research questions and approaches. The research questions were as follows:

1. From a teacher's perspective, can the flipped classroom pedagogical practice contribute to classroom interactions and if so how?
2. What features and characteristics of the flipped classroom pedagogical practice have the potential to enhance the development of skills of communication and collaboration?

Teacher interviews and classroom observations were analysed with an overview of the MOE, Singapore policy. Qualitative method of research in this study provided rich data. An in depth analysis of the data provided for deep discussions of the findings. Owing to the scope of the research study with three teacher participants in one primary school in Singapore, the findings may not be generalised. However, the findings offer insights into the implementation of flipped pedagogies in large primary classrooms and how the approach can be applied in similar settings.

7.3 Findings and Analysis

The findings of this research have addressed the research questions to some extent. The teachers who participated in this study were trained in the implementation of the flipped classroom pedagogical practice and are committed to engaging their students actively in their learning. Based on the interview data with the teachers in this study and the lesson observation notes, the findings indicated the teachers' perception towards the practice as bringing about classroom interactions, especially when the students engage in group work discussions in class. The consolidated view from the teachers was to use classroom time

effectively to hold deep discussions of lesson content, deliver engaging lessons, to improve their teaching pedagogies and to stay relevant in the globalised environment.

Based on the research data, the practice helped the teachers to design tasks for their students to be prepared and be well engaged in the lesson. The teachers shared a common stance that with flipped classroom pedagogical practice, there is more time available for classroom activities to enable deeper discussions of content as compared to going through content in the classroom. They agreed that with flipped lessons, there were classroom interactions. With these classroom interactions, they were able to incorporate communication and collaboration skills in their lessons.

One of the features of the flipped classroom pedagogical practice is the assignment of the pre-class task. The data illustrated how teachers designed the pre-class tasks. The nature and design of the pre-class tasks were crucial in the participation of the students in lessons. As students transform the knowledge from the pre-class task to the class based group activities, there were classroom interactions in the form of asking questions, clarifying doubts and offering feedback.

The design of the group task is another crucial component of the flipped classroom pedagogical practice. The group task, allowing for opportunities for students to interact, can be possibly inquiry-based or problem-based. Teachers mentioned in the interview that they designed problem-based tasks for their students in the flipped lessons. As students worked on these problem-based tasks, they interacted with each other. The data illustrated that teachers were able to develop communication and collaboration skills in the classroom via these interactions.

In summary, according to the teachers' perspective, the flipped classroom pedagogical practice has the potential to bring about classroom interactions. The design of the pre-class task and the group task are crucial elements in promoting interactions in the classroom. These interactions help teachers to develop communication and collaboration skills among students.

7.4 Summary of Findings

The research data provided evidence for the teachers in this school of the flipped classroom pedagogical practice in bringing about classroom interactions in the primary school setting. It is evident that the primary objective of all three teachers who participated in this study was to deliver engaging lessons for their students. The implementation of the flipped classroom pedagogical practice was a response to designing engaging lessons with collaborative work groups. The teachers in this study incorporated problem-based learning and differentiated instruction within the flipped classroom practice to heighten student engagement and interactions in the classroom. According to the teachers, these interactions provided them with opportunities to foster communication and collaboration skills.

However, the shift in pedagogical practice takes time especially if certain practices appeared to be engrained in the teachers. While there was significant class time devoted to student-centred learning, the teachers still used direct instruction for parts of the lesson. This appeared to duplicate rather than to complement the pre-class task carried out by the students. This impacted the amount of interactions in the classroom and affected the time set aside for small group discussions. During group work sessions, though the teachers assumed the role of a facilitator and an engaging partner in learning, there was much imparting of content to the students. Teachers may reflect on how much control they have on their students' learning and the lack of it may allow for more self-directed learning or even provide opportunities for deep learning.

7.5 Limitations of the study

This study is a small scale study involving a single institution, in this case, a government primary school in Singapore that has implemented the flipped classroom pedagogical practice as one of its professional development programme for teachers. The study was conducted within the time frame of a Master level course. The qualitative research methodology was constructed to enable an in-depth and detailed examination of the research aim and questions. The analysis of individual interview data and lesson observation notes

allowed for rich, descriptive data to explore the flipped classroom pedagogical practice and its contributions to classroom interactions. It also provided insights into how these interactions provided opportunities to foster communication and collaboration skills in large Singapore primary classrooms.

The implementation of the flipped classroom pedagogical practice have to be considered in the applicability of the findings. With most government primary schools in Singapore comparable in terms of class sizes, the results may be transferable to similar settings.

7.6 Possible Future research

The challenges in the implementation of the flipped classroom pedagogical practice can be the focus of possible future research in this field. One of the challenges that inhibits the implementation of the flipped classroom pedagogical practice is the teachers' stronghold on engrained didactic classroom pedagogical practices. These have the potential to impede classroom interactions as observed in this study. The scope of the study to extend to more participants and to cover more schools can be a platform for possible future research in this field.

7.6.1 Research about educational policy

In the Singapore context, each primary class comprises between thirty and forty students. It remains a challenge for educators to interact with every student in a large class, especially when teacher-centred, didactic pedagogical practices are adopted. With lesser classroom interactions, opportunities for the development of communication and collaboration skills may be reduced as well.

The Ministry of Education, Singapore (MOE) developed a 21st Century competency (21CC) framework, identifying communication and collaboration as well as information skills for the 21st Century (MOE, 2017). The key to incorporating these skills is increased interaction. Based on the literature and research in this area, the flipped classroom pedagogical practice is one of many practices that can enhance classroom interactions. This study explored the potential of the flipped practice in enhancing interactions in the

classroom. The practice was seen by the teacher participants as a response towards addressing the educational goals set out in the policy. The teachers' engagement with and interpretation of the policies and how these transcend to their classroom practices are avenues to explore for future research. Other aspects of the policy such as self-directed learning, critical thinking and creativity can be explored with relevant classroom pedagogical practices for future research.

7.6.2 Research about Flipped Classroom Pedagogical Practice

The flipped classroom pedagogical practice has a set of challenges when implemented in the classroom. The fundamental aspect of this practice is the assignment of pre-class task prior to the lesson. However, the research data from this and other similar studies showed evidence of students who do not carry out the pre-class task and come to class unprepared for the lesson. This hampered their contribution towards the group tasks, impeding interactions in the group. Strategies to overcome this challenge are crucial in achieving positive outcomes of this practice. Other factors such as grouping of students, designing of classroom tasks and differentiated instruction are vital to the implementation of this practice. Hence, future research on flipped classroom pedagogical practice is important for addressing these factors and to fully realise its potential benefits.

7.6.3 Expanding the Focus and Scope of Research

The research data provided evidence of classroom interactions in lessons that were designed with the flipped classroom pedagogical practice. Classroom interactions take the form of online communication in some of the lessons in this study. This is one area of research that can be explored, especially in primary school settings.

It will be valuable to explore the teacher's locus of control to improve classroom interactions. The shift from a content provider to that of a facilitator takes time for the teachers with engrained classroom practices. This research has implications for the evolving role of the teachers, the expectations of students as responsible learners and the design of classroom tasks. These present avenues for future research.

7.7 Final Words

With present literature surrounding the implementation of flipped classroom pedagogical practice mostly in tertiary settings, this study provided an insight on how the practice was carried out in primary school settings in Singapore where there are large classes. With flipped classrooms, the teachers were able to redesign a large class into an active learning class made up of smaller groups. The findings affirm that with the flipped classroom pedagogical practice, the teachers were able to design lessons with pre-class tasks complementing class-based tasks that can enhance classroom interactions. The study has also shown positive learning outcomes in terms of student engagement in their own learning, student participation in group work tasks and students' transforming knowledge from pre-class tasks to group tasks. With teachers' facilitation and interaction processes of giving feedback, asking probing questions and offering suggestions, the class environment is transformed to one where students are no longer passively seated but active with students interacting, learning, presenting, communicating and collaborating with each other.

However, the teacher's delivery of the lessons, the students' response towards the pre-class tasks and the class-based tasks are essential elements for promoting classroom interactions. Teachers with deep engrained practices such as whole group or direct instruction with much content delivery might not be receptive to shift their pedagogical practices to the flipped setting within a short span of time. The students not doing the pre-class tasks and the teachers' stronghold on their engrained philosophical stance on teaching can impede the adoption of this practice to realise its full potential benefits. Though the teachers implemented this practice, they were unable to administer it in the classroom with optimum capacity. With time and support from school, the teachers and the students can adopt this practice in its entirety.

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APPENDIX 1
INTERVIEW QUESTIONNAIRE

Name of Teacher _____ Teaching Level _____

1. From your perspective as a teacher who has implemented the flipped classroom pedagogical practice, what are the reasons for doing so?

2. From your perspective, how did and to what extent did the flipped classroom pedagogical practice contribute to interactions in the classroom between teacher to student and among students?

3. From a teacher's perspective, to what extent did the flipped classroom pedagogical practice has contributed to the enhancement of 21st Century skills of communication and collaboration in your students?

4. What are the challenges in implementing the flipped classroom pedagogical practice and how did you address these challenges?

APPENDIX 2

Classroom Observation Checklist

Teacher Observation Schedule

Teacher	Date/Time	Lesson	Class/Level	Duration	Additional Notes
A					
B					
C					

Physical Setting of Classroom

Instructional Activities

Lesson Content	Group Structure (Whole/Small)	No of Students	Student Involvement	Teacher Involvement	Additional Notes

Teacher Talk

	Activity	No of Occurrences	Type of Interaction	Additional Notes
Lesson Content Delivery				
Explaining				
Clarifying				
Listening				
Probing Understanding				
Demonstrating				
Short/Closed questioning				
Open-ended questioning				
Short/Closed response				
Discussing				

Student Talk

	Activity	No of Occurrences	Type of Interaction	Additional Notes
Listening				
Explaining				
Clarifying				
Demonstrating				
Discussing				
Short/Closed response				

Communication - Types of Common Interaction Patterns in a Classroom

T - Ss: Teacher talking to the whole class, such as in presenting a text, explaining grammar, giving instructions for an activity.

T - S: Questions and answers (dialogues) between the teacher and a student, such as in demonstration, checking comprehension.

T - S - S: Teacher initiated dialogues with more than one student, such as in role-playing demonstration and warm-up activities.

S - T: Student initiated conversation between a student and the teacher, such as in asking questions about a rule or an assignment.

S - Ss: One individual student talking to the whole class, such as in telling a story, reciting a poem.

Ss/Ss: Students working in small groups, such as practicing conversation, role-playing.

S - S: Two students work in pairs such as practicing a dialogue, carrying out an information gap activity.

SS: Students doing their work individually such as reading, completing an exercise.