Trialling the 4C framework in an Indian Grade 3 mathematics classroom

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ABSTRACT

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This thesis describes an action research carried out in a Grade 3 maths classroom in a low income, English medium school in Mumbai, India. The maths teacher in the study used the 4C model proposed by Do Coyle (2010) as a framework of Content and Language Integrated Learning (CLIL) for teaching maths in English to students whose exposure to English outside the classroom was negligible. The aim of this research was to understand from a teacher's perspective how the 4C framework contributed to this specific context and how group-work enhanced the 4C framework.

The action research was carried over a period of nearly five months in three cycles. Through the entire duration of the action research, the conversation with the teacher was recorded and it was analysed using qualitative content analysis to answer the research questions.

The research study found that from the teacher's perspective the 4C framework helped in delivering engaging, high rigour lessons with positive implication for the student's oral language and content knowledge. Her reinterpretation of culture in the 4C framework adds an additional dimension to the discussion of 4C. According to the teacher, group-work was beneficial in engaging the students and improving their language and content knowledge. However, the teacher faced certain conflicts in implementation of the group-work and restricted this to 2-3 times per week.

This study directly contributes to the TFI context in providing an alternate methodology to approaching content teaching in an English medium classroom. To the wider CLIL community, it provides insight into how the 4C framework works in a classroom.

CONTENTS

LIST OF ABBREVIATIONS

Abbreviation	Explanation
BOY	Beginning of the year exams
CBSE	Central Board of Secondary Education
CLIL	Content and Language Integrated Learning
EA	Exposure and Access
EFL	English as Foreign language
EOY	End of the year exams
GP	Guided practise
INM	Introduction to new material
IP	Independent practise
LP	Lesson plans
MHRD	Ministry of Human Resource Development
MY	Mid-year exams
NCERT	National Council for Educational Research and Training
NGO	Non-governmental organisation
PM	Programme Manager
RC	Reading Comprehension
SCERT	State Council for Educational Research and Training
SFL	Systemic Functional Linguistics
SLA	Second language acquisition
SSC	Maharashtra State board curriculum
SVS	Student Vision Scale
TL	Target language
TFI	Teach For India

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1   INTRODUCTION

"Education is a thoroughly human practice in which questions about 'how' are inseparable from questions about 'why' and 'what for'."

Biesta & Burbules (2003, p.22)

While there are fierce debates in India (and other former colonies) about English as an official language, it has been an inescapable fact that it is an officially recognised language in the country (National Informatics Centre, 2015) and also a language that is associated strongly with progress and higher economic and social status (British Council, 2013). The fact that majority of the parents want their children to have this advantage cannot be ignored - leading to ever increasing enrolment in schools with English as the instructional language. While the role of local languages and preservation of local culture is worthy of consideration, it cannot absolve schools of the responsibility to ensure that the children receive a quality education in content areas as well as English. The latter area can cause problems for many students, especially in low income communities where exposure to English is quite low.

This action research seeks to address the challenge of teaching and learning mathematics through English, an official language but not the first language of either the teacher or pupils. The specific context for this action research study is a Teach For India (TFI) classroom in Mumbai, India. The class has 103 pupils and a teacher with one year of teaching experience. Both, the teacher and pupils, are expected to use English in school as they work with different subjects pitched at a high cognition level. Regular assessments are carried out to monitor pupil progress. Although there are significant challenges to be faced in this context, the TFI organisation often recruits hard-working, well-educated, dedicated teachers for the improvement of education of young Indian learners. The five week training for TFI teachers often draws on established principles and practices, however there is little understanding of the challenges teaching and learning through

English brings to the classroom. As a former TFI teacher, in this study I introduced the 4Cs framework of Content and Language Integrated Learning (CLIL), a European innovation to a teacher colleague to see if this framework could positively contribute to the TFI efforts. The 4C framework developed by Coyle aims to define CLIL as "a planned pedagogic integration of contextualised content, cognition, communication and culture" (Coyle, Hood and Marsh, 2010). Since I aimed the research to be carried out in a "real" context and the practice to contribute to the theory as well, the methodology used was action research – which aligns with my own personal beliefs about educational research.

In applying a framework that was developed for Europe, to a low resource school in India, the resulting insights could lead to a more nuanced debate about the 4C framework, CLIL and second/foreign language learning. Since the number of studies focusing on implementation or analysis using the 4C framework is relatively low, this research can contribute valuable perceptions.

The first section of this research talks in detail about the background for the study and describes the country, the educational system and the TFI organisation. The second section introduces CLIL and provides an overview about research on CLIL, its pedagogical basis, the 4C framework and outlines reasons for using the 4C framework in this research. The next section states the research problems. In the fourth section, action research is briefly described before discussing the research partners and the process of the research. This section also discusses the lesson plans used in the classroom and the analysis method. Data analysis follows in section 5, Results in section 6, discussion in section 7 and the conclusion in section 8.

2   BACKGROUND

2.1   India and Mumbai

India is the seventh largest country and second most populous country in the world with a population of 1.2 Bn people in 2011 (National Informatics Centre, 2016). India is a federation with a parliamentary system and a representative democracy. While the annual GDP growth in 2015 was 7.6% and it is one of the fastest growing economies in the world, around 21.2-21.9% (2011) of its population live on less than $1.9 per day (The World Bank Group, 2017).

FIGURE 1. Map of India with surrounding countries (2017). Reprinted from Google. Retrieved on 8 March 2017, from
https://www.google.fi/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=india+map&*

Prior to the British rule, India was a collection of princely state and loose coalition between the various kingdoms. This allowed each region to develop culturally on their own, leading to a rich cultural heritage. There are 29 states and 7 union territories (National Informatics Centre, 2016) that are mainly divided on basis of the language spoken in that area. Each one of the 22 major language groups follows their own food, music, art, fashion practices (National Informatics Centre, 2016). Both Hindi and English are the official languages for the central

government (National Informatics Centre, 2015). The states are allowed to have any language(s) as their official language(s).

FIGURE 2. Map of India with states and union territories and location of Mumbai (2017). Retrieved on 8 March 2017 from http://www.embassyindia.es/archives/documents/india-political-map.pdf

Mumbai is the most populous city in India and has a population of around 18.4 Mn according to the 2011 census (Press Information Bureau, 2011). It is the capital of the state of Maharashtra where the official language is Marathi. While Mumbai is the richest city in India (Kounteya Sinha, 2017), it also houses 42-55% of its population in slums (Ministry of Housing and Urban Poverty Alleviation, 2016). Despite the squalid conditions, it attracts many immigrants from other parts of the country due to the presence of major industries such as petrochemical, chemical, film, stock exchange, banks, etc.. This makes it a true melting pot. While accounts vary of the native Marathi population, it is estimated that more than half of the population in Mumbai speak languages other than Marathi. There are estimated to be around 15 other languages spoken in Mumbai.

2.2　The education system in India

Education plays an important role in India. It is considered an equaliser – providing opportunities for people born with social disadvantages. Although the constitution referred to free and compulsory education since it was first written in 1950, free and compulsory elementary education for children from ages 6-14 was made a fundamental right only in December 2002 (UNESCO-IBE, 2006).

All schools follow the 10+2+3 pattern of education. Figure 4 provides an overview of the system. The one main change that has happened since the figure was published is that Bachelor of Education (B. Ed.) is now a two year course.
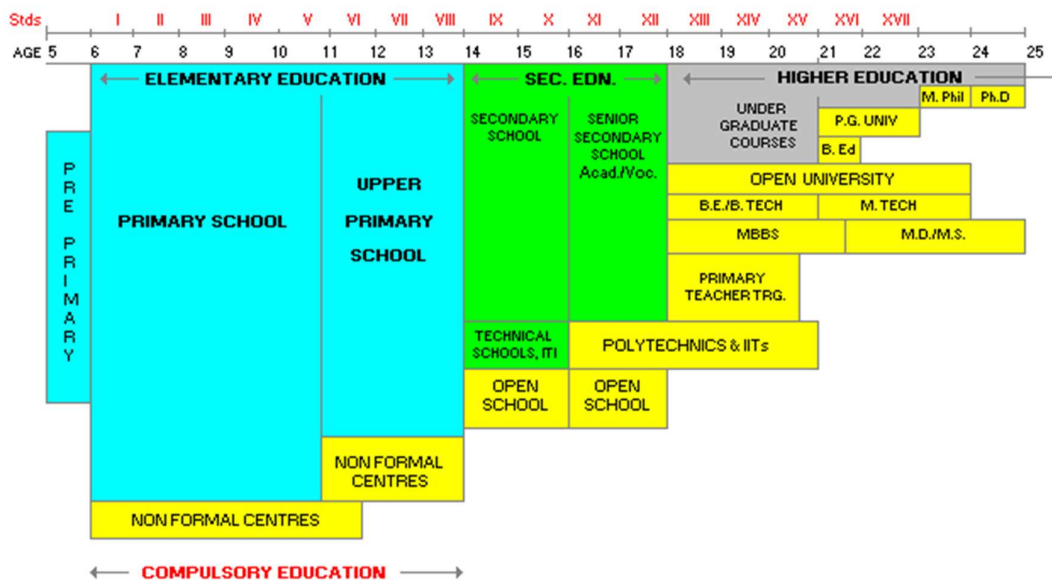
FIGURE 3: Education system from elementary to higher education (1990-92). Reprinted from International Bureau of Education, UNESCO. Retrieved on 8 March 2017 from http://www.ibe.unesco.org/fileadmin/user_upload/archive/Countries/WDE/2006/ASIA_and_the_PACIFIC/India/India.htm

Formal schooling starts at age 5 and compulsory schooling lasts until Grade 8 or age 12. After Grade 10, students have to choose between three streams: Science, Commerce or Arts. After the 12th grade, students can then pursue three years of undergraduate courses in the three streams. Engineering and medicine follow after 12th grade Science stream and have separate entrance tests for admission. At this stage, students can also opt for correspondence courses or part-time courses for the undergraduate degree. There is no age limit for majority of the undergraduate courses.

2.2.1 Regulatory framework

This section will only describe elementary and secondary education in India. Education in India is the joint responsibility of centre and state governments and increasingly the powers are devolved to the states. At the central level, the Ministry of Human Resource Development (MHRD) is responsible for education. Figure 4 explains the different government entities involved in education at different levels (UNESCO-IBE, 2006).

Exam organisers	Curriculum planning and advisory	Policies, programmes and execution
•Central Board of Secondary Education (CBSE) •State department of education (State Boards) •National Institute of Open Schooling (NIOS)	•National Council for Educational Research and Training (NCERT) •State Council for Educational Research and Training (SCERT) •National Univeristy of Educational Planning and Administration (NUEPA)	•Central Advisory Board of Education (CABE) •District boards of education (DBE) •Village Education committees (VEC)

FIGURE 4: Government entities involved in different aspects of elementary education in India

National Council for Educational Research and Training (NCERT) and State Council for Educational Research and Training (SCERT) decide on the curriculum as well as the syllabus. They publish textbooks that have to be followed by the schools as is. The Board of Education (central and state) follow the textbooks by NCERT or SCERT. The boards conduct two exams: one at the end of tenth grade and other at end of 12th grade. Exams from pre-primary until tenth grade are the responsibility of the schools. The schools are monitored and inspected by the District Education Officers who report to the MHRD.

One main law that governs all the education across the country is the Right to Education Act enacted in 2009. This law enumerates rules that ALL schools have to follow. This Act provides for free and compulsory education to all children in the ages from 6 to 14 years and details the state government and central government responsibilities.

2.2.2 Private schools

Education in India is provided by private parties as well as local and central governments. There are 1.44 Mn schools in India educating 198 Mn students across the country in 2014-15 (District Information System for Education [DISE], 2016). 60% of the students are enrolled in 1.1 Mn government schools and 40% in around 0.3 Mn private schools (aided and unaided). The private schools can follow the syllabus set by Central Board of Secondary Education (CBSE) or state boards or can even follow a syllabus set by other private and international boards such as the International Baccalaureate, Council for the Indian School Certificate Examinations and International General Certificate of Secondary Education Cambridge University.

Private schools are available at all income levels – from INR 300/month (EUR 4.3)[1] to INR 30,000/month (EUR 430). While government schools provide free education, the quality of teaching is not believed to be adequate enough – and hence parents increasingly send their children to private schools (FICCI & EY LLP, 2014). Thus, private schooling is of three types – low income, middle income, and high income. All private schools have to be "recognised" – a process that involves compliance with strict norms for infrastructure and other facilities, the process of application, registration as a society/trust to obtain the land, procurement of multiple licenses and numerous certificates to establish a school (FICCI & EY LLP, 2014). They are also inspected periodically to retain their recognition.

2.2.3 Role of English in the education system

The medium of instruction defines which language all the non-language subjects are taught in. An English medium school teaches maths, science, social studies, etc. in English. Normally, states provide local language medium schools and central government schools have Hindi or English medium schools. Normally, schools teach at least three languages (up to three hours of instruction per week

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[1] 1 EUR = INR 70.28 as estimated by Google on 2 March 2017 at 11:56 AM

for second and third languages) – the medium of instruction, the local language, and English or Hindi depending on which one is not the medium of instruction or local language.

Depending on income level, exposure in Indian society to English is varied from low to first language. Many households use English exclusively to help with their children's studies. Low-income households put their children in English medium because of the perceived advantages of providing access to education, employment, opportunity and social mobility (British Council, 2013).

In the international context, English medium schools in India could be considered as immersion education (Cummins & Swain, 1986) as the children enter the school with minimal experience or competence to the medium of instruction. Around 20% of students (31 Mn) study in English medium schools (DISE, 2016). English medium schools have the second highest amount of enrolment (after Hindi medium schools) and it has been steadily increasing over recent years.

2.2.4   Indian classrooms

For purpose of this thesis, I am going to focus on classrooms in Mumbai. Classrooms in India for low income and medium income children are quite traditional. Whether schools are private or government run, there is likely to be space constraint. Children are seated on wooden benches in rows and columns (see figure 5). Children have to wear uniforms and carry backpacks with the required textbooks and notebooks for that day. The timetable is set by the Principal of the school and the time for each lesson is likely to be 30-40 minutes typically (Alexander, 2001). Curriculum for a third grade maths classroom in CBSE is available in Appendix 1 for reference purpose.

FIGURE 5: Typical Indian classroom. Retrieved from http://reports.standardchartered.com/sr2011/leadingthewayincommunities/communityinvestment/employeevolunteering/casestudyhealthandhygieneinindia.html

Periodic tests are conducted every six weeks covering a few chapters from the textbook. A summative assessment in form of semester exams is conducted twice a year. Thus, students write four unit tests and two semester exams. The length of exams, the maximum marks, and the pattern of the paper is dictated by the board. Schools set the actual papers within the prescribed format. As per existing rules under the Right to Education Act, students cannot be made to repeat a grade and they have to be evaluated using Continuous Comprehensive Evaluation – the final exams should form only a small part of their complete evaluation. In the Maharashtra State Board curriculum (commonly known as SSC), the subjects taught in a third-grade classroom are English, Hindi, Marathi, Environmental studies, maths, physical training, computer and art.

Traditionally, classrooms are teacher-centred (Rao, Cheng, & Narain, 2003). The teacher stands in the front of the class and lectures. Rote learning is a characteristic feature of the classroom (Alexander, 2001). Discipline is a big part of classroom – a quiet class is highly valued by the teachers (Singal, 2008). This could be driven by the large classroom sizes (typically >25) (Alexander, 2001).

In content classrooms, teachers typically read from the textbook, summarise the information and then discuss question and answers from the textbook. Students then write the question and answers in their notebooks. In maths classrooms, teachers solve problems on the board and students copy the problems down. They then solve exercises from the textbook based on the teacher explanation and model solved problem. Teachers also ask questions and students raise

hands to answer those questions. This is all the students may be allowed to speak in the class. There could definitely be exceptions to the above-mentioned methods of teaching. However, by the personal and anecdotal experience of others, it seems to be the case with majority of the teachers.

2.2.5   Challenges in Indian education system

As part of Millennium Development Goals, India undertook massive reforms and initiatives to ensure 100% enrolment at primary level. Gross enrolment ratio in 2014-15 stood at 96.9% (MHRD, 2016), the number of primary schools increased by 32% from 2001 and number of secondary schools and higher education institutions increased quite substantially (MHRD, 2016). The gender parity index improved. Although the Indian government made substantial progress towards the Millennium Development Goals 2015, a large number of problems remain. The problems are two-fold – access and quality. The number of children out of school after eighth grade is quite high. The gross enrolment ratio at ninth grade is 78.5% and at 11th grade is 54.2% (MHRD, 2016). The gross enrolment ratio is low mainly because of inadequate access to secondary schools and also due to the poor quality of education (FICCI & EY LLP, 2014). Some other issues related to primary education is summarised well in the Education for All report as:

"(ii) lower enrolment rates in upper primary and secondary/higher secondary education;

(iii) higher drop-out rates in elementary and secondary education, especially among children belonging to socially and economically disadvantaged population groups;

(iv) lower level of student attendance rate at primary and upper primary stages of education in some of the educationally backwards States;

 (v) lower level of participation in education of children with special needs;

(vi) unsatisfactory level of student learning;

(vii) deficiencies relating to teacher quality and teaching-learning process;...and

(x) shortage of funding for some of the education sector development programmes" (National University of Educational Planning and Administration [NUEPA], 2014, p. XX)

It has been estimated that "in Grade 3, 11.9% children cannot even read letters, 26.2% can read letters but not words, 23.2% can read words but not Grade 1 text or higher, 17.2% can read Grade 1 text but not Grade 2 level text, and only 21.4% can read Grade 2 level text" (FICCI & EY LLP, 2014; Kingdon, 2007). This low learning outcome has been substantiated by NCERT survey (Kingdon, 2007). Also, poor teaching-learning processes lead to drop-outs in extreme cases and disinvestment from the education system. They also lead to parents opting for private tutors (FICCI & EY LLP, 2014). It is clear through multiple studies conducted by government and international agencies that the economic background of the parents determines whether and to what extent a child will succeed in the education system (Roy & Khan, 2003).

Due to this inequity, many Non-Governmental Organisations (NGO) have entered the education space (Kingdon, 2007) and focus on different aspects of challenges in the system.

2.3   Teach for India

Teach for India (www.teachforindia.org) is an NGO that is part of the Teach for All network that trains and places graduate students/working professionals (called Fellows) in low-income private schools or government English-medium schools in urban areas. It is a Fellowship programme of two years where the Fellows are provided mentorship and training through the two years and receive a salary of around INR 15000/month (203 Euros). This is modelled after the 30-year-old Teach for America programme in the US and the TeachFirst programme in the UK. The organisation is 8 years old and has currently 1104 Fellows working in India in 2015-16 (Teach for India, n.d.). This approach of providing teachers to classrooms fills the gap of lack of trained teachers and addresses the issue of

teacher absenteeism that is one of the major problems of the education system (Kingdon, 2007; NUEPA, 2014)

TFI adopt classrooms in low-income schools (both government and private). In this one classroom, TFI Fellows teach from second grade to eighth grade (sometimes up to tenth grade). TFI pays the Fellows directly and the school pays TFI a token amount for the teachers posted in their school. Since a classroom stays with TFI, it is assumed that there is a stable environment even if the Fellows change every two years.

Fellows have a five weeks training of up to 11 hours each day (full time - stay in the campus and training including teaching practice) in lesson planning and best practices in education. Furthermore, Fellows have a training at least once a month through the two years dealing with specific issues and topics. In addition, they have a programme manager (PM) who observes lessons and suggest how the Fellow could deliver more effective lessons (Teach for India, n.d.). The placement to school is done randomly - Fellows cannot choose the location or the school although location preferences are taken into consideration while deciding the placement.

One of the main aims of TFI is to offer students a holistic education - one driven by academics, values and mindsets, and exposure and access (see the Student Vision Scale (SVS) in Appendix 2). Under values, Fellows adopt values they feel the classroom needs and that has personal meaning for them such as perseverance, honesty, empathy, etc.. For exposure and access, Fellows introduce the students to opportunities that they would otherwise have any access to due to their economic background. Many Fellows introduce their students to sports, drama, dance, art, museums, tourist spots, concerts, etc.. Fellows also speak constantly to the students about their strengths, areas of improvement and how they could use them to achieve their goals.

TFI conducts three tests to record the progress of the students at the beginning of the year (BOY), mid-year (MOY) and end of the year (EOY). These tests are centralised and conducted in English and maths. The maths curriculum is

mapped in accordance with the syllabus set by NCERT irrespective of which syllabus is followed in the school. The English tests are of two types. The first one is levelled – students are administered tests based on their English levels from previous assessments. The second is administered only in secondary classrooms and are mapped to the English tenth grade local board paper. While TFI teachers do teach social studies and science, TFI does not conduct centralised tests for these subjects.

In addition to the elements in SVS, due to the type of schools TFI works in, behaviour management is a big focus area for TFI. TFI encourages the use of a consequence system in class, reward systems and public tracking of behaviour. These follow Skinner's operant conditioning principle. It is common for the Fellows in the initial weeks to focus heavily on behaviour management in the classroom. The PMs often visit the schools multiple times in the initial weeks and provide feedback on how to set up behaviour management systems in the classroom.

TFI provides lesson plan templates to teach the different subjects. Lesson plans for teaching English is based on pre-reading, during reading, post-reading structure found in the book 'Scaffolding language, scaffolding learning' by Pauline Gibbons (Gibbons, 2002). The English lesson plan format differs from maths lesson plans (see Appendix 3) and that in turn, differs from the Science lesson plan template based on 5E lesson plan structure by Biological Sciences Curriculum Study.

Since TFI works in English medium schools, there is an emphasis on Fellows using English in the classrooms in every subject. Every training and conversation with TFI emphasises this aspect.

2.4   My background

I was a Fellow in TFI Mumbai from 2013-2015 just before I began my Master's degree in Education at the University of Jyväskylä. I am an engineer by profession and worked in the field for nine years before joining TFI. I strongly believed in the power of education as an equaliser as well as its role in the development

of the country. Through the Fellowship, one of the major issues I faced was the issue of English as a medium of instruction. I knew the importance of English language for the success of my students. I was convinced that reading and writing English at grade level was an important achievement for the students. The English language classrooms focussed on reading comprehension, writing skills and to a lesser extent on speaking and listening skill development. But as a maths and science teacher, I struggled with teaching content in English. While TFI spoke quite often about the necessity of integrating content and language teaching, there was no coherent approach.

While studying at the university, I signed up for the 'Content and Language Integrated Learning' course that was a part of the JULIET (Jyväskylä University Language Innovation and Educational Theory) Programme. After six months of CLIL course, I felt the 4C framework could work in Indian TFI classroom context.

3   CONTENT AND LANGUAGE INTEGRATED LEARNING (CLIL)

3.1   **Introduction**

Content and Language Integrated Learning (CLIL) was officially recognised in 1994 as a means to support foreign language learning in Europe. CLIL combines the dual goals of learning content (subject) and a foreign language (Coyle et al., 2010). It is not a 'new' approach but an umbrella term that covers many methodological approaches such as immersion, bilingual education, content-based language teaching, etc. (Marsh, 1999). CLIL normally implies being taught in a language that is 'foreign' to the students and a language they do not encounter much in their world or immediate community (Dalton-Puffer, 2011). While CLIL is supported by the EU (Smit, Nikula, & Dalton-Puffer, 2010) and the majority of the research is carried out in the European context, CLIL is also practised in certain South American countries and some Asian countries such as China (Dalton-Puffer, 2011). English is the most dominant language taught through CLIL (Dalton-Puffer, 2011; de Zarobe, 2013).

CLIL is implemented differently in different contexts. On one end of the spectrum is immersion where all the instruction is in the target language (TL) and the other end of the spectrum is "language showers" in the TL (Smit et al., 2010). In some contexts such as Finland, schools and teachers have the autonomy to decide the most relevant implementation for them (e.g. OPH, 2014) and in other contexts a certain amount of CLIL is required by municipal decree, for example in regions of Spain (Pavon Vazquez & Rubio, 2010), this leads to a wide variety in the type of CLIL lessons observed.

Although it could be argued that learning language through content has been around since ancient Roman times (Coyle et al., 2010), interest in teaching language through content increased after the Canadian immersion programme in 1965 (Smit et al., 2010). At the same time, on the other side of the Atlantic,

teachers in the UK were discussing "Language Across Curriculum" (LAC). Although not directly related to second/foreign language learning, this concept brings the focus on the role language plays in the teaching of content. In this sense, CLIL can be seen as a special case of the LAC movement (Vollmer, 2007).

Although plurilingualism has been a feature of many societies for centuries, with the espoused need to engage with distant others on a regular, possibly daily basis, plurilingualism is being recognised as a resource to be fostered in individuals and societies. In this context, CLIL is thought to play an important role as an answer to many problems plaguing foreign language teaching across the world. CLIL also, purportedly, saves time in classrooms as language and content can be taught simultaneously, which is useful as teachers across the world feel the pressure to finish the curriculum in different content areas and are unable to devote additional time to foreign language classes. However, CLIL could not have been adopted unless it was believed that:

1. CLIL has positive effect on foreign language learning
2. CLIL does not have negative effect on content learning
3. CLIL does not have negative effect on L1 development (Maillat, 2010)

Research in CLIL (see Table 1) suggest these positive results and CLIL is being widely adopted across Europe (Smit et al., 2010). The next section summarises the research in CLIL done in various contexts.

3.2 **Research on CLIL**

As mentioned by Smit et al (2010), CLIL research can be thought to occupy three different dimensions: macro-micro, process-product and language-content. Majority of research studies can be classified along these three dimensions. For example, classroom discourse studies would fall under micro, product dimension while reports of CLIL implementation would fall under macro process dimension. Based on whether the classroom outcomes focus more on content or L2 outcomes, the study could fall under the third dimension of content or language. According to Llinares (2015), studies can also be classified according to the

theoretical model or approach. These lead to four different models/approaches: cognitive second language acquisition theories, sociolinguistic models, classroom discourse approaches and systemic-functional linguistics.

While the following sections summarise some of the main research carried across all these dimensions and across methodologies, in the context of this research, it is necessary to focus, mainly, on the educational benefits of CLIL. In consideration of this, we review the main studies in terms of positive and negative findings in research to date.

3.2.1 Positive findings regarding CLIL-based education

TABLE 1 Summary of positive research findings in CLIL

Research area	Papers	Context
Language development	Cummins & Swain, 1986	Canada (Immersion)
	Lorenzo, Casal, & Moore, 2009	Spain (Bilingual) (9-10yo, 13-14 yo) (No screening)
	Merisuo-Storm, 2007	Finland (CLIL) (7-10yo)
	Lasagabaster, 2008	Austria (CLIL) (15-16yo)
	Jexenflicker & Dalton-Puffer, 2010	Spain (CLIL) (14-16yo)
	Rodgers, 2006	Italy (CLIL) (>18yo)
	Serra, 2007	Switzerland (CLIL) (7-13yo)
Vocabulary acquisition	Lo & Murphy, 2010	Hong Kong (Immersion) (11-15yo)
	Admiraal et al., 2006	Netherlands (CLIL) (12-15yo)
Oral communicative tasks	de Zarobe, 2010	Spain (CLIL) (14-18yo)
	Admiraal et al., 2006	Netherlands (CLIL) (12-15yo)
Reading comprehension	Admiraal et al., 2006	Netherlands (CLIL) (12-15yo)
	Merisuo-Storm, 2007	Finland (CLIL) (7-10yo)
Written production	de Zarobe, 2010	Spain (CLIL) (14-18yo)
	Jexenflicker & Dalton-Puffer, 2010	Spain (CLIL) (14-16yo)
L1	Cummins & Swain, 1986	Canada (Immersion)

	Seikkula-Leino 2007	Finland (CLIL) (11-12 yo)
	Merisuo-Storm 2007	Finland (CLIL) (7-10yo)
Content learning	Cummins & Swain, 1986	Canada (Immersion)
	Jappinen, 2005	Finland (CLIL) (Maths and Science) (7-15yo)
	Seikkula-Leino 2007	Finland (CLIL) (11-12 yo) (Maths)
	Surmont J. et al.2016	Belgium (CLIL) (12 yo) (Maths)
	Stohler 2006	Switzerland (Bilingual) (10-13 yo) (Science)
	Admiraal et al.2006	Netherlands (CLIL) (12-15yo) (Social studies)
	Rodgers 2006	Italy (CLIL) (>18yo) (Geography)
	Serra 2007	Switzerland (CLIL) (7-13yo) (Maths)
Analogical reasoning, cognitional development	Jappinen, 2005	Finland (CLIL) (7-15 yo) (Maths and Science)
Motivation	Doiz, Lasagabaster, & Sierra, 2014	Spain (CLIL) (12-15yo)
	Seikkula-Leino 2007	Finland (11-12 yo) (CLIL)
	Merisuo-Storm 2007	Finland (CLIL) (7-10yo)
Interest in other cultures	Doiz, Lasagabaster, & Sierra, 2014	Spain (CLIL) (12-15yo)

As seen from table 1, there are many studies that display mostly positive results from CLIL implementation especially under the three main areas that were discussed in the preceding sub-section. The volume of studies done across different contexts and different age groups is what contributes to the widespread use of CLIL across Europe.

Since CLIL is an umbrella term, many studies done in bilingual/ immersion context is applicable to CLIL context. Many current studies in Europe have focused on CLIL classrooms and it was found that CLIL students' "receptive and productive lexicon is larger overall, contains more words from lower frequency bands, has a wider stylistic range, and is used more appropriately" (Dalton-Puffer, 2011, p.186). Studies done in Germany notably by Zydatiβ (2007) seem to support the above as well (Dalton-Puffer, 2011; Smit et al., 2010). Some studies

have found that although students do not lag behind peers in Maths, they do not fully reach their potential (Seikkula-Leino, 2007). But there could be some confusion in this result since other studies suggest that students in CLIL classrooms outpace their non-CLIL peers in mathematical performance (Surmont, Struys, Van Den Noort, & Van De Craen, 2016). Within the Spanish CLIL context, it has been observed that CLIL students (in Spain) have lesser anxiety (for older students) in speaking the foreign language and are also more motivated to learn the foreign language (Doiz, Lasagabaster, & Sierra, 2014). One study (Lasagabaster, 2008) also found that CLIL benefitted all students irrespective of their sociocultural status and even lessened gender difference in foreign language learning. One study also found that the longer the students are in the CLIL programmes, greater is their interest in other cultures (Doiz et al., 2014) – an important finding considering the aims of EU in promoting CLIL.

3.2.2 Negative findings regarding CLIL-based education

Despite the positive findings outlined above, research also found some negative results and should be acknowledged. These negative points do not undermine the positive findings, but rather suggest the need to be vigilant when introducing CLIL. The negative findings in some of the studies mainly refer to lower academic language development in TL. Within the French immersion context, Cummins and Swain (1986) found that students in immersion classes operate with simpler grammatical structures than their first language counterparts. Within CLIL contexts, Dalton-Puffer (2011) similarly found CLIL master a more conversational language, yet the formal and academic style of speaking was lacking (Dalton-Puffer, 2011). While same results were found for writing as well, it was found that students also struggled with similar writing related issues in L1 as well (de Zarobe, 2010; Lasagabaster, 2008). However, the students in CLIL class did have a difference between their receptive and productive skills even if the difference is lesser than students in an 'English as Foreign Language' (EFL) class which uses common language teaching methods (de Zarobe, 2010).

In addition to academic language development, with younger children, especially, it is found that students find it difficult to understand abstract or complex topics in TL (Jappinen, 2005). Younger learners were also found to be more anxious in using the TL than older learners (Doiz et al., 2014). One study presented that students in CLIL classrooms had low self-concept about how well they did in the foreign language (Seikkula-Leino, 2007).

In some CLIL contexts, the teachers' use of language while teaching content is more restricted than in L1 especially if the teacher has limited competence in the TL. This could also lead to lesser interactions in the classroom (de Zarobe, 2013). Multiple studies found that even in CLIL contexts students immediately switched to the L1 once they were among themselves (de Zarobe, 2013) implying the comfort level with the TL is not as high as that could be implied by other positive results on CLIL. Dalton-Puffer (2011) also argues that CLIL context is not that different from a traditional classroom and hence learners may remain as unprepared for other situational contexts as in traditional EFL classrooms.

A study done in Sweden (Sylvén, 2013) confirmed that students in CLIL classrooms have no specific advantage over the EFL classrooms in Sweden. This was explained by the students' exposure to English outside the classroom which is quite high in Sweden. However, it raises questions on contexts in which CLIL works and also the role of an additional factor in all studies – the exposure to TL outside the school.

Some of these negative results can be explained – for example, students' development of academic language. These findings accord with the proposal that whereas a second language learner is likely to develop conversational language quite rapidly - usually taking between one and two years - the registers associated with academic learning (under certain conditions and presuming strong L1 development) take between five and seven years for the learner to develop at a level equivalent to succeed in all subjects at school (Collier, 1989). This means that there needs to be a deeper look at how long the learners have been in the CLIL classroom and additional research needs to be carried out with the above

understanding. It is clear that CLIL teaching must consider carefully what is taught in classrooms and how it is taught.

3.2.3   Contentious issues in CLIL

Majority of the studies in CLIL have mentioned limitations as well as alternate explanations for CLIL results. Though a growing body of research supports CLIL as a learning methodology/pedagogy, some of the limitations are common across the studies. This has invited criticisms from some quarters (Bruton, 2011) as well as introspection from within the CLIL community (Cenoz, Genesee, & Gorter, 2014; Dalton-Puffer, 2011; Smit et al., 2010). While EU policies and beliefs support CLIL, it is not possible to have a unified, educational and language policies since that has to lie with individual countries (Cenoz, 2013). This has led to CLIL research from bottom-up than top-down. Some of the contentions are described below.

- Selection of pupils: Across countries, CLIL programmes could have selection criteria. These could be based on some tie to the TL or parents' involvement or even competitive entrance test (Bruton, 2011; Smit et al., 2010). If students are selected in any way at all, the results from CLIL studies could be biased.

  Studies do mention when students have been pre-selected for CLIL classes. Some recent studies (mentioned in Table 1 as "No screening") have had students with no pre-selection of any kind. Some studies have taken this into account based on the pre-test scores of the students in the TL. However, this factor cannot be completely ignored.

- What is CLIL: Due to the multitude of approaches being labelled as CLIL, different studies could have used different teaching/learning methods (Cenoz, 2013). One of the important areas of ambiguity is the definition, scope and diversity of the CLIL context (Cenoz, 2013; Surmont et al., 2016).

- Context of study: As can be seen from Table 1, CLIL studies have been carried out in many different countries (Canada, Spain, Italy, Switzerland, Finland, etc.) and across different age groups (7 – 18+ yo). Furthermore, these studies could be part of immersion, bilingual education, CLIL or CBI. The sheer number of different contexts where the different research

studies were carried out also raises questions on generalisability of the results.

Studies mention the context quite clearly and since many of the studies are qualitative, there is no assumption of generalisability. However, research needs to be replicated in the multiple contexts – but this is a big limitation considering the number of countries involved in CLIL adoption.

- <u>Exposure to TL outside classroom</u>: Sylven (2013) explains that the fact that CLIL does not work in Sweden could be due to the fact that students have high exposure to the TL outside the school. This calls into question results from research into CLIL and more investigations need to be carried out to measure how much could exposure to TL outside school hours affect the CLIL results.

- <u>Extra instruction in TL</u>: CLIL combines content and language teaching. However, the regular EFL lessons continue as well. This means that they have time advantage over their peers (Dalton-Puffer, 2011)

  This may not be a disadvantage – it could legitimately support why CLIL should be implemented in classrooms. It saves time due to its dual focus.

- <u>Teacher-related:</u> Every classroom and teacher is different. Teaching methods and teacher motivation play a big role in the classroom. Due to the nature of CLIL, there is a high probability that the teacher is highly motivated (Smit et al., 2010). CLIL results could partially be explained by this as well.

  Some studies have tried to address this concern by collecting data from a wide variety of classrooms or different learner groups from the same school. However, only a wide body of research (both qualitative and quantitative) can truly alleviate this concern.

3.2.4 Gaps in research in CLIL

As seen from the above subsections, some of the gaps in future research on CLIL are obvious. Some gaps are operational and concern the classroom space such as the development of CLIL material and other resources, the role of L1 (Cammarata & Tedick, 2012) while others concern the theoretical background of content and language integration (Dalton-Puffer, 2011). Also, the majority of CLIL contexts

use English as TL – research is needed to understand the transferability of this to other languages (ibid).

From the perspective of language, research needs to be done on identifying subject-specific language use in terms of lexicon and genres for various content areas (ibid). More research is needed also to answer some of the ambiguities in current research: possible adverse effects on L1 advanced academic language proficiency, increasing outcomes in academic register of TL and at policy level, whether EFL classes should continue alongside CLIL classes, CLIL teacher qualifications, etc.. (ibid)

Considering the above sub-sections that summarise CLIL research, it is clear that some clarity is needed on the theoretical framework for CLIL to explain the positive or negative results. This theoretical framework can contribute to the understanding of CLIL.

3.3   Theoretical framework for CLIL

A theoretical framework for CLIL needs to start with a deeper understanding of the two main aspects of CLIL: content and language. How can language best be learnt? How can content best be learnt (learning theories)? Are the two independent? Where do the two meet? Each of these questions has been well researched and the following subsections will briefly touch upon each of these questions and attempt to find a theoretical framework for CLIL that will best embody the key aspects of these research areas.

3.3.1 Learning theories
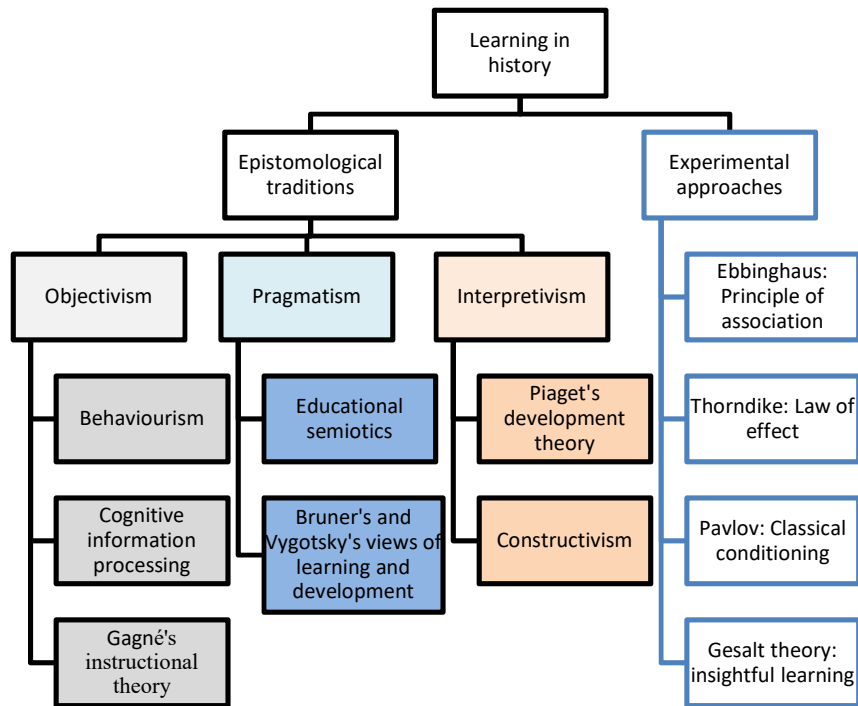
FIGURE 6: Introduction to theories of learning. Based on Psychology of Learning for Instruction, by M. Driscoll, 2005, (p.1, 15), GB: Pearson Education)

Research on learning falls under multiple domains – psychology, education, biology and computer science to name a few (Driscoll, 2005). Summary of all learning theories is illustrated in figure 6. Behaviourism can be envisaged as illustrated in figure 7. Radical behaviourism proposed by B.F. Skinner was unconcerned with the "black box" of what happens in a human brain and only worked on the observed behaviour.
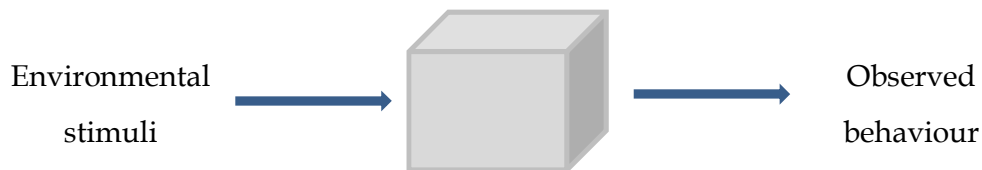
FIGURE 7: Black box metaphor. From Psychology of Learning for Instruction, by M. Driscoll, 2005, (p.142), GB: Pearson Education

Cognitive information processing (CIP) theory, Ausubel's theory of meaningful learning and the concept of the schema can be better envisaged as illustrated in

figure 8. These theories based on cognitive processes sought to explain how memory worked and how knowledge is represented in the brain.

Input: Sensory stimulation → Human cognitive processes → *Output*: Learned capabilities
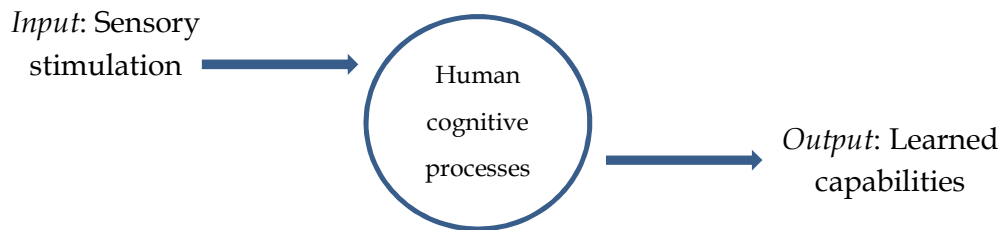
FIGURE 8: Information processing: the computer metaphor. From Psychology of Learning for Instruction, by M. Driscoll, 2005, (p.142), GB: Pearson Education

Piaget's constructivist theory sought to explain stages of development. While Piaget's theory has been criticised and partially disproven, others have sought to build on his theories leading to many updated theories of cognitive development. Bruner and Vygotsky's work built on many existing theories of that time but strongly believed in the role of culture and social context in learning. Biological studies of the brain have also contributed to an advanced understanding of how the brain functions and the role of biology and environment in learning processes. Theories of motivation and self-regulation add an additional dimension to understanding how learners can learn more effectively (Driscoll, 2005).

As Driscoll (2005, p. 407) describes despite many criticisms of the constructivist theory, there is a broad consensus on the following points of constructivism:

- "Only the active learner is a successful learner

- Learning from examples and learning by doing enable learners to achieve deep levels of understanding

- Learning with understanding is what is desired, not rote learning

- The social structure of the learning environment is important".

The above-mentioned summary of learning theories is quite brief; but as is evident, learning content of any type is quite a complex topic and straddles many

fields. There are no definitive answers and the answers any instructor/educator/researcher trusts is based on their own epistemological viewpoint. Language learning faces the same issues – as can be seen from the next section.

3.3.2   SLA theories

Second language acquisition (SLA) studies grew exponentially from the late 1960s (Ellis, 1994; Ortega, 2013). The reasons for this growth and subsequent introduction of the field as a separate area of study can be traced to the frustrations of methods of teaching L2 and the theoretical conflict of competing views on how language is acquired (Ellis, 1994). As explained by Ellis (1994), prior to the 1950s, grammar translation method and explicitly teaching grammar rules prevailed. As behaviourist theories gained traction, learning methods based on this theory such as audio-lingual method and oral method started to be used without great success either. This disillusionment in existing methods and research work done on L1 acquisition together provided methods and means for extensive research work in the field of SLA.

In the 1980s and 1990s, cognitive-interactionism perspective on L2 was dominant (Ortega, 2013). This was associated with the work of Jean Piaget and "refers to the position that multiple internal (cognitive) and external (environmental) factors reciprocally interact (hence the word 'interactionist') and together affect the observed processes and outcomes of a phenomenon – in this case, additional language learning" (Ortega, 2013, p.55). It is during this period that researchers studied five important ingredients related to SLA: attitudes, input, interaction, output and attention (Ortega, 2013). John Schumann's Acculturation Model (1976), Krashen's Comprehensible Input Hypothesis (1985), Michael Long's Interaction Hypothesis (1996), Swain's Pushed Output Hypothesis (1985) and Schmidt's Noticing Hypothesis (1995) furthered understanding of the role of environment in instructional SLA in particular. From the mid-1990's to date, based on the social turn in many other fields, SLA theories were re-specified us-

ing five connected theories: Vygotskian sociocultural theory, Conversation Analysis, Systemic Functional Linguistics, language socialisation theory and identity theory (Ortega, 2013).

As can be seen from the brief overview of research in SLA, much like learning theories, the epistemological stance is prominent. The current research is greatly influenced by the sociocultural perspectives of which Vygotsky's work is the most dominant.

3.3.3   Brief overview of Vygotsky

Lev Vygotsky was a Russian psychologist who first proposed his cultural-historical theories in the late 1920s but due to the political scenario, his theories were suppressed until the 1950s-1960s (Driscoll, 2013; John-Steiner & Mahn, 1996). Since his work has been influential in developing a sociocultural theory and many fields have rethought their research from this perspective, a brief overview of this theory is provided below.

As explained by Ortega (2013), it may be useful to visualise sociocultural theory as a portrait of a chameleon. Since a chameleon can change colours based on its background and moods, no portrait of a chameleon can be the "right" picture of it. Similarly, the sociocultural theory does not believe in a "right" answer or "right" knowledge. It is a function of time, social and cultural context. As Wertsch summarised in 1991, Vygotsky's work revolved around three core themes: "(a) Individual development, including higher mental functioning, has its origins in social sources; (b) human action, on both the social and individual planes, is mediated by tools and signs; (c) the first two themes are best examined through genetic, or developmental, analysis" (John-Steiner & Mahn, 1996, p.192). Within these core themes, the concept of internalisation and zone of proximal development explain how higher mental processes are created (Driscoll, 2013). Vygotsky believed that development of language had one of the highest impacts on the acquisition of higher psychological processes (Driscoll, 2013).

3.3.4   Language awareness in teaching content

Language is the basis for human communication. At a superficial and obvious level, language and content are linked by the fact that all content is taught through language. However, because it is all pervasive, it is often assumed than explicit. Teachers may assume that his/her language is understood by all students and hence, may not pay much attention to it. But the language used in academic settings may have a different aspect, pattern and register than that used at home (Silver & Lwin, 2013). Hence, teachers especially should be aware of the language used in the classroom and help students gain expertise in academic language. Even in classrooms where the students and teacher speak the same L1 and the medium of instruction is L1, language awareness plays a big role since the students and teacher could speak a different dialect or may come from different regions with different language habits (Cazden, 2001). In more complex situations where the medium of instruction is not the L1 or if the teachers and students have a different L1, language awareness needs to play a bigger role. However, this is still a superficial reason for language awareness.

There is a broad consensus in education that classroom talk during lessons is the chief locus of knowledge construction (Mercer, 2000). Language and talk not only are the goal of learning – a product – but also the tool for learning (Myhill, 2006; Ortega, 2013). "As all tools, language is used to create thought but it also transforms thought and is the source of learning" (Ortega, 2013, p. 219). This follows from Vygotsky's theory – as can be seen from the previous section. Hence, language and content are permanently intertwined – they both push and feed the other.

3.3.5   Towards a sociocultural model of CLIL

In the majority of classrooms, talk reportedly follows a similar pattern referred to as IRF or IRE - Initiation, Response, Feedback/Evaluation (Gibbons, 2002; Silver & Lwin, 2013). The teacher asks a question, the student responds, and teacher offers feedback. This talk is limiting since students typically respond in one word

or phrases. As seen before, the central principle of language learning is that using the language in interaction with others is an essential process by which it is learned. The experimental evidence supports the view that focused, sustained discussion amongst children not only helps them solve problems but promotes the learning of the individuals involved (Mercer & Littleton, 2007)

From the language theories mentioned in the previous section, it can be inferred that the benefit of a sociocultural approach is that language is not only the target of learning but recognised as the tool of learning. In CLIL contexts the need to support language and to develop language is even greater. In this perspective, CLIL is "dynamic, interactive process under expert guidance of the teacher in which learners are apprenticed into the ways of thinking, practices and discourses of a specific subject community" (Moate, 2010, p.39) and "...where language use and language learning can co-occur. It is language use mediating language learning" (Swain, 2000, p.97). As pointed out by Moate (2010), in a CLIL classroom, learners are being apprenticed into two communities each of which provides them with an opportunity to develop their language in different ways.

It has been argued that CLIL "demands an analysis of what is meant by effective pedagogies in different contexts" (Coyle et al., 2010, p.28). However, although CLIL is considered to force teachers to shift from traditional methods of teaching to student-centred methods, there is no reason why CLIL should imply this (Dalton-Puffer, 2011). Based on teacher's linguistic skills, the reverse may be true. And even if teacher's linguistic skills are adequate they may be ill-prepared to support learning through a foreign language. Teachers could also use simpler L2 and exhibit less variety in styles of speaking in L2 than L1 (Smit et al., 2010). Hence, it is especially necessary to prioritise the sociocultural model of CLIL when implementing it in the classroom.

3.3.6   Pedagogical basis for CLIL

It is evident from the research on learning theories and SLA that the two share many common features and epistemological stance. Language awareness in

teaching content is quite critical as seen from the previous section. But does this mean that second or foreign language should be taught through content?

As seen from the history of SLA research, the earlier methods of grammar-translation or even the behaviourist oral method did not led to much success in second or foreign language learning. As Gibbons (2002) explains the achievements of language learners are not dependent only on aptitude, background or individual motivation, but also on social and linguistic frameworks within which their learning takes place: language learning is a socially embedded process, not simply a psychologically driven process. Hence, a meaningful authentic context where dialogue is valued is currently considered to be an ideal environment for language learning – the same environment where content learning also thrives.

Figure 9 illustrates the many common features and goals of language and content teaching. As can be seen from the figure, both share common goals and methods. What differs in content and language teaching is the subject specific knowledge. The need in current content teaching is awareness of language (which can be aided by CLIL) and the need in current language teaching is to provide authentic context (which can be aided by CLIL). Integrating the two can aid each other in a reciprocal way (Gibbons, 2002). Done well, CLIL can aid students in the development of second language as well as the curricular content.
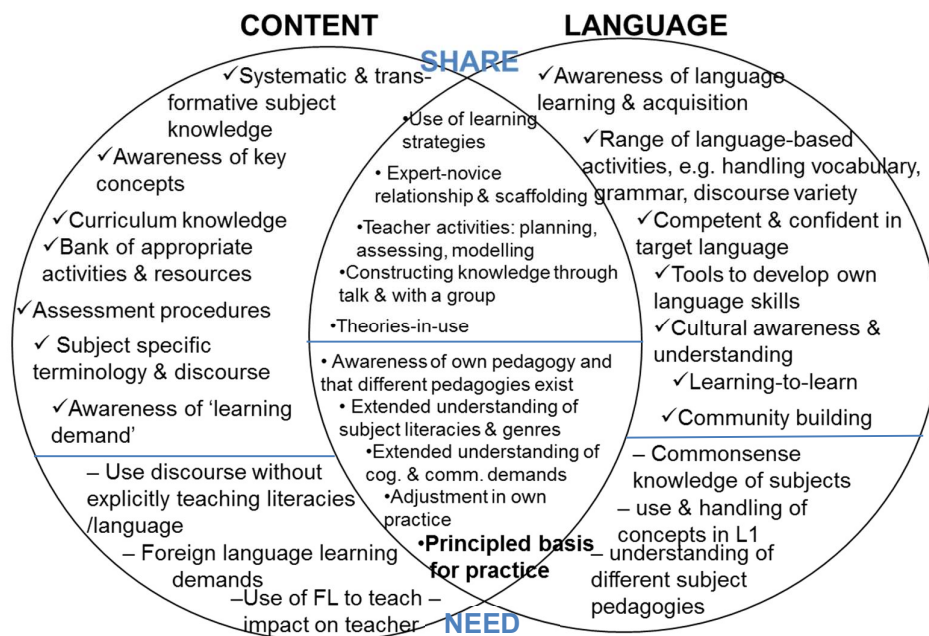
FIGURE 9: Integration, more than amalgamation. From Slide no. 6 from the presentation "Developing a Pedagogical Model for CLIL" for the CLIL conference 2008 by Josephine Moate.

While CLIL offers equal focus on both content and language, it also influences the classroom culture and practice. Drawing from a sociocultural model, the classroom is now transformed considerably. The relationship between the teachers and students is modified (Nikula, 2010) – they become partners in the learning process. Considering the change in dynamics in the classroom, CLIL can be considered as a pedagogy in its own right instead of a method to teach a foreign language.

This call for CLIL to be considered as a pedagogy (or even already considering it one) has been echoed by many of the CLIL researchers notably Coyle (2007, 2008), Dalton-Puffer (2011), Llinares (2015), Cenoz (2014) and De Graaff, R., Jan Koopman, G., Anikina, Y., & Westhoff, G. (2007).

The need for a strong framework for CLIL is magnified even more, now, after establishing CLIL as a pedagogy rather than a method. Within this study, this need was felt strongly for one main reason – the school in this study and many other schools in India have used CLIL for many years. If CLIL was just defined as teaching content in a second language, English medium schools can

be considered as CLIL – some place where 100% of the content is taught in English. Students from low-income communities do not encounter English out of the school. Considering all the positive research carried out in the area of CLIL, why then are results in schools in India so poor? Even in the context of a specific school in this study, students in the third grade had an average of 0.15 reading level in English (based on the TFI tracker) despite learning content in English for three years at the time of the study. The maths achievement was at 66% (the tests were read out to them due to the low English levels). Considering what has been discussed in the previous sub-sections, students should have demonstrated high achievement in language and content.

One reason to explain the above is offered by Marsh (2008). He explains that this phenomenon of adopting English as a medium of learning is spreading rapidly across the world for various political or economic reasons. However, this adoption is not accompanied by adaption of teaching and learning processes and he warns of negative consequences, especially in low-resource countries. So while technically India implements CLIL – the teaching and learning methods are still based on rote learning and research has suggested that cognitively undemanding tasks do not aid language learning (Smith & Patterson, 1998). From both the language learning theories and learning theories described in previous sections, it is clear that comprehensible input, output and interaction aid language development if other factors such as motivation and attention are assumed to be present. Thus, learning and teaching methods in an Indian classroom need to be revised to ensure that the benefits of CLIL are realised.

It has also been posited that teachers could lose enthusiasm in teaching a foreign language after the initial enthusiasm declines and when the programme is widespread and research funding has stopped (Nikolov & Djigunovic, 2006). In the case of India, considering the paucity of research in language teaching – this could be quite true. The Indian context is quite unique – and many of the European context research do not seem directly applicable.

Considering the above explanations, if CLIL is to be truly implemented in any classroom in India, there needs to be a specific framework that can be used –

as just teaching content in a foreign language is not working. Socio-cultural model is part of the answer and definitely lacking in classrooms in India (Alexander, 2001), but beyond that, a proper framework can help truly bring CLIL "alive" in the classroom.

3.3.7 Models for CLIL framework

One of the biggest problems in current research is the definition, scope and diversity of CLIL contexts (Cenoz, 2013). The different contexts and different varieties of lessons in different studies will continue to create confusion for CLIL adopters and researchers alike. While it could be argued that, the varied contexts are a strength of CLIL (Coyle, 2007), this strength need not be lost by defining CLIL in a structured manner and providing it a framework. This framework can offer a definite way of talking about CLIL lessons and research can then address the operational aspect of CLIL and the classroom space. Currently, there are two proposed framework for CLIL - Llinares' and Coyle's. In this section, the two models will be discussed in detail.

As discussed by Llinares (2015), currently, there are two major theoretical strands under which CLIL is studied: classroom discourse approaches and systemic-functional linguistics. An integration of all these theories can lead to better understanding of content and language integration. This can be pictured better as illustrated in figure 10. Systemic functional linguistics (SFL) is based on Halliday's systemic grammar and has been used for the analysis of discourse in classroom contexts and in work on literacy in English (de Zarobe, 2013). This approach "helps understand *how* integration unfolds in the classroom interaction and therefore addresses the *process* of integration in classroom activity" (Llinares, 2015, p.63). As illustrated in the figure, SFL contributes to the 'what' and 'how' of integration (Llinares, 2015). Task-based learning (learning second language through a meaningful activity), sociocultural theory and discursive pragmatics contribute to studying how this integration plays out in the classroom (Llinares, 2015). This model combining SFL with other theories offers a valid model to understand and study integration.
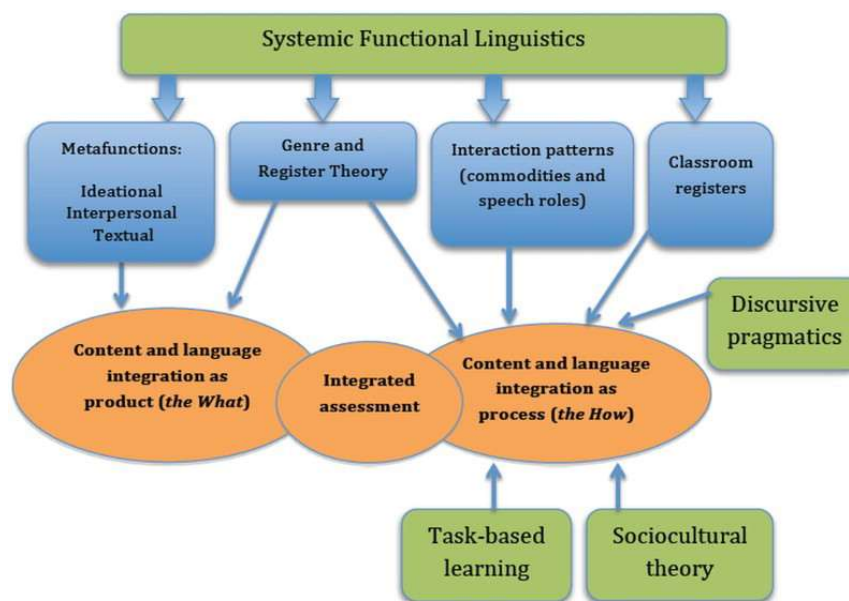
FIGURE 10. A combined theoretical model for the understanding of content and language integration. From Integration in CLIL: A proposal to inform research and successful pedagogy by A. Llinares, 2015, *Language, Culture and Curriculum, 28*(1), p.64

While the above model can offer a useful framework for implementing and studying CLIL, it is proposed quite recently and it will be interesting to see how this framework will look like in practice.

The other theoretical framework is proposed by Coyle – the 4C framework. "CLIL is different from content-based language learning and bilingual education - it is planned pedagogic integration of contextualised content, cognition, communication and culture into teaching and learning practice" (Coyle et al., 2010, p.6). This approach immediately solves the issues of definition and scope of CLIL identified in the sections earlier. It also looks at the content (through content and cognition) and language (communication and culture) together – integration is thus, built into the framework. "The 4Cs Framework focuses on the interrelationship between content (subject matter), communication (language), cognition (learning and thinking) and culture (social awareness of self and 'otherness'). It takes account of 'integration' on different levels: learning (content and cognition), language learning (communication and cultures) and intercultural experiences" (Coyle, 2007, p.550). This model takes into account one of the important aspects

of the EU's goals – culture. Language is intrinsically connected to culture and this framework allows for the development of culture alongside content and language development. The 4C framework seeks to overcome teaching recycled content in the TL through its focus on cognition – thereby, maintaining student motivation in genuine and authentic language use. The focus on cognition also brings about focus on other 21st century skills such as problem solving and creative thinking. Through the communication, there is focus on form as well as meaning (Coyle et al., 2010).

This model, at least on the surface, offers solutions to many gaps in the CLIL approach seen in earlier sections although there is surprisingly little research that interrogates the implementation of the 4Cs at a classroom level. In the next section, the 4Cs are discussed in detail.

3.4   4C framework

The 4Cs are Content, Cognition, Communication and Culture. In the following sections, these will be defined and discussed in detail. Figure 11 depicts content, communication and culture embedded in culture and context.
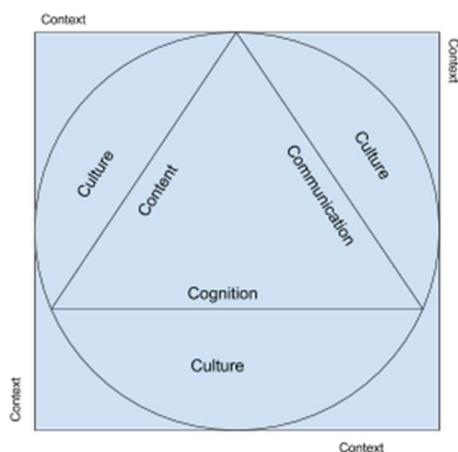
FIGURE 11: The 4Cs framework. From CLIL: Content and language integrated learning by Coyle, D., Hood, P. & Marsh, D. , 2010, p.41

In order to have a quick reference guide to CLIL, Coyle (2005) designed the 'Planning tools for teachers' (see Appendix 4). This provides a brief explanation

about CLIL, the different Cs, the language triptych, and also provides the questions that the teacher can think through for lesson planning. In addition to information on CLIL, the planning tools contains lesson plan template and example lesson plans across different subjects.

3.4.1   Content

Content refers to what is being taught. In the European CLIL context, this could be from within and beyond the standard curriculum. Content are the subjects or cross-curricular content. Content can be considered to be the new knowledge, skills and understanding (Coyle et al., 2010) that the teacher explicitly plans for. Coyle (2005) suggests the key questions that relate to content are:

- What will I teach?

- What will they learn?

- What are my teaching aims/objectives?

- What are the learning outcomes?

3.4.2   Cognition

Cognition refers to the engagement in cognitively challenging tasks (Coyle et al., 2010). Since in European contexts, content is chosen by the CLIL teacher, this choice should be done with thought. By having the content be cognitively engaging, students are offered an opportunity to grow in the language while also keeping the new language context dependent. Cognition specifically refers to both - lower and higher order thinking - that are discussed in Bloom's taxonomy. From lowest to highest, these are: remember, understand, apply, analyse, evaluate and create. The questions that the teacher can answer for cognition are:

- What kind of questions must I ask in order to go beyond 'display' questions?

- Which tasks will I develop to encourage higher order thinking- what are the language (communication) as well as the content implications?

- Which thinking skills will we concentrate on which are appropriate for the content? (Coyle, 2005)

3.4.3   Communication

This is the language part of CLIL - content and cognition refer to the content part of CLIL. In the CLIL context, communication refers to two things - learning to use language as well as using the language to learn (Coyle et al., 2010). Communication refers to every type of talk in class as well as other output(s) the student produces. It refers to both, form and meaning. As discussed before, CLIL in any form benefits from being taught from a sociocultural perspective. Coyle et al (2010) call for the same in looking at the 4C framework. Combining the sociocultural approach and the focus on form AND meaning leads us to the language triptych illustrated in figure 12. This is a new approach that combines existing research on language development (Coyle et al., 2010). Its specific use is in transparently deciding the language progression through cognitively demanding content (ibid).

Language *of* learning

CLIL linguistic progression

Language learning and language using

Language *for* learning

Language *through* learning
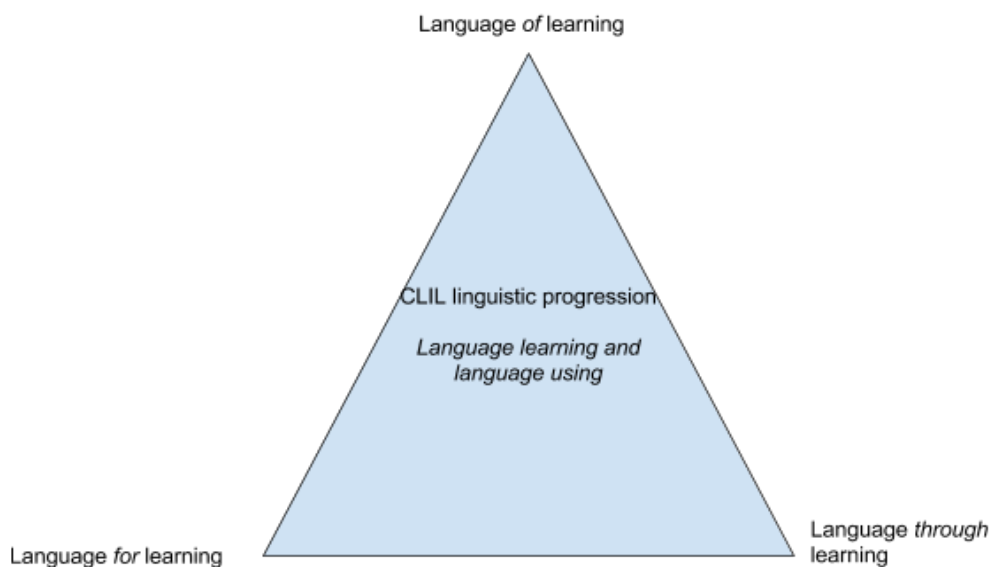
FIGURE 12: The language triptych. From CLIL: Content and language integrated learning by Coyle, D., Hood, P. & Marsh, D. , 2010, p.36.

The triptych has three interrelated, interconnected parts - the language *of* learning, language *for* learning and language *through* learning.

- Language *of* learning refers to the language that students will need to access the new content. It is typically what teachers focus on easily - specialised vocabulary and phrases. It also includes specialised grammar that appears in the content.

- Language *for* learning refers to the language skills the students need to work with the content. It includes language for group work, strategies for reading texts, language for meta-cognition skills, and practice of new and existing language repertoires.

- Language *through* learning refers to the new language that will develop through the learning. This is the unplanned section and could be structured by helping students learn methods to extend their language learning.

Some of the questions a teacher can ponder over when designing lesson plans are:

- What language do they need to work with the content?

- Specialised vocabulary and phrases?

- What kind of talk will they engage in?

- Will I need to check out key grammatical coverage of a particular tense or feature e.g. comparatives and superlatives?

- What about the language of tasks and classroom activities?

- What about discussion and debate? (Coyle, 2005)

3.4.4   Culture

In the European CLIL context, culture refers to many aspects of the lesson. It could refer to the culture of the TL, the culture of the content taught or even identity, citizenship, "self and other awareness" (Coyle et al., 2010).

One example for culture in maths content is explained as follows "The square. In Czech, there are different words for square as the geometric shape ("čtverec"), square as in the square power ("na druhou", "druhá mocnina") and a square as the part of the city ("náměstí"). There is no etymological, phonetic or visual bond between the individual Czech words, and subsequently, for many

students the connection between the first two concepts is often formal, artificial. In this specific situation, using English makes the complexity of the notion very clear" (Prochazkova, 2013, p.24). Thus, culture of the language can offer better understanding of the content, improve cultural understanding of the TL as well as increase awareness of L1. Some questions related to culture are:

- What are the cultural implications of the topic?

- How does the CLIL context allow for 'value added'?

- What about otherness and self?

- How does this connect with the all Cs? (Coyle, 2005)

3.4.5 The 4C Integration

While CLIL can in its basic form be considered as a class where content is taught in the TL, what provides a proper framework are the 4Cs. However, all these elements cannot exist separately in the classroom. These are integrated to form a coherent whole in the lesson (Coyle et al., 2010). Integration of these elements and in turn, content and language is the key to a successful CLIL lesson. While technically a lesson in eighth grade Finnish classroom teaching parts of a plant in English could be considered CLIL, it fails the cognitive aspect of a 4C based CLIL lesson. It would be more appropriate to teach acids and bases in eighth grade instead.

Communication is woven in every aspect of the lesson and the teacher makes a decision on how she/he would use language support structures throughout the lesson to aid the building of content as well as language. This could be the most challenging part of the lesson (Coyle et al., 2010). Culture is woven through the lesson with building awareness of both - TL and L1. Culture of the subject being studied could add an extra dimension to understanding the content better. Depending on how well all elements of the framework are integrated, stronger the CLIL lesson plan will be.

Integration of content and language itself has not been studied extensively from any perspective (Nikula, Dafouz, Moore, & Smit, 2016) and consequently, the number of studies detailing the use of the 4C framework is limited. One of the study that has used the 4C framework for analysing CLIL lesson is a Master's degree thesis by Pei-Fen Hsu (2016) from the University of Jyväskylä. The other study that describes the 4C framework in lesson planning, is an Indian study described in the next section.

3.5   CLIL in the Indian context

As discussed before, English medium schools in India can be considered a case of immersion where students receive instruction in a language (English) to which they are not exposed out in their world (Cummins & Swain, 1986). Since children learn all their content in English, this is CLIL in the fullest sense. However, as discussed before, it is not enough to consider mere content teaching in a TL language as CLIL; CLIL requires the careful integration of content and language.

An Indian CLIL study by Vency & Ramganesh (2013) was published in a local ELT journal. This study used the 4C framework and also planned for student interaction. The result of this study was positive and concluded that CLIL was an innovative language teaching methodology and resulted in positive outcomes especially when combined with technology. I could not find any studies published on CLIL in Indian context in any international journals.

3.5.1   Language focus in TFI training

This action research study is conducted in a TFI classroom and hence the following section explains how language considerations are included in the TFI training and I provide a critical reflection on my personal experience of using CLIL in the classroom although at the time I was not aware that I was involved in CLIL as such.

The five-week initial teacher training in TFI is in the following areas: behaviour management, education scenario, teaching English language (Reading

comprehension (RC) strategies, English Language Arts, and Writing) and teaching maths. Through this training, Fellows also taught in summer school in the neighbourhood where the lessons were observed and debriefed by the TFI staff. Since all exams are conducted in English, TFI emphasises maximum exposure to English through the whole teaching day.

Many secondary teachers complained that there was no coherent strategy to teach content other than maths – but TFI emphasised over and over again about paying attention to language no matter what the subject. Some strategies that we were asked to use in the classroom were: teach vocabulary words explicitly in any subject, use of audio-visual media, use of graphic organisers and sentence frames, use activities, projects, group discussions and use minimum L1. There was no coherent theoretical or pedagogical basis for any of these strategies – we tended to experiment for ourselves in the classroom and check what worked.

What worked for me personally was to have a word wall with subject specific vocabulary as illustrated in figure 13. I would periodically review these words. In science, I tried to use visual cues and videos to teach the content.

FIGURE 13: Words on a 'word wall' in my classroom

But one of my important strategy was to focus on English growth through reading and using RC strategies. My students did grow in English but I often felt it was at the expense of other subjects.

3.5.2   Existing context for the 4C in TFI classrooms

Since joining the CLIL course at the university, I wondered about its applicability in the Indian context. As mentioned earlier, I was looking for a more coherent framework as a "solution" in the classroom. The 4C framework seemed to provide a relevant framework that I could see relevant to an Indian TFI classroom.

- **Content:** It could be considered that all subjects except language studies are content - the curriculum defines what is taught in class and textbooks guide this. Hence, content is rigid and there is little flexibility in the choice of content.

- **Cognition**: Since the students are assumed to be at the "right" linguistic level, the content is pitched at a high cognitive level. If the teacher, during execution of lesson plans, tries to reduce this cognitive demand due to language issues, the student loses out on the next step in the curriculum. In a sense, cognition is fixed and rigid as well.

- **Communication**: The communication is the teacher's main responsibility. She/he plans the lesson and decides on how they want to communicate the main aims of the lessons to the students. Since the student is expected to pass a written paper at the end of the year, maximum work in the classroom is written. TFI encourages group work, debates and discussions in the class.

- **Culture**: Since English is not a foreign language but an official language, the role of culture in the classroom was unclear to me. In the European context, culture plays an important role for the goals of the EU. However, culture does have a broad definition – it could refer to the culture of the country. But it could also refer to the culture of the subject and culture of the classroom. For me, culture would be another way to ensure that the CLIL practice would be situated in a sociocultural perspective and students would be provided with an opportunity to talk and interact with each other.

Once the 4C framework seemed feasible in the Indian TFI classroom, it provided an impetus to carry out this research. As mentioned earlier, there is relatively little research on the 4C framework and Coyle (2010) encourages an 'inquiry-based' approach to using this in the classroom. This study would then be a micro process-oriented study with an equal focus on content and language integration.

I chose to carry out this research in a TFI classroom for two reasons: convenience and freedom. Since I had worked in the organisation, it was easier for me to implement it there. TFI classrooms have the freedom to explore new approaches in the quest for accelerated student improvement. Many other constraints that exist in other non-TFI classrooms such as teacher quality or teacher motivation exist to a lesser extent in the TFI classrooms. Thus, it could potentially offer an optimal environment for implementing the 4C framework minimising many unfavourable logistical conditions.

Fellows in TFI teach for two years and as my fellowship was completed before my Master's studies began, it was necessary to find another TFI fellow willing to participate in this study with me. In such a scenario, it was necessary to see if this framework was acceptable to the Fellow and what would he/she feel about its utility in the classroom. It also provided another observation point – how did the Fellow feel about implementing this in the classroom considering the existing pressures of time and multiple foci in the classroom. This study could, thus, offer a multi-dimensional view of the 4C framework.

4 RESEARCH PROBLEMS

My research problem, thus, is implementing the 4C framework in a TFI classroom in which content (in this case, maths) is taught in English. Through using the 4C framework, I was trying to understand how it supports both, maths and language growth. I would specifically use the culture of the 4C to implement a sociocultural learning environment where students not only learnt from the "expert" – the teacher, but also from each other. My main interest was to see whether and in what way the 4Cs can contribute to the TFI initiative. As the content and cognitive considerations are inflexible due to the specific Indian context, my research questions focus on the teacher's experience of working with the 4Cs and whether group work activities enhance the way in which the 4C framework can be implemented. My research questions were then framed as below:

1. What does the 4C framework contribute to an English medium maths classroom from a teacher's perspective?

2. How is the 4C framework enhanced when situated in a sociocultural context (group work) in maths classroom?

5   IMPLEMENTATION OF THE STUDY

5.1   Action research

5.1.1   What is action research?

Action research can be defined as "the study of a social situation with a view to improving the quality of action within it" (Elliot, 1991, p.69). In action research, "theories" are not validated independently and then applied in practice. They are validated through practice (Elliott, 2009). As Carr (2006) explains "it [action research] would be a form of inquiry that recognised that practical knowledge and understanding can only be developed and advanced by practitioners engaging in the kind of dialogue and conversation through which the tradition-embedded nature of the assumptions implicit in their practice can be made explicit and their collective understanding of their praxis can be transformed" (p.433).

FIGURE 14: The circle of action and reflection. From Teachers investigate their work: An introduction to the methods of action research by P. Altrichter, & Somekh, 1993, p.8

As illustrated in figure 14, action research follows the cycle of action and reflection. Necessarily, action research is carried out by people directly concerned with the situation that is being researched. Action research can start with any specific

problems in the work area or even as a means of reflection in the classroom (Altrichter et al., 1993; Biesta & Burbules, 2003). After this has been clarified, the practitioner uses existing research or other available resources to devise an action strategy and implements it. The situation is again observed and clarified with more data. Once an action strategy works, the practitioner can publish it so that other practitioners can benefit from the insights. This process not only develops the practical situation but also enriches the practitioner's practice (Altrichter et al., 1993).

5.1.2   Why use action research?

"Research on Education" and "Educational research" (Elliott, 2009) differ based on the role of the researcher in the classroom. For a layman, the idea of a researcher is someone who observes and reports - without any personal values and opinions colouring the observations. This aligns more with "Research on education". In "educational research", the researcher is the practitioner or closely aligned to the practitioner - the value of the research is to improve his/her practice or make the situation more "educationally worthwhile". In that sense, the two differ in the way they are viewed: scientific theorising against common sense theorising (Elliott, 2009).

As explained by Altrichter et al (1993), "research on education" is commonly based on Research-Development-Dissemination (RDD) model which is traditionally used in physical sciences. As a first step, researchers research new knowledge based on science (Research) and then test them (Development). After the materials are considered as "matured", they were handed over to practitioners (Dissemination). Practitioners are, in turn, to use the materials as specified by the researchers. In practical fields such as education, practitioners rarely adopt the material as-is and for a long time, practitioners were considered to be uncooperative or even ignorant.

The teacher action research which could be considered as "educational research", in the UK, traces back to Professor Lawrence Stenhouse, 1975 (Carr,

2006). He outlined the importance of these questioning and resistance from practitioners as a natural part of the process and recommended that teachers be partners to the process. The instructional innovations cannot be applied as -is to the field and should be modified based on specific context - and here the role of teachers as researchers is introduced (Altrichter et al., 1993). Teachers often test hypotheses in classrooms and share the results with others. This leads to a body of common knowledge - described by Stenhouse as "tradition of understanding". This "tradition of understanding" can yield knowledge that can be significant and can help other teachers (maybe across the world) to direct their praxis (Elliott, 2009; Kemmis, 2009).
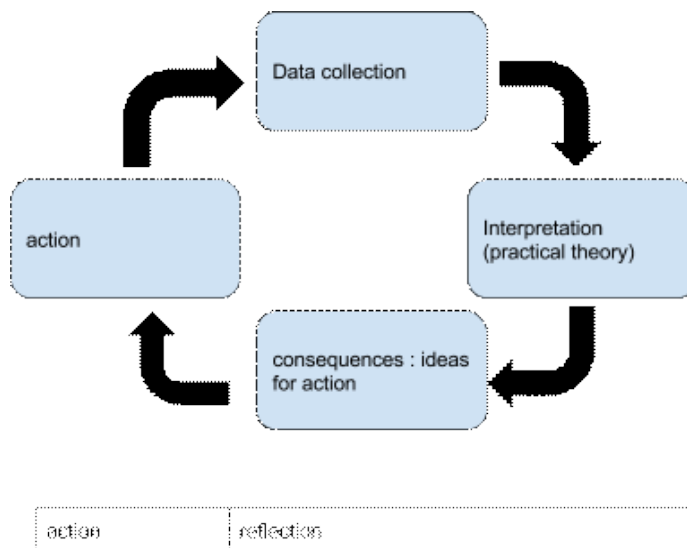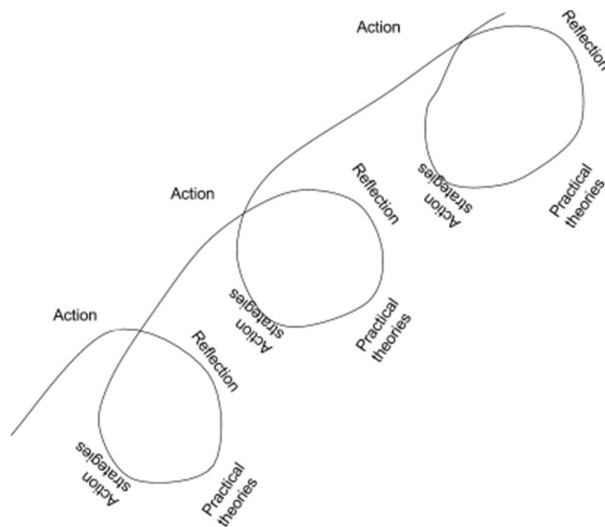

FIGURE 15: From action to reflection and back again. From Teachers investigate their work: An introduction to the methods of action research by P. Altrichter, & Somekh, 1993, p.8.

As seen from figure 15, the process of action-reflection spirals upwards and leads to a new understanding. As Dewey explains, the process of inquiry is never-ending – it leads to a new situation and new perspective which in turn can be questioned and transformed through the inquiry process (Biesta & Burbules, 2003).

5.1.3   Action research in this study

Though Carr (2006) argues against the need to justify the appropriateness of action research in a study, this section will aim to justify its need in this study.

Action research is appropriate for the study since the 4C framework is mainly European in origin and in practice. If it needs to be implemented in a vastly different context, it is not enough to create artificial and "clean" condition to implement a pilot. The very utility is important to TFI only if it is understood in a real, complex situation where the Fellow implementing it will represent any other Fellow who has access to the same resource as the teacher participant in this study. This interaction of the 4C framework with TFI is not one way; in being implemented in a vastly different context, the 4C framework can evolve and adapt as well. The new challenges and perspectives are likely to inform other practices of the 4C framework.

In this study, as a past Fellow from TFI and a future teacher, I belong to the community of teachers even if I am not presently teaching. The answers that the teacher in this study sought were the same questions I struggled with and the wider TFI community struggles with. Thus, this research is rightfully a study carried out by practitioners. This study was not carried with the intention of applying a ready-made solution in the situation. The cycles of action and reflection were followed throughout the study and the resulting insights are being published as part of this Master's thesis in addition to being shared with TFI. Right from the beginning, the intention of this research has been to do and learn through the doing.

5.2 The research partners

5.2.1 The school and classroom

The school is privately run and follows the Maharashtra state curriculum (SSC). The school was started on 15 June 1995 and has two mediums of instruction, English and Hindi. The school has classes from lower kindergarten through tenth grade. In total, the school has 26 classes with 2000 students. The school timings for pre-primary is 13:00-15:40, primary (1st - 4th grade) is 13:00-18:00 and for secondary (5th - 10th grade) is 7:10-12:45. The school works from Monday to Saturday with Saturday as half-day. The total number of working days in a year is 220.

The school is obligated to follow all rules laid down by the local government and they are inspected periodically to ensure their compliance. The school charges a fee of INR 400 (EUR 5.7)[2] per month for the primary section. Uniform is provided by the school at a rate of INR 400-450 (EUR 5.7 – EUR 6.4). Students have to buy books separately.

The research was conducted in a Grade 3 classroom. There were two class-rooms with 53 and 50 students in two divisions - a total of 103 students with 23 girls and 80 boys. Students live in the slums nearby; majority of their parents are employed in small-scale industries or low skilled jobs such as painters, electricians, drivers, etc.. Students are first generation English learners in their families. Around 5% of family members speak English. All students speak Bhojpuri (similar to Hindi) as their mother tongue. Students speak Hindi to communicate with each other. 85-90% of students go for private tuitions before or after school.

The classroom has been under TFI for one year - this is the second year of intervention. The previous maths teacher finished her Fellowship in 2014. In addition to one continuing teacher from last year, and the teacher participant who transferred from secondary, one new teacher was placed in the school based on the class strength. In the first semester, the continuing teacher taught a subset of the class in a separate classroom (12 students). In the second semester, she taught EVS to both the classes. The other new teacher taught English RC and writing. All three shared all class-related responsibilities – training for extra-curricular activities, administrative work and common class goals of values, exposure and access.

5.2.2   The teacher participant

Purva (pseudonym) is a second-year TFI Fellow. Last year, she taught the eighth grade in the same school. However, because of personal preference for primary students and because of negative experience with teaching in secondary, she shifted to the Grade 3. She has a Bachelor degree in Biotechnology and an MBA

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[2] 1 EUR = INR 70.28 as estimated by Google on 2 March 2017 11:56 AM

in Human Resource and she worked for two years as an human resource trainer before joining TFI. When she worked as a trainer, she used to wonder why the training methods she used with adults could not be used with children at school. She got an opportunity to volunteer at a school and that experience led her to apply for the TFI Fellowship.

She was a friend of someone I knew. When the mutual acquaintance introduced us, Purva was clear that she was willing to accept any support/help to help her be effective in the classroom. This positive attitude towards learning kept her going through the many challenges in the classroom. Her attitude is clearly visible through her conversations with me and her first-year experience drove her to take some specific stands and actions in the classroom. She details those in the various conversations as well.

5.2.3   My role

My entire interest in CLIL framework is implementation oriented. This entire research report and a brief summary will be handed over to TFI for review and implementation. Following the principles of action research, this study aims to examine in detail whether and how the 4Cs can enrich the TFI intervention in Indian education.

In one sense, I take on the role of teacher educator in this research - "as one of enabling teachers to develop and test a common stock of shared understandings about how to realise worthwhile educational ends" (Elliott, 2009, p.9). In practice, this meant acting as a critical friend to the teacher, providing materials, suggestions, and assisting with the action-reflection cycle. My role is outlined in more detail below and the recorded conversations, emails and messages exchanged between myself and the teacher provide an important dataset used in this study.

5.3   **Research Methods**

5.3.1   **The beginning**

The teacher was interviewed at the beginning of the research process in order to acquire a better understanding of her views on the classroom. The questions helped to gain a complete picture of her needs and goals. Additional data was collected and analysed together in order to develop a better understanding of the classroom context and pupil participants. These included last year maths and English scores as well as speaking to the existing teacher who knew the students. I also attended the meetings between the teachers to understand their approach in the classroom to behaviour management, class goals, class values and the exposure and access plans and timetables. All this laid the groundwork for me to understand how the teachers would co-operate and teach the two classes. Since the two teachers had different styles and experiences, it was necessary to understand the situation as completely as possible while also making sure that the other teacher knew about the research goals of the project and was on board with the requirements of the project.

Since I understood the pressures that a Fellow faced in the classroom, one of my major considerations in performing the action research was to make sure that my research does not add to the complexity of the teachers' role (Altrichter et al., 1993; Baumfield, Hall, & Wall, 2008). I wanted data collection to be something that was regularly available in the classroom and did not need special tools or extra time to collect. This is to ensure that if, in my absence, the teacher wants to continue with this practice - even if she does not publish - it would still be something that can guide her practice (Banegas, 2013). Also, I collected data through "multi-methods" (Baumfield et al., 2008): interviews, class notes, diary, and conversations through digital medium to ensure that I was capturing many aspects of the CLIL implementation. Since this teacher has tough responsibilities and a short timeline to accomplish her personal goals for the classroom, I did not feel it right to restrict any other techniques or suggestions she may have received from other sources, training, her PM or the previous Fellow. I did note down as

many as I perceived and my data is coloured by the extra influences. This is contrary to the suggestion in research papers (Baumfield et al, 2008), I felt I was matching my ethical values to the context in which I was working.

5.3.2   Observations in the classroom

In the next phase, I visited the classroom to obtain actual experience of the classroom and the issues the teacher had raised in an initial telephone call. The school reopened on 15 June. Since the teacher was new to the classroom, I gave her two weeks to settle in and I started the observations on 4 July and observed two times for the full working day. Through my interactions in the classroom, I focused on the approach the teacher took in the classroom, her lesson plans (LP), her lesson execution as well as familiarising myself with the way students responded in the classroom. At this point, I took videos and pictures of the lesson plans so that there is a "before" picture set up for reflection purpose for Purva. I also focused on specific elements of the lesson plans to make them more compliant with TFI norms as well as to the CLIL framework. Some of these elements included the language of the classroom, structure of lesson plans in maths classroom and the seating of students to aid the group work.

One major element considered while making lesson plans was the classroom theme. The two teachers discussed a class theme before the school reopened. A class theme is necessary as a fun element in the primary classroom. The class theme decides the class name, the name of the groups and also connects to the classroom values. In this classroom, the classroom theme was Panda Warriors – from the movie "Kung Fu Panda" by Dreamworks Animation. In the first week, the students saw the movie and the two classroom values of ownership and empathy were introduced through the movie. In addition to introducing the values, the groups were named after the characters in the movie and the students who performed well in the week were called "Super Pandas". Normally, the super pandas were also heads of the teams.

The observations were only to help familiarise myself with the class routines and procedures so that when I prepared lesson plans using CLIL framework, I considered the classroom context.

5.3.3   Cycles of implementation

After my observations, I spoke to the teacher to receive an update of how she was coping in the class and what she considered her priorities. I made sample lesson plans using CLIL as a model considering her priorities of language development and growth in maths level. During this process, group-work activities were introduced to offer space for students to work with each other and practice the content and language. Once Purva executed these lessons, we could re-think elements that she would like to retain or re-work. At this point, I shared with her the 'Planning tools for teachers' by Coyle (2005).

TABLE 2 Phases of implementation

Phase	Date	Action
Phase 1	8th – 12th August 2016	CLIL lesson plans made by me; executed by Purva
Phase 2	22nd August – 1st September 2016	CLIL lesson plans made and executed by Purva; comments by me
Phase 3	19th November 2016 – 2nd January 2017	CLIL lesson plans made and executed by Purva independently

Based on that, she made her own lesson plans using the CLIL framework. I was present for this phase and recorded the lessons as well as discussed how she felt about the lesson planning process. After this phase, she continued planning lessons and I supported her in case she had issues. After the Christmas break, Purva recorded and sent me one of the lessons so that I could see how much of the framework was visible in the planning and hence, determine the sustainability of the concepts.

5.3.4   4C in lesson plans

One of the lesson plans from pre-CLIL intervention phase is presented in figure 16. The lesson plan details what the teacher will talk in the class and what she will make the students do in the class. As mentioned before, both due to the context and TFI training, some elements of CLIL are already present in the lesson plans. These are analysed through the prism of the 4C framework in order to distinguish the difference between the lesson plans across the phases of implementation.

- Content: Teaching the concept of 100.

- Cognition: Explain in different ways in which 100 is formed

- Communication: Relate to a known phenomenon – cricket and century in cricket (a popular sport in India). Although the lesson plan is in English, it was executed in Hindi

- Culture: Culture (as defined by Coyle) is not obviously present
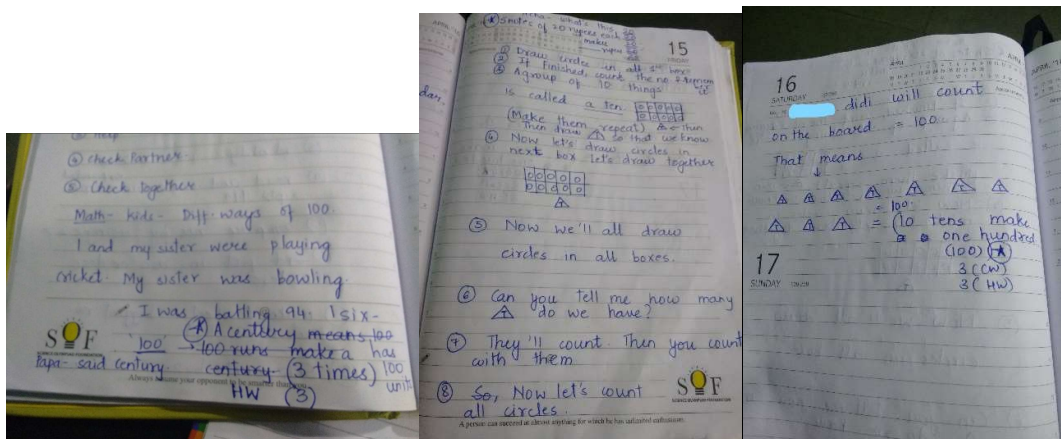
FIGURE 16: Maths lesson plan implemented by Purva on 4 July 2016 before CLIL intervention

This specific lesson was well broken down in terms of going over the concepts visually and through known examples. It could be argued that the lesson did meet the content objectives. It fulfilled some language objective as well – the students learnt a new word – century. But students had limited opportunities to grow in the language.

Once my starting point was established and I understood the limitations of the classroom, the first lesson plan I made is presented in figure 17. The detailed lesson plan is attached in Appendix 5.

FIGURE 17: Maths lesson plan made by me, implemented by Purva on 8 August 2016

In the above lesson plan: the first section clearly describes the 4C. The rest of the lesson plan follows the TFI pattern of Introduction to new material (INM), Guided Practice (GP) and Independent Practice (IP). The new sections added are vocabulary (words and sentences), drill and group practice. The structure of the lesson plan was discussed with the teacher before.

As the teacher continued planning lessons on her own, she re-defined the lesson structure as having three sections: the drill, the hook and the main lesson. The drill is a revision activity done at the beginning of the lesson (see lesson plan in Appendix 5). It could be done individually or in groups. The hook was the initial part of the new lesson that engaged the student – this could be a group

activity or an activity they observed. This was followed by the TFI lesson plan structure of INM, GP and IP.

5.3.5   Data in the thesis

As this study spanned a number of months, different types of data are available throughout the period of study. Some of these are done in class regularly – for example, the BOY and MY trackers and the weekly trackers. In addition to the lesson plans, I also videotaped some lessons and Purva videotaped some so that I could discuss it with Purva later. In my first interview, I played the videos to aid her reflection. I took pictures of the classroom, lesson plans and also of student work. I interviewed students to understand how they were feeling and provide a feedback to the teacher. I also saved all the conversations I had with Purva through emails and WhatsApp. I also have access to her classroom photographs on Facebook.

The complete list of data I collected is presented in table 3. While this is a complex data set, the different types of data help me triangulate information and provided supplementary information to acquire the 'big picture'. Some of this data could also be used for other research purpose. I transferred all the data to folders on my computer and backed them up online by emailing them to myself.

TABLE 3 Summary of data collected for the thesis

Data type	Quantity	Remarks
Trackers	8	Trackers made for TFI during BOY, MY, EOY exams. Includes last year EOY tracker.
Lesson plans	4	Made by me.
Lesson plans	8	Made by Purva.
Video of the classroom	15	Videos of the lessons and group-work
Audio recording of interviews	8+5	8 audio recordings of interview with teacher and 5 with students
Other conversations in written format	2	Diary entries, WhatsApp chat backup, feedback

5.4   Data Analysis

The conversations I had with Purva since September 24th were audio recorded. I had five conversations with her in all – on September 24th, December 19th, 22nd, 25th and 27th. This was meant to be a reflective conversation where Purva thought through how she had implemented CLIL and what she thought about implementing it. These talks, in many ways, resembled the reflection talks with PMs in TFI – a format she was used to. I transcribed all the conversations over the Christmas holidays. During transcriptions, I skipped corrections (self-corrections), pauses and some re-directs, and some repeat utterances. I put all my transcriptions on Google document and shared it with the teacher to ensure transparency.

One of the major consideration for data analysis was to determine the data I will use for analysis. After going through all the different types of data I collected, I felt the teacher conversation helped me answer the research question more completely. So I focused on the teacher communication as the main data to be analysed and used the other data in a general way to support or explain the findings.

As the first step, I printed out the entire teacher conversation and read through it multiple times. The unit of analysis I chose was based on instances (either words, sentences or paragraphs) that completely described a specific C of the 4C framework. If the quotation had multiple examples of the same code, I coded each example separately. I started by highlighting the instances of 4C and CLIL in the teacher's mentions. After trying this out with paper and highlighter, I shifted to using Atlas.TI. I defined all the terms in comments part of the codes (see table 4). I noticed instances of where the teacher had used the 4C in non-maths situations. I coded them as 4C as well adding the non-maths prefix. I also noticed other common themes that the teacher considered important – practice, independence, lesson planning structure, lesson planning process. All these were not directly connected to 4C – but played an important role in the classroom. I

coded them separately from the CLIL codes resolving to rethink them as I finished the first round of coding.

After the first round of coding on Atlas.TI, I took a break for a few days to be able to look at data afresh after some time. In the relook at the codes – I redefined codes, formed code families and also recorded in memos and comments the changes I made. One major change during this time was to break down the Communication code into Language triptych: Language *of* learning, language *for* learning and language *through* learning. At this stage, I also spoke about the codes to two of my classmates who were not part of my process and discussed my codes. This is also recommended as a way to increase the trustworthiness of the data (Elo et al., 2014; Tracy, 2012).

TABLE 4 Codes with definitions at primary coding stage

Code name	Definition
Class culture	In specific TFI context, classroom culture (includes theme of classroom (panda warriors), values of the classroom (independence, polite language, ownership and empathy). These will only be ones that appear in maths class.
CLIL	CLIL refers to codes related to meta talk about CLIL - it is specifically related to instances of looking at the whole 4C framework or content-language integration.
Cognition	Cognition refers to the thinking skills - in TFI terminology, anything to do with rigour. It will also include teacher questions in classroom and anything that goes higher in Blooms than remembering, recalling.
Communication	Communication refers to Language of learning, language for learning and language through learning.
	It also covers all instances of communication that refers directly to language or thinking about language (meta talk)
Content	Defined as the content taught in the classroom including objectives (maths related), maths topics and also student outcomes.
Culture	Culture is defined as culture of the foreign language (English, in this case), culture of the content (maths in this case)
Group work	In this case, all instances of students working with each other will be coded as group work - this should ultimately be coded into content-language integration.
Independence	This is the class value - will possibly be soon recoded into culture

Language for learning	This refers to language *for* learning the content - the talk explicitly taught for group activities, engaging in meta-talk, practising existing language skills, etc.
Language of learning	This refers to all the language support offered in the class to understand the content.
Language through learning	Will refer to meta talk on language development as a whole not just in maths class.
LP structure	This is a temporary code - needs to be decided whether to have this in the research thesis. This code will contain all references to lesson planning structure - either TFI, CLIL or teacher generated
Non maths cognition	All instances of cognition not related to maths
Non maths communication	All instances of communication not related to maths lessons
Non maths content	All instances of other objectives not related to maths
Non maths culture	All instances of culture not related to maths classroom
Not related to 4C in any way	These are all instances of lesson deemed important to teaching but not part of 4C CLIL framework. Hopefully this will lead to insight of things not part of CLIL but still needs to be considered.
Not related to 4C in any way - non maths	These are all instances of lesson deemed important to teaching but not part of 4C CLIL framework or the maths class.
Planning process	This will possibly be abandoned later. It will include all instances of planning process that the teacher mentions
Practice	Practice will refer to all instances of building student fluency in maths - all the extra work student do to become fluent in the topic.

To increase my data's trustworthiness, I coded everything the teacher said rather than choosing only codes that fit (Tracy, 2012). I hoped that all instances not being coded under 4C or CLIL would offer me additional insight into how the teacher saw her classroom.

I went over the codes and quotations separately by printing them out and checking for both – unit of analysis as well as the actual codes themselves. After the corrections, I had finished my first round of coding. The second round of coding is more integrative in nature and is guided by literature and the research question. After reading through the literature and re-reading the codes once again, based on my research question, I selected part of the codes to focus on my results. These codes are presented in table 5.

TABLE 5 Codes selected to answer the research questions

Research question 1	Research question 2
Content Cognition, Communication including language of learning, language for learning, language through learning, Culture (Class culture, independence), CLIL, not related to CLIL in any way	Group work

After going through the quotations only related to these codes, I looked at all quotations within each code under four headings for the first research question regarding the teacher's perception of how the 4Cs contributes to the Grade 3 mathematics class. The four headings were: Definition, Planning, Execution and Role. I realised that I went through two other codes to find specific examples of planning: LP structure and planning process. I also picked up quotations from non-maths codes for a specific section in the analysis: How CLIL was used beyond the maths classroom. I felt that the importance of CLIL could be fully understood if these codes were considered.

5.5   Reliability, validity and trustworthiness

While reliability and validity are common terms for quantitative research, there is much debate on its applicability directly to qualitative research (Elo et al., 2014; Golafshani, 2003; Kohlbacher, 2006; Madill, Jordan, & Shirley, 2000; Zhang & Wildemuth, 2016). This debate is rooted in the epistemological differences in the two methodologies. Many researchers recommend the criteria devised by Lincoln and Guba in their 1985 book "Naturalistic Enquiry" for measuring reliability and validity in qualitative studies which according to Lincoln and Guba basically indicates if the findings should be considered worthwhile (Elo et al., 2014; Golafshani, 2003; Madill et al., 2000; Zhang & Wildemuth, 2016). In answering that

question, reliability and validity in a qualitative study can be considered as an issue of trustworthiness which in turn encompasses five criteria: credibility, dependability, confirmability, transferability and authenticity (Elo et al., 2014; Zhang & Wildemuth, 2016). These concepts are valid through all stages of the research from data collection to reporting of the studies.

Through the data collection process, I have made efforts to choose an appropriate method to answer the research questions. Both the research questions deal with a teacher's viewpoint, hence the teacher's interview triangulated with videos from the classroom and observations, form the main basis of the analysis. This meets the criteria of credibility (Elo et al., 2014; Zhang & Wildemuth, 2016) and also the triangulation of data increases the general credibility of the research findings. A prolonged period of the study and multiple interviews with the teacher (Zhang & Wildemuth, 2016) add credibility to the data. The teacher has been described adequately including her context, background, priorities and challenges she faces so that the reader can judge for themselves the trustworthiness of this research. In this report, all efforts have been taken to ensure that the teacher's voice is represented through direct quotations so that the findings and interpretations can be seen to conform to the data.

The coding process has been described in detail along with definitions of the codes used so that it lends trustworthiness to the analysis process. Since the initial codes were taken from existing theory, the codes themselves can be considered to be trustworthy. All utterances by the teacher have been coded and interpreted, increasing trustworthiness. The codes that did not "fit" into the 4C framework have been reported separately and all the negative comments about group work have also been reported and discussed.

Limitations of the study have also been reported in the Conclusion section (Elo et al., 2014). Overall, all care is taken to ensure that the data collection methods, analysis process and interpretations are reported with as much detail as possible so that the reader can judge for themselves the transferability of the results (Elo et al., 2014; Zhang & Wildemuth, 2016). Though no other member was involved in the coding, during the analysis process, I spoke to classmates, who had

knowledge about CLIL, about the codes and definitions and examples of the codes. Finally, the results have been shared with the teacher in the research including all the transcripts and final findings to additionally increase the trustworthiness of this research.

5.6 Ethics in this research

In order to ensure that this research was ethical, three main criteria was looked at - informed beneficence, respect and justice (Fisher & Anushko, 2008). For beneficence, it is necessary to ensure that there is no harm caused to the participants while also maximising research benefits. Through the research process, I ensured this by not adding any additional pressures on the teacher. I did not introduce any new tests or any additional procedures that could cause her or the students any additional stress. This method is also in line with the requirement of an action research (Altrichter et al., 1993) and thus, has not reduced the results of my research in any way.

The second aspect of ethics is the principle of respect which encompasses my responsibility to ensure that all the participants know about the research process and their rights to consent and withdrawing consent (Fisher & Anushko, 2008). For informed consent, I ensured that the teachers explained the research and what it entailed in Hindi. The consent letter (Appendix 6) was in Hindi and English and was sent home with the students so that parents do not feel pressure to sign it in a parent-teacher meeting. I personally met the students and explained that they could disagree to be part of the study. Thus, adults and children involved in the research are made fully aware of their rights not to answer any question they may wish not to. They were also made aware that they may withdraw from the research at any point without any fear of negative consequence. For the students whose letters have not been signed and returned, their names or interviews have not been considered as part of the raw data. The school already consented to be part of any research process through its agreement with TFI and the teachers informed the Principal of this research process as well. The three TFI

teachers teaching the class knew about the research process and the findings will be shared with the other two teachers even though they were not involved directly in the research. TFI was informed about the research and they included it as a part of the internship they assigned to me. The final report will be shared with them as well.

Confidentiality was considered a priority and participants were aware of and agreed with the strategies provided for protecting anonymity and the limitations this has. All care has been taken to ensure that any direct identifying information of either the school or teacher has been removed. Purva is a pseudonym that the teacher consented to use.

Finally, I come to the third general principle of research ethics: justice. In my research, this principle is extremely important. Through the whole process, I have aimed to be transparent with my research participants – the teachers and the students. I will send my final thesis to them as well as talk to Purva explaining the whole report.

In a video speech for SAGE journals, Grace Spencer (2015) talks about researchers working in schools with children and young people and their teachers and stresses the importance of negotiating and defining the role of a researcher before beginning the research. Spencer refers to the confusion that can arise if researchers are asked to take sides in supporting either party in situations of conflict or potential conflict. So it is important that the researcher has a clearly defined role before the research begins. However, due to the nature of the action research, my role is not as an outsider to the research. The role I played has been described earlier in the research in detail.

In addition to the above ethical issues, I faced auxiliary issues related my presence as an experienced maths teacher in the classroom. Since this was the first year of maths teaching for the teacher, I struggled with whether I should offer support beyond the 4C framework and group work in the class. I resolved these issues trying to keep true to the teacher's reality – I helped her with techniques for maths teaching, suggested alternate methods for things that did not work and helped her plan some of her extra classes. I, similarly, helped the other

teachers with issues; observing some of their classes and providing my comments. I contributed to the classroom behaviour management plan, vision document and the planning for the whole year. These contributions can be considered as drawbacks in a research study – but I consider them an ethically responsible choice I made for aiding student growth.

The other additional element of ethics is the fact that through this long process, I became friends with Purva. Some amount of bias is likely to be reflected in my findings because of this. Some bias could also have been introduced since I know this report is being submitted to TFI.

6   RESULTS

Prior to the CLIL intervention, the teacher's lesson plans and activities were based on lesson plans suggested by TFI and sought to maximise maths learning in the classroom. During the CLIL intervention, however, the 4C framework provided a different lens through which the aims and activities of the lessons could be considered. Although the first few CLIL lessons were designed by me, in the later lessons Purva was responsible for using and implementing the 4Cs in her planning and lessons. By placing the different lesson plans side-by-side, it is possible to see where the teacher began to prioritise and modify the 4C framework that she had been introduced to, suggesting that the teacher felt free to work with the 4Cs in a way that suited her priorities as a TFI fellow. She implemented the framework from August 7th onwards. By the time of the final conversation with the teacher on 27 December, CLIL implementation had been going on for 4 months and 20 days. This was a long period of time for the teacher to form impressions for the 4C framework's relevance to her maths classroom. The two research questions focus on her views on the framework and group work. These findings are dealt with separately in the two subsections.

6.1   A teacher's perspective on the 4C framework

The first findings are based on the teacher's comments gathered during our multiple conversations and answers the first research question "What is the teacher's perspective on the 4C framework of CLIL?" The sub-sections can be visualised as illustrated in figure 18. Each of the Cs is analysed separately before the teacher's views on CLIL is considered.
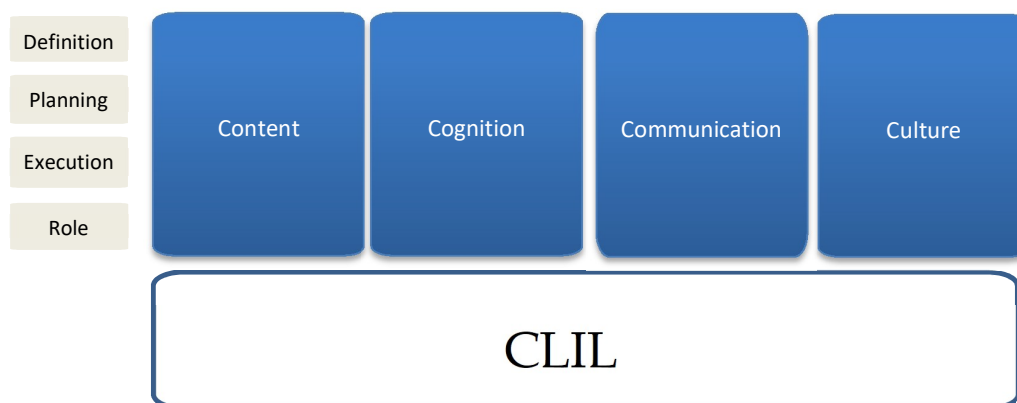
FIGURE 18: Visualisation of the analysis section of first research question

In addition to a detailed examination of her views on each of the 4Cs, her views on CLIL will be discussed using the same format: definition, planning, execution and role. The quotation codes are a combination of codes from Atlas.TI and the date of the conversation. For example, the code P2:242:27.12 is a combination of code from Atlas.TI (P2:242) and the date of the conversation (27.12). This coding is unique. In addition, her conversations offer a more detailed picture of the framework through discussions on her difficulties in implementation and understanding of CLIL, on the extension of CLIL framework beyond the maths classroom and on other factors that were important to her but not directly related to CLIL. Although the findings reported here are based on the experiences of one teacher alone, the careful documentation of the overall process and the multiple datasets provide important insights into the potential benefits and challenges of introducing the 4C framework into the TFI context.

6.1.1 Content

This section discusses how the teacher works with the first C – content - in the classroom. While definitions of content have been provided in both European and Indian contexts, it is necessary to analyse how the teacher understands this C. This section goes beyond just the definition, it analyses the value the teacher places on this C in planning and execution process. It also discusses the tensions that arise in the classroom when focussing on the content.

Definition of content

This section outlines the teacher's understanding of content.

"I knew the content is what I am teaching in math. The objective. In my head it was like that. Content what I am teaching." (P2:242:27.12)

"My first important thing is the objective 'What are my teaching objectives? And What are the learning outcomes?' So learning outcomes is a broader thing. So only for that particular lesson, I only think about the ESR (exemplar student response). What will they answer? How will they answer? So first is 'what is the objective' and second 'how will they answer the question.'" (P2:216:27.12)

"If I feel that I can do away with one question...for example in content. I know that when I do Q3, my aim of content gets solved. So content area is sorted. Or when I use the 4th question, 'what are the learning outcomes?' Although I mix it with ESR [Exemplar Student Response]. So it is sorted. So I know Q3 and Q4 helps me finish the content part. So I know that's done." (P2:254:27.12)

From the above instances, the teacher's definition of content is quite clear – she talks repeatedly about the actual topics as well as the student outcomes (how they write a specific answer) as content (P2:216:27.12). Through the entire conversation, she also mentions specific maths topics as the starting point of lesson planning process.

Content in the planning process

This section outlines how the teacher considered content while planning her lesson. This is not just applicable for her lesson plans; it covers her planning process for the unit or even the year.

"I go in class with exact objectives and outcomes what I want from my kids" (P2:8:24.9)

"This year, I knew that I have to read my content. So in my summer vacation, I had started reading. I knew what chapters are there. I did not break down each chapter. I knew that these chapters were there. The content wasn't surprising to me." (P2:134:25.12)

"What I did was, I picked out things that are important for the next year. I started reading the chapters and I mapped it with the SSC and NCERT. So, I did the entire time chapter with NCERT book. I spoke to the PM and she came to class twice and she asked us to focus on NCERT and not SSC because the question types in EOY comes from NCERT and not SSC. So, what I did was, I started mapping…both of us had also spoken about this right…mapping the questions. Now I have done that and that has helped a little. So I knew about this month…so I kept the light chapters this month." (P2:50:19.12)

"I keep one day as buffer so that if anything my kids have not understood, we again go through the same objective on that particular day."(P2:271:24.9)

"I knew I had to start improving on content. Slowly I started improving in content also." (P2:131:25.12)

These extracts highlight the key place content occupies in the planning process. Content is the starting point of her whole planning process – for the week and for the year (P2:271:24.9). She started her planning well before the school started so that she is familiar with the content. Her first target for improvement was content. In addition to the logistics of planning, she has to consider the tensions in the dual focus of content – SSC that the school demands and NCERT that TFI insists on (P2:50:19.12).

Content in execution

This section elaborates on how the teacher's considerations in content play out in the classroom. This is not just about teaching a maths topic – as can be seen from her comments below.

"I can actually in 45 minutes, I can do one objective very nicely. If I do one objective every day, I only have to revise the concept. That's it and I don't have to teach again the objective to the kids and that has saved time." (P2:24:24.9)

And I started printing more worksheets and I make it a point that - whenever I am giving them extra sums or worksheet, I first give them the correct answer of one sum - like the first sum, I do and tell them this is how your answer should look like in your answer paper or book and then I give them 3 more sums. I don't know what it is called in TFI terminology - that I show first - I tell them that if they don't do this way, here are where the mistakes will happen. They are like ok. They will do 3 sums on their own. Earlier, I never used to say where they are likely to make a mistake - so that non-example thing, I wouldn't do before, now I do that. (P2:48:19.12)

I haven't done the operations. I have only done the 3 things. In subtraction with borrowing as well, they were confused with 300-291, the 0 0 borrowing was confusing and that took 2- 3 days (P2:49:19.12)

The clap activity...their tables...they like speaking table now. I did that for the time chapter. For 5-5 minutes. So I did 5 table revision. (P2:65:19.12)

Content plays an important role in the execution of lessons. In addition to the instances of specific content topics (addition without carryover, multiplication,

time, etc.), the teacher also mentioned how she focuses on student outcomes in the classroom (P2:48:19.12).

The content drives the classroom priorities. Earlier, she would struggle to finish a specific objective in a week since she rarely could plan out the content in a structured manner. Recently, she has realised that the extra time in planning beforehand helps to save time over the week (P2:24:24.9). Although everything still is not ideal and some content topics still cause problems and delays (P2:49:19.12).

In the classroom, Purva also reviews many of the objectives using some activity (P2:65:19.12). This group work is discussed in detail in the second research question.

Role of content in the classroom

To conclude her understanding of content, this section highlights her understanding of the role of content in the classroom – this role could be positive or negative and deal with the inherent tensions.

"Last year, because I wasn't so clear on what I wanted, it had an effect on classroom behaviour." (P2:22:24.9)
"Objective driven LPs also somewhere helped" (P2:70:WA:21.12)
"Breaking down of Q types especially NCERT curriculum should have been practised more." (P2:71:WA:21.12)
"One, I think, the reason I was more confident with the HM was because I knew my content was becoming stronger day-by-day." (P2:127:25.12)

Through her conversations, it was evident that she felt content was the first point of improvement (P2:131:25.12). She did not have confidence unless she felt she achieved her content outcome. The teacher credits her improvements this year with having gone through content well before the school started in June (P2:134:25.12). She also attributes clearly defined objectives to some of her successes during MY exams (P2:70: WA:21.12). She also feels that if she had done better at mapping the curriculum and resolving the tensions between SSC and NCERT before mid-year, her students would have had better results

(P2:71:WA:21.12). While the above two statements seem contradictory, they have to be understood in the context of the classroom results at MY. In the MY exams, the classroom performed at 42-47% mastery. This meant that students answered only half of the questions correctly in the exams. The teachers were upset because the students could not read the exam papers on their own and the fall in grades was not the result of maths content as much as it was about the language. While students could partially do the maths content (which the teacher attributes to her objective driven LPs and planning process), they failed to understand some of the question types because of the language of the NCERT questions (P2:71:WA: 21.12).

One of the important effects of a well-defined objective is in behaviour management (P2:22:24.9). The teacher mentions multiple times that knowing what is to be done and what she wants as student outcomes helped her with behaviour management and time management in the classroom.

6.1.2   Cognition

This section discusses how the teacher works with the second C – cognition - in the classroom. As with content, this section goes beyond just the definition of cognition. It discusses how the teacher uses cognition in her lesson and the consequences of elevation of cognition in the lesson plans.

Definition of cognition

This section highlights the teacher's understanding of what Purva interprets cognition to be.

"Thinking skill - what will I ask them to push their rigour."(P2:245:27.12)

Rigour is a common term in TFI meaning higher thinking skills on Bloom's taxonomy. Thus, linking cognition to rigour is accurate. For the teacher, an increase in rigour and hence cognition is based on TFI's view of the topic. Although maths curriculum of SSC is at an appropriate rigour, TFI pushes for use of NCERT which they believe to be more rigorous. For this teacher, higher

rigour relates to two things: doing problems from NCERT and pushing the children to think and not just follow rote processes.

Cognition in the planning process

Cognition is an important aspect in the planning process – if not planned, it is unlikely to appear in the classroom on its own (Coyle et al., 2010).

> "The last question 'Which thinking skills will we concentrate on which are appropriate for the content?' Now, through my lessons, I always focus on problem solving and reasoning. For every step. So that is very important for me. So here I have written that one of the thinking skills would be asking 'why' after…their carry over….this happens in my every lesson plan. Sometimes I do some non-example. I do a non-example and then I ask them "Why did I do this? What should have been done?" So that reasoning is sort of there in every lesson plan. (P2:222:27.12)

> I tried to stick to nice content and increase the rigour of the class. (P2:136:25.12)

The teacher started planning for increased rigour through using the NCERT textbook and solving additional problems from those. In addition to NCERT, the teacher also plans for rigour by asking critical questions in the class. She does problems wrongly on the board or asks explanations for the steps of the problem.

Cognition in execution

Since cognition is a major consideration for the teacher, it plays out in the class-room quite perceptibly.

> "Last year, my rigour level for the kids was really low. I couldn't push them higher. I could only stick to the textbook. This year, I try to…first day I will teach the objective and second day, I will revise the objective if they didn't understand. The third and fourth day, I try to do application questions terming them as challenging question. These guys will try to do them and I do a mix of questions. I start with simple questions so that the kids will get a sense of achievement and then I go to challenge question. Obviously, the HO kids get faster but the other kids also try the challenge question. So I try to push them towards application questions. Last year I did not do that. I was only textbook driven and I did not help them think through." (P2:124:25.12)

> And I knew that if they write 5 ones are 5, 5 twos are 10, they have just mugged that up. I wouldn't be pushing their skill there. They have to play it so that it is different …it's a game also…but they know that after 5, 10 is coming…after that is 15 and they have to do it till 60. So I made them play a game where they have to say clap and say 5 and the other person says 10…15…like that. And there they were going beyond 12. 5X12 = 60. Actually, in tables, they learn..they only know 5 10s are, they know only till 10. But when they are doing that game, they went till 12, they went till 15, 5 15s are 75. They only did it, I did not do anything. So that way it pushes the rigour and it also sets the class for a particular chapter. (P2:251:27.12)

"So in between, if the kid asks a question, there are kids who have doubts. So what I do is when they ask a question, I say 'Does someone have an answer to this?' So some other kid talks. So that has also happened in the class." (P2:196:25.12)

Rigour level quite low. Students knew the place value well. (My observation diary entry) (P10:9:7.12)

The teacher plans separate days for "challenging questions" where the students can specifically try high rigour questions (P2:124:25.12). Even through her daily classes, she thinks about asking questions to push their thinking skills higher. This was not a consequence of the 4C framework but the MY exams and insistence from TFI.

However, even before the NCERT questions, the teacher would often ask thinking questions in the classroom. While in the initial few classes and for certain topics, the students seem to be well aware of the topic and the rigour level was quite low (P10:9:7.12), the teacher increased the rigour of the class by the additional focus on language in the classroom. The group work activities also had high rigour as can be seen from quotation P2:251:27.12.

Role of cognition in the classroom

This section describes both the positive and negative aspects of cognition. By considering cognition in the classroom, other pressures arise.

"Sometimes you are great at content, but if you are not using the right thinking skills and not asking the right questions, then your lesson goes for a toss." (P2:249:27.12)

"I know when I plan, this takes time and I will not be able to go to challenge questions more. So I sort of restrict this activity to...2-3 days only." (P2:186:25.12)

Cognition plays two roles in the classroom for this teacher. She acknowledges its importance and since mid-year has prioritised challenging questions in the class. This is driven by the need for students to do well in the EOY exams but also because she truly believes rigorous lessons help keep the class engaged. This leads to another tension with group work. Her need to do challenging questions is in direct conflict – with respect to time – with her need to do group work. This could be due to an underlying conflict in her belief system a teacher-centred

approach in conflict with a student-led approach. This is elaborated on in the discussion section.

6.1.3   Communication

This section focuses on the teacher's interpretation of the third C – communication. This is the language in maths – a major focus area for the teacher and TFI.

Definition of communication

This part does not do a word definition of "communication". It actually analyses the part of the lesson plan the teacher interprets as communication. The definition also looks at which questions (from the Planning tools by Coyle) does the teacher think about when she thinks of communication.

> "My next focus in communication is second (question) 'vocabulary used' and the third one 'What kind of talk will they engage in?' So the talk bit." (P2:218:27.12)

> "So, then: classroom activity. That is 'What about the language of tasks and classroom activities?' Classroom activity. Earlier I used to focus as if each and every activity should be there. Now what I do is, my hook sort of becomes an activity" (P2:219:27.12)

> "So then, the next day, during the drill they do a group activity. That is my structure." (P2:221:27.12)

> "Now communication part…if you have given me 4 questions; what is important to me is Q3 and Q4." (From Planning tools) (P2:255:27.12)

The teacher interpreted communication and simplified it to two specific parts of the lesson: the drill and/or the group activity and the hook.

While the teacher only mentions drill and hook as communication, she uses other aspects of this C – language *of* learning, language *for* learning and language *through* learning. She provides visual support for concepts and teaches specialised vocabulary and phrases related to content (language *of* learning). She teaches sentence frames to engage in group talk (language *for* learning). She made a word wall for the new vocabulary. However, she rarely used these examples to explain her definition of communication. Evidence of her use exists in other non-maths examples she explicates and in recordings of her later lessons.

Communication in the planning process

As pointed out earlier, planning for communication is a major challenge of the 4C framework. This section analyses how the teacher meets this challenge.

"I deliberately do - in lesson planning as well - I have to speak minimum and kids have to work maximum. That shift has come." (P2:57:19.12)

"Last year, I wrote paragraphs on what I will say to students and after you sharing your lesson plan way, I have kept things simple and I have learnt how to break down big-big chunks into smaller sentences." (P2:101:25.12)

Communication in the planning process has also conversely been interpreted as the teacher as **less talk**. This less talk is more deliberate and well thought out and presents a space for students to work on their own or practice with each other. Hence, this specific approach for the teacher is deliberately planned. This is a major shift in this classroom and also compared to how teachers in India work with students. This is a TFI focus area and it can be seen that the teacher believes that the 4C framework contributed towards this aim.

Purva also focused on making sure she was not talking "big chunks" of words and was breaking down everything she was saying to simpler phrasing during whole-class teaching. While this could be considered as a "good" teaching strategy anyway, for new, inexperienced teachers this could be a hard skill to master. The 4C framework is believed to have helped this teacher to learn this skill.

Communication in execution

Communication can play out in the classroom in many ways. This section deals only with what the teacher directly mentions or from my observation. This section will also detail instances of language *of* learning, language *for* learning and language *through* learning.

"I actually used notes (currency) and I used different markers also." (P2:28:24.9)

"Actions: last year, I thought that it is a secondary class, we had to speak in a particular way. Actions might not help them…But I realised that when we use actions, it is automatically set in their head…So I naturally have this habit of using my hand gestures a lot. So I thought why not then use them properly in class and use maximum hand gestures for actions. And I think that sort of helped me and also helped the kids to remember." (P2:139:25.12)

"So, this year, I told them it can't be one word, it has to be full sentence." (P2:156:25.12)

"If I tell them 'what is the time?' they have to start the sentence with 'the time is' and then say the time. So I think if I give them sentence starter, they will try to say the sentence starter and fill in the fact." (P2:159:25.12)

"But when they write, all those silly mistakes they make while writing; like arranging the numbers also in units, tens, hundreds, I can quickly see if that arrangement is also wrong. Or they have made some mistake or they have not put the addition or subtraction sign, they haven't put the bigger number up. All those small, small things, I can catch faster when they are writing." (P2:188:25.12)

"I also realised that during PT [Physical Training] period, they went down and they said "Purva didi, we only arranged ourselves in ascending order" which was a huge sentence and arranging they knew, ascending they knew and also they now started using this in other didi's lessons also… They have started using full sentences and whatever structure "what is" structure "what is there in-between" structure, whatever we have taught, once they practice they use it everywhere and that is a good thing." (P2:17:24.9)

"That gave me an idea that people still didn't know what symbol was because I always taught them put <,>, =. The question in the workbook was put the correct symbol. Though I introduced what symbol was, I didn't reinforce it." (P10:76:11.9)

Good English practice though (My observation diary entry) (P10:10:7.8)

English practice needs to be more intensive (My observation diary entry) (P10:15:7.8)

Communication in classroom manifests in many ways as seen by the quotations above. There is an aspect of language support offered to the students through materials or through gestures. Her use of the classroom space, more concrete materials, as well as more concrete real-life examples all, relate to the language *of* learning. The other aspect of language support comes from the teacher's use of language frames and the teaching language necessary for group work. This relates to language *for* learning. The quotation (P2:17:24.9) describes an instance where the students applied the language frames taught in a maths classroom to a physical training class. This is one of the examples of language *through* learning which the teacher mentioned.

This is not an ideal execution. Despite her lesson on symbols (<,>, =) done using the 4C framework and group activities, it was not enough. The students have not remembered it in a later lesson (see quotation P10:76:11.9). Purva also places importance on writing in maths class (P2:188:25.12) and ensures that conventions are followed. This is necessary as can be seen from her example – arranging numbers by place value cannot be done verbally and requires written practice. However, this importance placed on writing, conflicts with any oral practice in the classroom in terms of time. It also consumes time to go through each written work to ensure conventions are being followed correctly. This conflict she feels about written work versus group work will be described in the discussion section.

One other aspect that needs discussion are the two diary entries made by me (P10:10:7.8 and P10:15:7.8) for the same lesson which seems contradictory but can lead to a nuanced discussion of the 4C framework in the classroom. The second comment on needing more intense English practice related to specific observation from group-work. While the students were practising the sentence frame "What is in the units place?" many students said "What is units place?" instead. The teacher could not have been able to check every single student's utterance. But I noted this down to inform the teacher so that she could be on the lookout for mistakes similar to this. However, even in topics with low rigour, the content-language activities kept the students engaged and kept the overall rigour high since the students were practising new language while revising the basic concept. While this may not be the objective of every lesson, the 4C content-language duality can provide for engaging, high rigour lessons even on familiar topics or for reviewing concepts.

Role of communication in the classroom

The teacher highlights the positive effects of focusing on communication in the classroom.

"The kids also started engaging and they started speaking." (P2:29:24.9)

"Math drills of number names helped the HO [higher order] and MO [middle order] kids." (P2:69:WA:21.12)

"They have tried to think and they also speak...when they speak to us, all 3 of us, earlier their first instance was Hindi. Now they will only try and speak to us in English. That has improved. And they talk; they will not say one or two words - they talk, they try to converse." (P2:182:25.12)

"Last year, I used different medium of video and more videos and all that stuff, thinking that they will understand. But this year, I minimised that and I made them think first and made activities that will engage them rather than just looking at something and listening and not participating. This time I wanted them to engage more. So this time whatever activities did after your intervention, I think that sort of engaged them more." (P2:123:25.12)

The teacher places huge importance on having focused on communication in the classroom. She attributes, multiple times, the students' language development to the drill and hook activities she has done in addition to the group work (the second research question). She feels that the class became more interactive as well as engaged due to the breakdown of language she was using.

Purva has also started thinking more deeply about all the actions in the classroom. The common wisdom is to use more multi-media in the classroom to encourage learning. However, just playing videos cannot cause students to grow in content or language and the teacher recognises this and instead chooses activities where students are producing and using language and maths concepts – aligning with Swain's Pushed Output Hypothesis that was mentioned in the SLA theories. This has been done without any overt knowledge of the theory. However, CLIL and the 4C framework incorporates this aspect of Swain's work. Her belief and observation in the classroom, thus, aligns with existing theory on SLA and CLIL.

6.1.4 Culture

This section details how the teacher thinks about culture. It is perhaps worth noting, once again, that in the European context, culture refers to the culture of the language and culture of the subject.

Definition of culture

This is an important section for this study since the teacher defines culture differently than the theory.

"And culture - how will I push the value in my class." (P2:246:27.12)

The teacher's interpretation of culture is one of the biggest deviations from the theory. While the teacher rarely mentions the culture of the subject in the same context, she is aware of the culture of the subject and deals with it without any specific awareness towards it. This is evident when she talks about teaching history as opposed to teaching maths. In the current fields of CLIL theory, systemic functional linguistics (SFL) deals with the linguistic demands of different subjects. Lorenzo and Dalton-Puffer's article (Nikula et al., 2016) on "Historical literacy in CLIL: Telling the past in a second language" is an excellent example of the language demands of specific subjects.

Coyle (2001) elaborates on another way of looking at culture – learners' engagement in interactive and dialogic learning. Considering the space for students to talk and work with each other is quite limited in Indian classroom, this C can potentially offer space in daily lessons for students to build interpersonal skills as well as learn from each other. This aspect of culture will be dealt with the second research question since group-work is the space where students talk in this classroom.

Purva, however, re-interprets culture to mean classroom culture. In TFI terminology, classroom culture includes themes in the classroom (Panda warrior theme) and values of the classroom (ownership and empathy). Hence, the teacher uses culture from the CLIL framework to implement her goals for value development in the classroom and push her students higher on the SVS scale. While the other Cs were tools in the lesson, the lesson is a tool for growth in the fourth C, culture. In one sense, the teacher loses an opportunity to engage with content and language deeper through the culture of the subject. In another sense, the teacher adds to the 4C framework another nuanced way to talk about education in any classroom that goes beyond academic goals.

Culture in the planning process

Culture is not incidental. Much like the other Cs, it is planned.

"And in my head, I knew that I had to go towards a higher SVS (Student Vision Scale) goal." (P2:240:27.12)

"And then the second question 'How does the CLIL context allow for 'value addition'?' so, this thing has helped me. So what I try to do is: when lesson planning, I try to put my part - I try to connect it with ownership and empathy. If I can't connect immediately, what I do is, I give a problem sum or something related to empathy or ownership. So that the value is still there." (P2:224a:27.12)

"If we integrate culture in our every single lesson plan, what happens is over the period of time, the entire value - they sort of internalise that. Then the teacher doesn't have to do much effort. They will come out with the examples." (P2:387:27.12)

In the mid-year, the teacher started focusing on growth in the SVS as an important target in the class. Even before the school starts, she considers the values to be important but she uses CLIL framework as her space to better integrate these values into the classroom after the mid-year. She uses other mechanisms to monitor and support growth in value but uses the maths lesson plans as her space to talk about the values constantly.

Culture in execution

Culture plays out in many ways in and out of the classroom. This section looks at some of the ways it works in the maths classroom.

"We also made worksheet, I remember, the Diwali worksheet - one of the worksheet was on empathy. Word problem. And before that also my word problems had started." (P2:236:27.12)

"But in this culture bit also - the third one "What about otherness and self?" Now this sort of doesn't come immediately in the lesson while doing the lesson. This either comes in the morning meeting or the end of the day. Then they are doing EA tracker, where they track themselves. They automatically come to know, I used a magic word - yes or no. Ok. Did I help someone? Yes or no. How many people did I help? Why he couldn't help himself? Why did I have to come in? All that otherness and self-thing comes in when they are doing the EA (Exposure and access) tracker." (P2:223:27.12)

"From that we took it ahead by using small, small bits of these values in our lesson plans….whatever worksheet I made, I made sure that I used these two examples. Not just words - I used them in the context." (P2:213:27.12)

"Yes. The culture bit. I did the example of person helping thing...whatever I have written. I did the next day...not the same day. And I just randomly asked. When I used that action, they immediately said. Carryover and then Empathy." (P2:198:27.12)

The teacher integrates her values through using examples in word problems or through linking mathematical concept with values. For example, Purva talks about a lesson plan where she was teaching the concept of carryover. For explaining this term, she got three students to stand in the front and the students enacted the word by transferring books from one person to another. After the students understood the mathematical term, the teacher connected it to the value by asking which value was demonstrated when someone "carries" someone else's burden.

Role of culture in the classroom

Of the 4Cs, this one enthuses the teacher, as is evident in the quotation below. Although I have only coded instances of culture in maths classroom, it extends beyond the maths classroom.

"And I am very thankful to the culture part because it has actually helped us make value thing alive in our class. It would have just been on paper, on chart in class and it would have been 'the meaning of ownership is this. The meaning of empathy is this'. But how they have shown - it is the big thing." (P2:234:27.12)

"So this value thing - initially it started in class. Now it has gone outside the class also. Today, was that example. It is very fresh in my mind so I am saying that. Now the best part is it is transitioning out of class. We did not want them to do it in class only. We wanted them to do it with other non-TFI, with their relatives, cousins. They have started doing that which is very very nice." (P2:229:27.12)

"So this question is also very important to me. Q2 and Q3. Now focusing on the 3rd question, what has helped the kid is - they have become aware of what they do in class. That is a big achievement for us. They know that 'Ok. I hit Ali, it was a wrong action.' Earlier, they used to hit and they used to finish it. There was no realisation that I have hit and the other person might get hurt. That realisation was not there. But now slowly because of the value integration, this part has come in." (P2:224b:27.12)

"Once they question and answer each other, their sense of belongingness to each other increases. So that has sort of helped in creating the class culture." (P2:169:25.12)

Classroom culture plays an important role for the teacher in the classroom. This goes beyond the maths classroom – but the integration with the subject content helped her introduce the values in an authentic context. She elaborates using multiple examples of how using the maths lesson has caused the two values of empathy and ownership to be internalised. In TFI context, where goals are eval-

uated under three heads: academic, values and exposure & access, the 4C framework offers a way to integrate at least two of the goals and answer a commonly asked question by Fellows – how do I find the time to teach values, authentically, in the classroom?

6.1.5   CLIL 4C framework as a whole

After looking at each C individually, this section looks at the teacher's perspective on the 4C framework of CLIL as a whole. This section analyses the 4C framework from a zoomed out view. It also deals with aspects of integration that will be discussed later.

CLIL framework definition

Did the teacher understand the 4C? If yes, what exactly did she interpret it as? This section elaborates on these answers.

> "But I remembered the content, communication, thinking skills and culture, headings…I knew the content is what I am teaching in math. The objective….Communication - what will they do in their maths drill or what will I do as a hook - the activity. Thinking skill - what will I ask them to push their rigour. And culture - how will I push the value in my class. So this is how I had broken down CLIL for myself." (P2:241:27.12)

The teacher used the 4C framework by breaking down each term individually.

CLIL in planning process

This section deals with the lesson planning process using CLIL.

> "So I used to just keep the headings in my head and then I used to lesson plan….So these questions you have given me are more broken down. I used to keep these 4 things in my head and I used to keep the format of my lesson plan, I used to time it and finish it. This is how I used to lesson plan." (P2:241:27.12)

> "Sometimes, you tend to become blank. You just have a textbook in front of you and you have the format but sometimes you don't know how to go about it. So the flow sort of comes with these questions. So it gives me confidence that I can think in a particular way and I know how my thought process can flow." (P2:248:27.12)

> "Sometimes you are great at content, but if you are not using the right thinking skills and not asking the right questions, then your lesson goes for a toss." (P2:249:27.12)

The 'Planning tools for teachers by Coyle' provided to her as part of the study, was helpful to her, in the beginning, to look up example lesson plans. She did not read the theory but used the detailed lesson plans at the end of the toolkit to understand the 4C framework. She explored the toolkit further after our many conversations. In addition to the toolkit, she illustrates how the integration of the 4C leads to effective lessons.

CLIL in execution

Although the 4C framework was complex for her, in the beginning, this section demonstrates how she executed the framework.

"The way you sent me the lesson plan. I think I went into the habit of breaking down. I went into the habit of not speaking in Hindi until and unless the kid doesn't understood at all." (P2:97:22.12)

While the teacher demonstrates an understanding of many aspects of the CLIL framework, she does not recognise some of the other aspects of integration that she does in the classroom. The above quotation specifically highlights that her learning process was unconscious and came about after following lesson plans prepared by me earlier in August. Although she rarely verbalised some of the CLIL aspects, she implements it nevertheless.

Role in the classroom

This part of the analysis focuses on the CLIL 4C framework's role in the classroom and the effects it led to.

"As for me personally, because of framework, my thought process has become more clear." (P2:7:24.9)

"It was very broken down approach." (P2:275:24.9)

"Previously, before CLIL framework, in fact even last year, I would keep referring to my lesson plan each and every time. Lesson flow wasn't that fluid. Now I don't need to do that because I am very clear what I have to do next. I am more prepared and because of that the lesson flow is very smooth and kids are also engaged." (P2:260:24.9)

"Maths was only numbers and it was not language based. But now that I have incorporated language, I know that because of the language my kids have now started speaking in full sentences." (P2:14:24.9)

"My objective is like the comprehension in the MY thing was lesser. The comprehension thing and English language has to come in math also." (P2:67:19.12)

"If we do it, all the 4 aspects and only then our lesson becomes like a complete lesson. And I think I could do all the 4 is the reason that they are so independent on the second day itself." (P2:90:22.12)

"If I take that much effort, the results are tremendously good and I take that effort and I sit and that helps my thought process and I don't go into class with full confusion and I go with clarity and that comes across in the class and in the kids also." (P2:263:24.9)

"Because of continuum, the kids look forward to the lessons and because of that, I can actually in 45 minutes, I can do one objective very nicely. If I do one objective every day, I only have to revise the concept. That's it and I don't have to teach again the objective to the kids and that has saved time."(P2:267:24.9)

The teacher attributes the framework for specific improvements in her teaching practice including her thought process, the flow of the lesson, students' engagement, and language improvement in the classroom. She also mentions that lesson planning using the framework takes more time but she considers that worth it for the effects in the classroom. She also specifically demonstrates how the extra time spent planning has helped her save time in the long run since she the increased clarity in the classroom means she completes her objectives sooner, over a period of a week.

6.1.6 Struggles with implementation

No implementation can be painless. It has its own unique challenges. This section analyses what Purva struggled with. This can offer insight into implementation in similar contexts.

"Because I don't know whether I actually - now that you are saying I am using it, I will have to look back to see what I am using. I know I am using that visual thing + language thing which helps them but I don't know where it is in CLIL. I am using it indirectly but I don't know where - I don't know pinpointedly what I am using." (P2:89:22.12)

"Basically I did not break it up for my own self what CLIL is. I did not simplify it for my own self. Had I been doing that, I would have had concrete examples of CLIL every day to give you." (P2:92:22.12)

"I complicated it saying that this is a research study and XYZ part of it I have to do and I am not doing it. And I was, like, oh my god, am I aligning myself with the lesson plans which Swathi has given. Am I doing that or not doing that? All of that. I think I kept both those things separate. CLIL is a study and whatever we do in class is separate. Actually, it is the same every day." (P2:93:22.12)

"What more does CLIL have apart from the lesson plan structure?" (P2:329:22.12)

"So I thought I wasn't doing comprehensive lesson plan. So I thought I was lacking somewhere. So those simple things worked." (P2:98:22.12)

"Now I know, CLIL takes more time than normal lesson planning." (P2:262:24.9)

The teacher reveals her confusion with the 4C framework – her apparent uncertainty stems from her belief that any research project must be complex. The toolkit added to this uncertainty since it was perceived as a long document. During earlier implementation, the teacher had looked up examples from the planning tool and used them for lesson planning. But she found that the example lesson plans quite elaborate and she felt an inner tension that she did not have the time daily to prepare such comprehensive lesson plans.

Her other point of confusion arose from the lesson plan structure I gave her (P2:329:22.12). The lesson plan structure was from TFI. Although Purva used the lesson plan and implemented the 4C framework lessons, she did not have complete clarity on how 4C framework was used in the TFI lesson plan template. These doubts and confusions resulted in her in not being able to verbalise some aspects of CLIL she was using – but she could use them nonetheless, as is evident from her lesson plans and conversations.

6.1.7   Extending beyond maths classroom

This section analyses how the CLIL framework extends beyond the maths classroom. At the beginning of the research, this was not even considered as part of

the study. However, analysis of the teacher's conversations led to many codes that did not relate to the maths classroom. Since this could have a wider implication to the 4C framework, this has been discussed in this section.

For the teacher

"But I have become more confident in my thought process and not only in class, now my thought process is much better than when I talk to others also. So it's not just class related, it's related to how I speak or how I communicate with others also. It has helped me that way." (P2:295:27.12)
"With the HM, I started doing the same things that I was doing with my kids. With my kids, when I write the objective, I also write the outcome that I want. I used to approach the HM also the same way. I used to write what I expect." (P2:129:25.12)
"First, it was action and words. So 1 is bad - it has an action and a rating. So they know it is a bad thing and that is why I am getting a rating of 1. So it has everything - it has an action, it has a language and also a number." (P2:80:22.12)

The teacher indicates that her growth in confidence came from finding success while using the framework. For the teacher, it goes beyond the classroom – she is able to deal more confidently with peers and superiors. She uses the same 4C framework in talking to the Principal.

She also uses the framework unconsciously in many other tasks and activities of the classroom. In one of our conversations, she was excited about the start of the 'Exposure and Access Tracker' (EA tracker). She described in detail how she broke down the language for the ratings the students were to do every day. She clearly used the framework from CLIL – where the content was the tracker itself and the culture was intrinsic in the questions in the tracker. This extension of CLIL experiences from maths class to other interactions, can be considered as a justification of using action research as the collaborative nature of the research project gave her the space to become a more reflective teacher. A finding that is confirmed in at least one other action research project in CLIL by Dr. Banegas (2013).

For the students

"I also realised that during PT period, they went down and they said "Purva didi, we only arranged ourselves in ascending order" which was a huge sentence and arranging they knew, ascending they knew and also they now started using this in other didi's lessons also. They have started using full sentences and whatever structure 'what is' structure 'what is there in-between' structure, whatever we have taught, once they practice they use it everywhere and that is a good thing." (P2:17:24.9)

"So even during morning meetings also…gave them this structure of 'if I am Santa, I will give _____.' That structure was there and three points were there….So what we were thinking was that they will write 3 gifts or 3 words. But what they actually wrote was full sentence like 'I will give a gift to child.'…few MOs and LOs still write like 3 words. But there is a tremendous change in the way, HOs and higher MOs write." (P2:179:25.12)

"They have tried to think and they also speak. Yeah, even when they speak to us - all 3 of us - earlier their first instance was Hindi. Now they will only try and speak to us in English. That has improved. And they talk - they will not say one or two words. They talk, they try to converse." (P2:182:25.12)

The students use the language learnt in maths classroom – beyond the classroom as well. The teacher's quotations include instances of "maths" language used in physical training periods as well as in the morning and closing rituals. The teacher also feels that the improved language has provided the students' confidence to use the language with others.

6.1.8   Considerations not part of CLIL

During analysis, codes related to this section were somewhat confusing. The teacher kept mentioning things not part of CLIL – it was clear that these were important considerations for her. If CLIL has to be looked as a pedagogical approach and not just methodology, these codes gain importance.

"One of the major differences from previous year to this year - making rules and consequences and sticking to them. Being consistent with rules and consequences." (P2:330:25.12)

"What I realised was the kids are slow in understanding. It was not that they were completely unknowing of what is happening in the class. So, that was a relief for me. They know it is the time chapter. There is a gap of 5-5 minutes. Like they know what are the basic things happening in class. They just don't pick up as fast as the other kids." (P2:307:19.12)

"…Found out that two kids are struggling. Those kids are always struggling from B class - ones who got 0 and 1. I don't know what to do with those two kids." (P2:312:22.12)

"Because of that, last year, I did not how the kids will maintain their books." (P2:335:25.12)

"Last year, I did not take many assessments also. The weekly assessments were taken - the marks were given but the corrective measures wasn't discussed with them." (P2:336:25.12)

"I used to keep the format of my lesson plan, I used to time it and finish it. This is how I used to lesson plan." (P2:398:27.12)

Personal diary entry: I helped with two groups - can teacher manage 9 groups on her own? (P10:18:7.8)

"How to change lesson plans when something changes?" (P10:28:7.8)

When asked the question "What are the changes that you see from last year to this year?" the teacher went into a detailed introspection of everything she felt was working well in the class. Her answer to this question led to many aspects of the 4C framework but also to other considerations that were not part of the CLIL framework. Some of these are evident through her quotations above. Two of the important factors that have been pivotal to her are behaviour management and her consistency in all aspects of the classroom. There are other aspects of the classroom that are not directly addressed in the 4C: differentiation, practice, pacing in the classroom, class size management issues, assessments, format of lesson plans, administrative issues, etc.. While no one tool can address every single aspect of a classroom, from point of view of trustworthiness of this thesis, it is necessary to report all aspects that plagued the teacher in the classroom. This will be elaborated on, in the discussion section, since it provides an interesting viewpoint on the 4C framework as well as CLIL.

6.2   A teacher's perspective on group-work

The second research question "How is the 4C framework enhanced when situated in a socio-cultural context (group work) in maths classroom?" is analysed using the teacher's comments on group-work and the 4C framework. Purva specifically used simple group activities as revision/ review activities. Sometimes she used them as a hook to her lesson. This section starts with looking at how the

4C framework is present in the group-work and then goes on to analyse the teachers' views on the importance of the group-work in the maths classroom and conflicts with implementation.

6.2.1   Group-work and the 4Cs

This section will report on the analysis of how the 4Cs are present in the group activities. Each of the activity required the students to work in pairs or small groups. The students asked each other specific question related to maths and the other answered. Each one got a chance to question and answer. After the activity, the students wrote the answers in the book. For clarity, every quotation is labelled with the C from 4C that is obviously present. While culture has not been mentioned, it is implicit in working together.

"Some game they will play or they will use some cards or they are going to ask questions and answer in full sentences." (P2:45a:19.12) [Content, Communication]

"For example, I revised the entire time chapter in 7 minutes by only telling them to look at the clock and ask each other questions - which is the shortest hand? They will say "Hour hand is the shortest hand" (P2:45b:19.12) [Content, cognition, communication]

"I give random cards to them. I tell them that one person in the pair will add the cards and subtract the cards. So add horizontally and vertically and subtract horizontally and vertically. I just write the question 'add vertically' - and they will take the two cards and add. Each card has 3 digit number written." (P2:63:19.12) [Content]

"I remember I did the card activity, where I wrote random 3 digit number for these guys… I told them you will ask each other the number and number name and then you will write it. After that, I kept increasing. Next day I told them, ok now you have to arrange it…..you have to write which number will come before and after. " (P2:192:25.12) [Content, cognition, communication]

From lesson plan: One person makes a 3 digit number (528) and asks question 'What is the expanded form of this number?' Opposite person answers 500+20+8. (P4:20:22.8) [Content, communication]

From lesson plan: I'll give two cards to every person (See it to it that the number doesn't carry forward). You will think of two things and make a problem and give to your friend. Your friend will solve it. Model it with one team. (P5:15:26.8) [Content, communication, cognition]

The 4C can be seen integrated into these activities through a focus on both content and language development. The content is the base for the activity – the activity is a review of a maths topic. The cognition is two-fold – maths and English. The students are working at an appropriate level with maths with topics such as place

value, addition, subtraction and they are reviewing the maths topics by asking each other questions in English. They are being pushed to engage more deeply with the content. This is evident in the teacher statement *"I knew that if they write 5 ones are 5, 5 twos are 10, they have just mugged that up. I wouldn't be pushing their skill there....it's a game also. But they know that after 5, 10 is coming, after that is 15 and they have to do it till 60. So I made them play a game where they have to say clap and say 5 and the other person says 10, 15, like that. And there they were going beyond 12. 5X12 = 60. Actually, in tables, they learn, they only know 5 10s are, they know only till 10. But when they are doing that game, they went till 12, they went till 15, 5 15s are 75. They only did it, I did not do anything. So that way it pushes the rigour and it also sets the class for a particular chapter."* (P2:251:27.12) The communication aspect is clearly visible in the activities – the language support is offered by the teacher at the beginning of the activity. The students are talking to each other and working with each other. They also support and correct each other, if needed (as is evident from the student interviews). The students also write – thus improving their maths conventions. The culture is quite strong – the students work with each other. In the teacher's words *"Once they question and answer each other, their sense of belongingness to each other increases. So that has sort of helped in creating the class culture."* (P2:169:25.12)

6.2.2   Advantages of the group-work

Group-activities are not new to TFI or to Indian schools. Limited amount of group-work exists in every school. Through this research, an attempt was being made to introduce group-work in every maths lesson. The group activity could span a few minutes or substantial part of the class. The important focus of group-work was to give space for the students to talk and work with each other. Purva wanted her students to be able to work independently *of the teacher* and help each other instead. Once implemented, she found many advantages to the group activities that are discussed below.

"Because of your collaborative learning methods, we actually broke the class into different groups and that helped a lot." (P2:1:24.9)

"Earlier, they were getting confused between horizontally and vertically. That has decreased with the card activity." (P2:64:19.12)

"So since there are no one-word answers, when they are speaking also, they try to speak in full sentence. So, initially, they used to never open their mouths. They used to say in one word and finish it. Now they make an effort of asking the full question also - using the question words also. What, why, how, why is this happening? They will try and make this a full sentence." (P2:166:25.12)

"So this time whatever activities did after your intervention, I think that sort of engaged them more." (P2:123:25.12)

"It gives a chance for them to speak. And they like that." (P2:168:25.12)

"But that part of they talking in the start, that 15 minutes talk also has made a big difference. That is my point."(P2:195:25.12)

The teacher mentions the following advantages to using group work in the class:

- Language development – specifically talking in full sentences in English instead of just using some words

- Review and practice in maths leading to better understanding of mathematical concepts

- Better student engagement

- More "fun" classes

- Better class culture

- Better administration/logistics in the classroom

Since one of the first suggestions I gave in the classroom was to split the classroom into groups as presented in figure 19. The teachers took advantage of the new grouped structures.

FIGURE 19: Picture of the left is before class was grouped. The picture on right is with groups.

The groups were necessary to be able to do group activities as part of CLIL but they also provided other advantages to the classroom in terms of administrative issues. The "super pandas" who were group leaders checked homework, distributed materials and monitored each other. Grouping together also gave the teacher space to walk around the class – she could now reach the last benches. These benefits were incidental and not related to CLIL directly but they feed into better classroom management as a whole and hence the teaching and learning processes.

Unlike many recommendations from learning theories and SLA theories, the students are not producing original content nor are they discovering maths on their own in these group activities. The teacher structured the activities around reviewing the concepts and gave the opportunity to speak structured sentences. While this provides some amount of scaffolding for both, maths and English, the entire growth in English and maths that she attributes to CLIL cannot be attributed to the 4C framework alone but also the general classroom structures as well as the other teachers' contribution in the classroom. However, considering the fact that students rarely have any opportunity to interact in classrooms, the confidence to speak in the language could be presumed to have come from the opportunities afforded in the CLIL classroom.

Similarly, the activities in maths may seem simplistic and teacher-driven, but in a classroom of 53 students, it is not possible for the teacher to check with every student about their progress or understanding. The group activities provide a space for the students to practice in groups – the peers could help clear

any misconceptions and the review of the core concepts could possibly have helped students internalise the maths topics.

6.2.3   Conflicts in implementation

One of the first few talks Purva and I had while inserting group-work in daily maths lessons concerned the difficulties of group-work. When we started out, there were two logistical issues to start group-work - how to change the classroom space to accomodate group-work and how to structure the teams. Purva showed great fortitude in dealing with these – especially when the Principal opposed the movement of the benches. For this reason, she had to ensure that the benches would be changed back to original position every evening. The complaint was then that the constant movement of benches could cause damages. With help of the other two teachers, they managed to convince the Principal of the need to rearrange the classroom space. The other two teachers also helped in structuring of teams. These logistical issues were sorted over a period of time but other issues with group-work caused new conflicts for Purva and they are outlined below.

"Only for now, if school tells us there is admin work, I have a small time frame for lectures and that is the time that I cut down on group activities and I teach them the objective and they practice." (P2:13:24.9)

"When I told him that it is very important for these kids to engage and collaborate, he was like give it a shot and now when he comes to the class he knows that it is noisier than the other classes and he also knows that the noise is not noise, it is collaborative work." (P2:40:24.9)

"Collaborative group work - in between, I had stopped that because in my head it was like - it was waste of time."(P2:163:25.12)

"So in my head, it was - they are making a lot of noise. How many people are learning I can't interact." (P2:165:25.12)

"So in collaborative structure, I don't do very regularly. I think that 3-4 times a week is fine. It has not become a part of me completely." (P2:167:25.12)

"I still need to be snappy about the group activity. I need a little more time." (P2:170:25.12)

"We have changed our timetables also. So I get a little lesser time. So I have this fear of what if I cannot finish this lesson? Because I am giving time to collaborative group activity. So that fear keeps lingering in my head. So I sort of stick to 3 times a week. That's it." (P2: 171:25.12)

"My myth of the collaborative group learning will take a lot of time - that has broken. But if I stick to this structure it is faster. So that is slowly coming in. That is taking time." (P2:173: 25.12)

"I have started seeing value only when I have consistently done it." (P2:174:25.12)

"So I know that if those high rigour questions, I have to do, NCERT. They don't get solved. Because it takes 15 minutes in this only. First they will ask, they will do the activity and then they will settle down. That process sort of takes more time." (P2:185:25.12)

Personal diary entry: The class was chaotic during group work but groups were practising phrases without reminder with some errors. (P10:32:8.8)

Personal diary entry: Teacher intervened for group work and changed to make it more structured. It went well. (P10:34:8.8)

Two of the biggest obstacles the teacher faced in implementing group work were time and noise. The teacher went back and forth about the use of group work in the class due to these reasons. Figure 20 illustrates this.

August-September	October-November	December - January
• Positive about group-work • Commented that noise was not a problem	• Negative about group-work • "Waste of time"	• Cautiously optimistic about group-work • Believes it helps if done consistently • Doing it 2-3 times a week
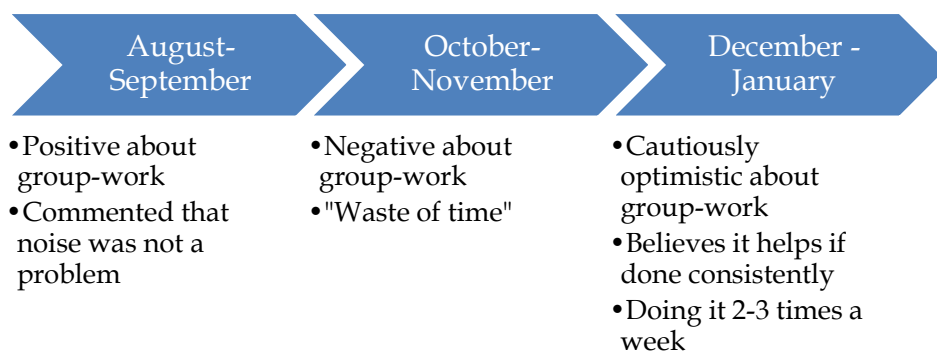
FIGURE 20: Purva's changing views on group-work

In the conversation in September, she was happy with the group work and she also mentioned that the noise was not much a problem. She also mentioned about the conversation she had with the Principal of the necessity to have students talk with each other. While she seemed positive in her conversation, my personal diary entries from that time reflect on the struggle she was facing to manage the classroom. But this was quite typical of introducing group work – I had warned her that it takes time to adjust and manage.

In the beginning, two teachers shared half a day in each classroom. Some of the second language subjects had not started yet. Hence, Purva had a longer time in each class and she was able to do group activities more frequently. As time went on, the school started insisting on sticking to a specific timetable, allocating

30 minutes to each subject. After mid-year, the three teachers took one subject each and the other subject teachers started claiming their period. The time for each subject became less – hence, Purva felt quite disheartened to use group work in every class. Also, as her expectations from students went up a level, she felt it difficult to monitor multiple groups and valued the writing process more to ensure that maths conventions were practised. Hence, she again felt "*it was a waste of time*". During one of our check-in telephone calls, she mentioned that she had stopped doing this altogether because of the time pressure. That is when I pointed out how much the kids had liked it and also mentioned her own views at the beginning. We discussed possibilities to do shorter activities that were quicker to monitor. She decided to stick to a simpler structure and restarted group activities. When we spoke again in December, she was again positive about the group-work – although she used it 3-4 times a week and not every day.

The tension she faces with group-work is her feeling that it is not a high "rigour" activity. She feels it competes with time with challenging questions that she does from the NCERT syllabus. This tension is understandable in the light of value placed on written work in exams rather than oral work. The language development is necessary only to the extent that the students can comprehend their exam papers and answer questions properly.

The time pressure is also keenly felt especially in the months of November-December since there are other extra-curricular activities that the teacher has to participate in. Completing the syllabus is more important at this point – new content is taught quickly. Review activities reduce during this time. The many demands placed on the teacher and the tension she feels at this point can be understood in this context.

7   DISCUSSION

This research has aimed to understand a teacher's perspective on the 4C framework of CLIL in an Indian Grade 3 classroom. The two questions it attempted to answer were 1. How does the 4C framework play out in this specific context and 2. How is the 4C framework enhanced through group-work. The second question assumed that the 4C framework is enhanced due to the group-work drawing on the multitude of papers published on learning theories as well as SLA theories on which the 4C framework is based. However, what issues arise when implementing group work within the Indian context adds a novel aspect to this question. In this section, the focus is to see how far these two questions were answered and summarise the various conflicts, tensions and perspectives this research study has raised.

7.1   Summary of results

In answer to the first research question, the teacher has mentioned over and over again how the 4C framework improved her classroom practices. Personally, she benefited from the lesson plan structure creating more structured, effective and high rigour lessons. She found it easier to maintain class behaviour, keep students engaged, increase their English oral skills and maths knowledge and perceptibly make her students more empathetic, responsible and independent. This process made her more confident as a teacher and affected the way she held conversations with the Principal and other peers. The 4C framework did not remain in the maths classroom – it encompassed all her interactions with students. One of the examples she enthusiastically describes is the EA tracker.

In answer to the second research question on group-work, the teacher again mentions its benefits in giving the students a space to talk and also making lessons more fun. Group-work activities as designed by the teacher integrates content and language and offers space for enhancing both. Even in some low rigour lessons, group-work increases the rigour of the whole lesson due to the language

practice. At the end of the year, students exhibited high growth in maths results and substantial growth in English levels as well (from TFI trackers). Purva informed me that this growth was the second highest in Mumbai city among all TFI classrooms for which she and her co-Fellows were felicitated.

Can the above results be attributed to the 4C framework completely? From the teacher's perspective, she openly acknowledges my interventions and the lesson plan structure helped her. However, as noted before, my interventions spanned other areas and the lesson plan structure was from TFI that incorporated the 4C framework. The flow of the lesson came from TFI lesson plan structure – the new material introduction followed by guided practice and then the independent practice. So Purva's comments and the final maths results need to be interpreted cautiously. On the other hand, the Planning tools (by Coyle) was provided to her and she specifically planned lessons from it in the beginning and also looked at it later for the thinking questions. I also spoke to her multiple times about CLIL – as evidenced in our conversation. So while her whole scale enthusiasm could include other reasons, CLIL plays a major role in her positive feelings about the classroom.

The lessons were definitely a departure from the normal Indian classroom lessons. While still teacher-centred, the students participated and were offered space to work with each other. Language practice and values were integrated in maths lessons – another departure from a standard lesson. Hence, the 4C framework brought about observable change in the classroom lesson execution. The increased engagement of the students are borne out by the student interviews.

7.2   Conflicts

The teacher faced two major conflicts in the class – oral group-work versus high rigour written lessons and being unable to articulate the ways in which she provides language support to the students.

Written work is of utmost important in Indian classrooms since all the year-end exams are writing based. Note books are also checked by the Principal and

sometimes by the District Education Officer. Considering the importance placed on written work, it is not surprising that the teacher faces conflict with this aspect of the classroom. The other valid reason for her to focus on written work is the subject itself. Maths has specific conventions that needs to be followed. Considering the context, the oral group activities takes away valuable classroom time from written practice and the teacher has to balance the two carefully considering the benefits of group-work. Due to her inexperience and a big class size, it is not surprising that she struggled with managing group work. She incorporated writing into group work activities as well and that helped her balance the two conflicting needs of the classroom.

One of the possible reasons for her inability to articulate language support she offers in the classroom could be the steep learning curve she has in TFI. TFI has multiple modes of support – from the PM who observed her lessons, the bi-weekly training and peer observations. Often teachers in TFI absorb the information provided to them, implement it in the class, observe whether it works and then either make it a permanent feature or discard it. In a month, the teacher may receive many such suggestions and quickly implements and discards new ideas. This may make it difficult for her to remember the source of the ideas every time. So Purva learnt about using actions in the classroom as language support from a training the previous year and then she heard it from other peers as well (P2:139:25.12). She incorporated it in the classroom as part of the 4C framework but once it worked and she internalised using it, she is not able to articulate what comes as part of the 4C framework and what comes from other sources. Also, since she considers the 4C framework a research project and hence, inherently complex (P2:98:22.12), the simple ideas she uses does not "fit" with the 4C framework. This could have been mitigated if I had been able to better discuss the 4C framework with the teacher in the initial stages. I could have also decided to send her simplified toolkit and provided clarifications while she was making lesson plans for the first time. These limitations could have been caused due to my relative inexperience in the required role.

7.3   **Other considerations**

As mentioned in the literature review, CLIL has a strong pedagogical basis which means that in an Indian context, especially, it can change the dynamics of the classroom quite substantially as it influences the way the teacher and students behave in the classroom. The 4C framework, thus, needs to address broad concerns in a classroom. The teacher brings out the major concerns she faces in the classroom (see section 6.1.8) and in discussing those concerns and CLIL, it may be possible to have a deeper understanding of CLIL and the 4C framework and investigate if this implementation of CLIL has pedagogically changed the classroom and teacher-student relationship.

The major concern of the teacher, at least in the beginning was behaviour management. This area is of importance in an Indian classroom due to the perception of a disciplined classroom being a quiet classroom (Singal, 2008). In low-income schools, the behaviour could derail studies for the whole year especially if the teacher is considered soft. From Purva's own personal experience in her first year of teaching, this was a major concern area for her. It is commonly known that behaviour management is linked to engaging, high rigour lessons. The teacher mentions how the 4C framework helps her design engaging lessons and she attributes better behaviour in the class to her lessons as well as the smooth flow of the lessons (P2:20:24.9 and P2:260:24.9).

She also mentions consistency as her focus in the classroom. This is directly related to the teacher's personality as well as her own planning skills. The 4C framework aided her in this as well since she started to make lessons for a whole week at a time. As she knew the 4C framework takes time to plan (P2:262:24.9), she consistently spent time in planning beforehand and could maintain consistency in the classroom.

Purva also, like all teachers, struggled with differentiation, adequate practice in the classroom and pacing of lessons. With differentiation, she discovered that the lesson breakdown in simple terms using actions, especially, helped her

lower order students. She mentions that these students were not completely unaware of what was happening in the classroom but just needed more practice (P2:307:19.12). She also set up systems in the groups itself for helping the lower order students through peer support. The students also mentioned this in the student interview – the group-work gave them space to clear their doubts from their friends. Additionally, the values of empathy and ownership pushed the students to help each other in the classroom. While this could not have been all the support that the students needed, the 4C framework can offer support structures for differentiation. Group-work offers space for additional practice in the class as mentioned by teacher multiple times. The pacing of lessons is partially aided by the weekly lesson planning. But time is an aspect the teacher has to plan in addition to the 4C.

Class size is a major barrier to learning in this classroom. The 4C framework partially helps here as well. In addition to students helping each other, the teacher is also able to walk around the class and observe quickly which students need additional help.

Thus, the 4C framework can address, at least partially, many needs of the teacher in the classroom and as per Purva it did noticeably change the classroom and the relationships.

7.4   Adequacy of the 4C framework

While the previous discussions have been centred on the framework as a whole, the individual elements of this framework play out differently in the classroom than anticipated. Some of the tensions are highlighted below.

7.4.1   Content

Content is the starting point for any lesson and it is present in all lessons. The aspect of content that caused Purva some problems was the syllabus to be followed in the classroom. She was conflicted between the NCERT syllabus and the SSC syllabus. The former was recommended by TFI and latter was a requirement

of the school. TFI teachers face this struggle since it means being accountable to two different taskmasters and many times, the integration of the two is not possible. This is not a 4C framework issue – this tension exists due to a very specific context. Eventually, Purva made a choice to follow the NCERT syllabus including question patterns. Once, she resolved this tension, planning content became easier. Hence, for this C to work – the eventual outcome in terms of syllabus, textbooks to be followed and the outcome has to be clear. This may seem like an obvious conclusion.

7.4.2   Cognition

As noted before, cognition and in this context, high rigour lessons directly conflicted with the time needed for group-work activities. Maths is considered as an individual activity and the writing demands of maths seemed to contradict with the nature of group activities. Purva recognised the value-addition of group-activities, but due to the constraint of time, she split time between independent 'high-rigour' practice and group-work.

7.4.3   Communication

One of the major conflicts in communication has been discussed before – teacher's inability to articulate how she is breaking down the lesson and providing language support. The other aspects of communication that this study raises are also interesting.

One of the care that the teacher takes while planning is less talk and maximising the students' actions. Teachers generally use talk to test a student's knowledge or to test for curricular goal achievement (Hayes & Matusov, 2005; Myhill, 2006). Teachers dominate classroom talk, especially in India (Alexander, 2001). This teacher's attempts to minimise teacher talk and increase students' participation could be considered as a conscious attempt to break this pattern. This is also encouraged by TFI. In restructuring the class to minimise talk, the teacher is also able to choose her words carefully and build more language support in what she does speak. The class did not automatically convert into a student-led

classroom or even a dialogic one, but the students gained additional practice time.

Purva used to make lesson plans that I felt could be improved on. Just like the lesson plans I made were improved by my CLIL teacher. In this sense, lesson planning is a relative process – there can be no absolute in lesson plans. The lesson plans also have to consider local context as well as the goals of the different stakeholders in the process. This creates some measure of doubt in the research process and the practice in the classroom. Even by using a definite framework such as the 4C, the classroom results could be vastly different since the teachers planning the lessons are completely different. Their belief system, as well as their approach to the classroom, is different. How does the 4C framework help in minimising these differences or at least creating some measure of effective lessons? The 4C framework, especially, in the C for communication is subjective. The socio-cultural context provides for interactive and engaging lessons and the second C, cognition, raises the bar for high rigour lessons. However, due to the subjectivity of what constitutes adequate language support, the 4C framework is still quite subjective. This can be seen in this research by the teacher's inability to articulate language support. If not for video recordings of the classroom and examples from outside the maths classroom, this research would have questioned the teacher's understanding of the communication aspect of the 4C. Can some kind of scale be designed to strengthen execution of 4C based lesson plans? One such measure could be 'talk-based pedagogical model for CLIL' described by J. Moate (2011). This should definitely be considered in future research.

7.4.4   Culture

Since this is the biggest deviation from theory, this aspect raised many questions during this research process. Why is culture of the language or subject important to the 4C framework? As mentioned before, culture was a part of the 4C due to the context of where the 4C was developed. In the context of European language goals, it was not enough to know an additional language alone, the goal was to increase intercultural understanding and tolerance. Language was a means as

well as a tool to achieve this goal. Every subject has its own culture and specific approach. Especially while learning a subject in a foreign or second language, this culture must be transmitted so that students are apprenticed into the community of the subject. Culture, thus, is a valuable addition to the framework in the European context.

However, in the Indian English medium context, culture has to be reinterpreted else its presence will be both artificial and forced. Here, Coyle's (2010) imagining of culture as culture of the classroom where learners have space to engage in interactive and dialogic learning fits better. This is the understanding with which I approached the classroom. However, based on the teacher's reinterpretation of culture as values, it becomes necessary to look in detail at its effect on the 4C framework.

What would happen if culture did not exist in the 4C framework in the Indian context? There could be two scenarios – the teacher uses the socio-cultural paradigm as a consideration in the third C of communication as Coyle (2010) insists is implied. The second scenario would be where the teacher ignores the socio-cultural paradigm altogether. Both these scenarios can be easily imagined and the results could be inferenced from the findings of this research study. In the first scenario, the teacher would continue to execute academic lessons and continue with group-work activities and the academic gains could have continued. However, the classroom management and classroom behaviour could still have caused problems for the teacher. This can be inferenced from the many incidents she narrates in the classroom and how the growth in values reduced the incidents (students hitting each other, not using any polite language, making noise in the classroom, etc.). In the second scenario, the language growth could have seriously been hampered as implied by the teacher. In both scenarios, there is a discernible loss to the classroom.

My interpretation is that the teacher would have been unhappy in a classroom where only academic goals were important. Purva was exceptionally enthusiastic when talking about the growth of the student's values and their empathy towards each other. Even in later, unrecorded telephone calls, she informed

me about how well her students behaved and how much they grew in the two values. She narrated an incident where her students who participated in a Mumbai wide competition, led a group of children from different schools, to make thank-you cards for the organisers and trainers. Surely, that is a worthwhile goal to pursue in education.

7.4.5   Integration of content and language

When I started on my CLIL course in September 2015, I thought of content and language integration as a watermelon. The seeds of language were embedded in the content. Balance between the two was necessary to pursue the dual goal of CLIL. The teacher, at all moments, made a choice between content and language and walked a fine line between both. For me, this was an added tension to be considered when making lesson plans using the 4C framework. My initial lesson plans for the class required some thought and I obsessed over the thinking questions provided in the Planning tools (by Coyle) to ensure a proper balance between the two.

However, through this project, through seeing Purva execute lessons and analysing her conversations and lesson plans, my understanding of integration changed. The group-work activities, often, seemed to me, to be an ideal integration of the 4C – content and language balanced well with the cultural values. During the analysis phase, when I tried to separate the two and point them out separately, I failed. It took me a while to realise that the reason I could not separate the two was because my metaphor was wrong. Integration seems to be achieved when the two blend together and do not remain discreet. This changed understanding brings about a different lens through which to analyse the lesson plans and the classroom interactions. A well-executed integration is when content and language are inseparable – support provided continuously for both. This, of course, may seem idyllic especially considering the challenges related to collaboration between language and content teacher (Nikula et al., 2016). However, I hope this research has offered some insights on the integration aspect as well.

8   CONCLUSION

8.1   Contribution

This action research project by its very nature was used in the classroom right away. The teacher worked with the 4C framework in the way she found beneficial and this report captures some of that. The teacher and the student, thus, contributed to the academic and non-academic goals of the classroom.

This report will be shared with TFI when it is accepted for publication. Since the context of the study is applicable to TFI, it is assumed that interested Fellows can apply the findings of this research to the classroom. Resources such as the 'Planning tools for teachers' by Coyle and CLIL reading list can be shared with interested Fellows.

This research also has potential to contribute directly to all English medium Indian classrooms especially in low income and medium income school. Every teacher will apply the 4C framework in a different way – the nature of 4C lends itself to flexibility. This study can provide insights on ways to apply the 4C framework.

Since there are few research papers published using the 4C framework, this research can contribute to the wider European CLIL context as well. While some parts of this research are quite contextual, it can add to a broader understanding of CLIL and the 4C framework especially as a theoretical framework in CLIL is current area of interest in CLIL studies. This study can also open avenues for teachers struggling to provide a more holistic education based on values.

8.2   Limitations of the study

Personally, I struggled with the epistemology of the study. Coming from a more positivist background, the sociocultural nature of action research and qualitative content analysis was a challenge. I found it practical to use action research – a methodology that I felt fit in this context, but it was a challenge for me to not take

a more positivist stance during analysis. One of the major limitations, according to me, is that this struggle is quite apparent in this report.

In the same vein, the influence of others in this research can be considered a limitation. Purva had one year to work with these students – creating a "lab" condition for purpose of my research study made no sense. This meant that any suggestion for improvements she received from her PM, peers and training were used in the classroom. From a positivist stance, then, the findings of this research even the teacher's comments cannot be considered conclusive. However, considering the TFI context, the additional support is available to all Fellows. Findings of this research can be considered relevant and authentic to TFI.

This research report also looked at a narrow part of the dataset. With a more experienced researcher, all the data together could have provided a richer picture of the classroom and the teacher's actions. My inexperience could have also distorted the execution of the project or even contributed to wrong impressions of the 4C framework in the teacher's mind.

I have also previously discussed that some part of the teacher's positive talk about CLIL can be considered as an extension of her positive feelings towards the help I provided in the classroom. The language growth in the class can also be attributed to other factors such as the English teacher's contribution or the strict enforcement of talking in English at all times or even as part of the student's natural growth. Maths growth can also be explained by help from outside the school (private tutors) though this is unlikely since the tutors tend to follow the SSC curriculum and the tests were from NCERT curriculum. Student's growth can also be attributed to the many extra classes and support provided by the teachers throughout the year – an aspect that was considered but not covered in the scope of this research.

8.3   Future direction

As a qualitative study, this research study cannot be applied directly. More studies using the 4C framework are needed in different contexts across different age-

groups. The 4C framework, in addition, needs some kind of scale to gauge the quality of lessons.

In future studies, I would also be interested to see a discourse analysis based research in a classroom. This could be necessary to understand the third C, communication, and how it works in a classroom. It could also offer insights into how language *through* learning works in the classroom – how students appropriate language learnt in school and extend it beyond the subject where it was learnt.

I hope that this research can contribute beyond the TFI context and open lines of enquiry that will deepen the understanding of content and language integration.

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APPENDIX

Appendix 1: **Maths curriculum for third grade**. NCERT. Retrieved from

http://www.ncert.nic.in/rightside/links/syllabus.html on 17 Jun 2017

Geometry (16 hrs.)
SHAPES & SPATIAL UNDERSTANDING
• Creates shapes through paper folding, paper cutting.
• Identifies 2-D shapes
• Describes the various 2-D shapes by counting their sides, corners and diagonals.
• Makes shapes on the dot-grid using straight lines and curves.
• Creates shapes using tangram pieces.
• Matches the properties of two 2-D shapes by observing their sides and corners (vertices).
• Tiles a given region using a tile of a given shape.
• Distinguishes between shapes that tile and that do not tile.
• Intuitive idea of a map. Reads simple maps (not necessarily scaled)
• Draws some 3D-objects.

Numbers (42 hrs.)
NUMBER SEQUENCE UPTO 1000
• Reads and writes 3-digit numbers.
• Expands a number w.r.t. place values.
• Counts in different ways – starting from any number
Compares numbers.
• Forms greatest and smallest numbers using given digits.
ADDITION AND SUBTRACTION
• Adds and subtracts numbers by writing them vertically in the following two cases:
– without regrouping.
– with regrouping.
• Uses the place value in standard algorithm of addition and subtraction.
• Solves addition and subtraction problems in different situations presented through pictures and stories.
• Frames problems for addition and subtraction facts.
• Estimates the sum of, and difference between, two given numbers.
MULTIPLICATION
• Explains the meaning of multiplication (as repeated addition).
• Identifies the sign of multiplication.
• Constructs the multiplication tables of 2, 3, 4, 5 and 10
• Uses multiplication facts in situations.
• Multiplies two digit numbers using standard algorithm and Lattice multiplication algorithm.
DIVISION
• Explains the meaning of division from context of equal grouping and sharing.
• Relates division with multiplication.
• Completes division facts:
– by grouping
– by using multiplication tables
MENTAL ARITHMETIC
• Adds and subtracts single digit numbers and two digit numbers mentally.
• Doubles two digit numbers mentally (result not exceeding two digits).

Money (5 hrs.)
• Converts Rupee. to Paise using play money.
• Adds and subtracts amounts using column addition, and subtraction without regrouping.

• Makes rate charts and bills.

Measurement (21 hrs.)

LENGTH

• Appreciates the need for a standard unit.
• Measures length using appropriate standard units of length by choosing between centimetres. and metres.
• Estimates the length of given object in standard units and verifies by measuring.
• Uses a ruler
• Relates centimetre. and metre.

WEIGHT

• Weighs objects using non standard Units.
• Appreciates the conservation of weight.

VOLUME

• Measures and compares the capacity of different containers in terms of non-standard units.
• Appreciates the conservation of volume.

TIME

• Reads a calendar to find a particular day and date.
• Reads the time correct to the hour.
• Sequences the events chronologically.

Data Handling (6 hrs.)

• Records data using tally marks.
• Collects data and represents in terms of pictograph choosing appropriate scale and unit for display through pictographs.
• Draws conclusions from the data by discussing with the teacher.

Patterns (6 hrs.)

• Identifies simple symmetrical shapes and patterns.
• Makes patterns and designs from straight lines and other geometrical shapes.
• Identifies patterns in the numerals for odd and even numbers and in adding odd and even numbers.
• Partitions a number in different ways.
• Identifies patterns in his surroundings
• Identifies patterns in multiplication with, and dividing by 10s.

Appendix 2: **Student Vision Scale (SVS) from TFI**

STUDENT VISION SCALE

STUDENT VISION ASPECTS	1 NO LEARNING	2 LIMITED LEARNING	3 BASIC LEARNING	4 SIGNIFICANT LEARNING	5 PATH CHANGING LEARNING
ACADEMIC ACHIEVEMENT The knowledge and skills our students need to be on the path of expanded opportunity	No aspects present	Some aspects present, but not integrated	All aspects present, but not integrated	All aspects present, and some integrated	All aspects present, and integrated
CULTURE OF ACHIEVEMENT	are destructive	are apathetic	are on task	are interested and hardworking	are passionate and joyful
RIGOUR	are not learning	are confused	can factually recall and learn challenging procedural content	can analyse and apply challenging content	can evaluate, synthesize and create challenging content
VALUES AND MINDSETS The values and mindsets that shape how our students choose to operate in the world and contribute to making it better	cannot articulate class values	can articulate class values and know what they mean	can demonstrate some class values with teacher reinforcement	can demonstrate class values with teacher reinforcement	can independently demonstrate class values in and out of class
ACCESS AND EXPOSURE The experiences that will lead our children to discovering their strengths and attaining the aspirations of their choice	cannot articulate own strengths, goals, challenges and opportunities in the community and the world around	can vaguely articulate own strengths, goals, challenges and opportunities in the community and the world around	can articulate own strengths, goals, challenges and opportunities in the community and the world around	start to leverage own strengths and goals, sometimes solve challenges and sometimes leverage opportunities in the community and the world around	operate using own strengths and goals, often solve challenges and leverage opportunities in the community and the world around

STUDENTS

Appendix 3: **Maths lesson plan template from TFI**

5-Step Lesson Plan

Do not write in the grey portions.

<table>
<tr><td rowspan="8">VISION-SETTING</td><td colspan="2">NAME</td><td>DAY, DATE</td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td colspan="2">OBJECTIVE
What will your students be able to do?</td><td>ASSESSMENT STANDARD
To which Assessment Standard does the objective connect?</td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td colspan="3">ASSESSMENT
How will you know whether your students have made progress toward the objective
How and when will you assess mastery?</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">KEY POINTS.
What three to five key points will you emphasize?</td></tr>
<tr><td colspan="3">What (Vocabulary, Notation, Concept):
    •
How (Steps):
    1.
Why:
    •</td></tr>
</table>

MATERIALS:	•

OPENING (__ min.)
How will you communicate what is about to happen? How will you communicate how it will happen? How will you communicate its importance? How will you communicate connections to previous lessons? How will you engage students and capture their interest?

Type Opening here.

INTRODUCTION OF NEW MATERIAL (__ min.)
What key points will you emphasize and reiterate? How will you ensure that students actively take-in information? How will you vary your approach to make information accessible to all students? Which potential misunderstandings will you anticipate? Why will students be engaged/interested?

Type INM here.

GUIDED PRACTICE (__ min.)
How will you clearly state and model behavioral expectations? How will you ensure that all students have multiple opportunities to practice? How will you scaffold practice exercises from easy to hard? How will you monitor and correct student performance? Why will students be engaged/interested?

Type GP here.

INDEPENDENT PRACTICE (__ min.)

How will you clearly state and model behavioral expectations? In what ways will students attempt to demonstrate independent mastery of the objective? How will you provide opportunities for extension? Why will students be engaged/interested?

Type IP here.

CLOSING (_ min.)
How will students summarize what they learned? How will students be asked to state the significance of what they learned? How will you provide all students with opportunities to demonstrate mastery of the objective? Why will students be engaged/interested?

Type Closing here.

HOMEWORK (if appropriate)	

Appendix 4 **Planning tools for teachers by Do Coyle (2005).** Retrieved from

http://www.unifg.it/sites/default/files/allegatiparagrafo/20-01-
2014/coyle_clil_planningtool_kit.pdf

Planning and Monitoring CLIL

Presenting 3 Tools for Teachers

Introduction

Successful Content and Language Integrated Learning requires teachers to engage in alternative ways of planning their teaching for effective learning. CLIL is not language teaching enhanced by a wider range of content. Neither is it content teaching translated in a different language (code) from the mother tongue. However, in adopting a CLIL approach, there will be elements of both language and subject teaching and learning which are specific to the CLIL classroom as well as emerging CLIL methodologies.

1. CLIL Models

CLIL is flexible and there are many different models depending on a range of contextual factors. These differences are best seen on a continuum where the learning focus and outcomes differ according to the model adopted. Some examples are as follows:

- Subject topic/syllabus adapted for teaching in the target language to explore the subject from a different perspective whilst improving foreign language skills ie teaching in the target language to explore the subject from different perspectives whilst developing specific foreign language skills. Example: Human Geography through the medium of French (study of Senegal);
- Cross curricular project which involves both language teachers and subject teachers planning together. An example might be a study on different aspects of eco-citizenship or the global village, fair trade or war & peace;
- Language teachers developing a more content type approach to a theme. This might include taking a typical topic such as house and home and carrying out a comparative study between house and home in an African country and in an English-speaking western culture;
- Where it is possible to re-conceptualise the curriculum in an integrated way, then CLIL might consist of say the study of 'water' in a foreign language which is investigated from different perspectives such as scientific, geographical, historical, current catastrophes, water shortages, water for leisure, poetry, art, drama and music, linking wherever possible language to space and place;
- A global project such as those organised by *Science Across the World*, where identical topics (eg global warming, renewable energy, what we eat, road safety) are studied by learners in different countries and in different languages and then the results compared.

There is no single model for CLIL. Different models all share the common founding principle that in some way the content and the language learning are integrated.

KEY ISSUES

In your own context, which model for CLIL do you use?

Who is involved in the teaching and the learning?

Who is involved in the planning?

What are the desired learning outcomes?

How can we as teachers account for the quality of the learning experience?

2.0 CLIL Topic Planning

What is meant by integrating language and content? Does it mean that there are parallel teaching aims and that to satisfy both will involve some complex management between them or even some good luck?

2.1 Teaching aims/objectives and learning outcomes

Whatever kind of model, it is fundamental to CLIL that the content of the topic, project, theme, syllabus leads the way. This means that:

The content is the starting point of the planning process.

However in considering the content, it is useful to think of the project in two ways: the teaching aims/objectives and the learning outcomes.

Teaching aims and objectives are what the teacher intends to do - the knowledge, skills and understanding which are intended to be taught and developed.

The learning outcomes focus on what it is we want learners to be able to do and understand at the end of the teaching unit.

An example:

- The aim of this unit is to study specific aspects of water through the medium of English
- The teaching objectives are: to understand the water cycle, to raise awareness of the effects of climate and climate change on water supply, to explore ways of saving water
- The learning outcomes
  By the end of this unit learners will be able to:

    give a small-group power point presentation explaining the water cycle;

    discuss the concept of drought in a range of countries and create a policy for reducing its effects;

    design a water saving poster and questionnaire to work with data on how the class saves water;

    discuss and evaluate how to improve saving.

KEY ISSUES

Define the teaching aim/s (general) and objectives (specific) of your topic. What are the learning outcomes?

What processes did you have to go through to identify these?

How easy is this to do? What are the issues?

2.2 <u>A CLIL topic or project planning framework: 4Cs curriculum</u>

There are four guiding principles upon which a CLIL programme can be built.

1. **Content-** At the heart of the learning process lie successful content or thematic learning and the acquisition of knowledge, skills and understanding. Content is the subject or the project theme.
2. **Communication-** Language is a conduit for communication and for learning. The formula *learning to use language and using language to learn* is applicable here. Communication goes beyond the grammar system. It involves learners in <u>language using</u> in a way which is different from language learning lessons (of course CLIL does involve learners in learning language too but in a different way).
3. **Cognition** For CLIL to be effective, it must challenge learners to think and review and engage in higher order thinking skills. CLIL is not about the transfer of knowledge from an expert to a novice. CLIL is about allowing individuals to construct their own understanding and be challenged – whatever their age or ability. A useful taxonomy to use as a guide for thinking skills is that of Bloom. He has created two categories of thinking skills: lower order and higher order. Take Bloom's taxonomy for a well-defined range of thinking skills. It serves as an excellent checklist.
4. **Culture** For our pluricultural and plurilingual world to be celebrated and its potential realised, this demands tolerance and understanding. Studying through a foreign language is fundamental to fostering international understanding. 'Otherness' is a vital concept and holds the key for discovering self. Culture can have wide interpretation – eg through pluricultural citizenship.

The 4Cs framework seeks to assure quality in terms of guidance for:

Content	~ progression in knowledge, skills
Communication	~ interaction, language using to learn
Cognition	~ engagement: thinking & understanding
Culture	~ self and other awareness/citizenship

However it is content which determines the learning route. If it were language, imagine how limiting this would be eg where learners had not yet been introduced to the past tense. Try to have a conversation with someone using only the present tense in authentic settings- it is almost impossible. If the content requires use of the past tense and learners have not studied this, then CLIL lessons will enable learners to access the language needed in the defined context in differ-

ent ways. This may initially be in the form of using key phrases in the past tense without studying the whole tense formation at this stage. The emphasis is always on accessibility of language in order to learn.

To use the 4Cs planning guide:

- Start with **content**. Define it.
  - ❑ What will I teach?
  - ❑ What will they learn?
  - ❑ What are my teaching aims/objectives?
  - ❑ What are the learning outcomes?
- Now link content with **communication**.
  - ❑ What language do they need to work with the content?
  - ❑ Specialised vocabulary and phrases?
  - ❑ What kind of talk will they engage in?
  - ❑ Will I need to check out key grammatical coverage of a particular tense or feature eg comparatives and superlatives?
  - ❑ What about the language of tasks and classroom activities?
  - ❑ What about discussion and debate?
- Now explore the kind of **thinking skills** you can develop according to decisions made above.
  - ❑ What kind of questions must I ask in order to go beyond 'display' questions?
  - ❑ Which tasks will I develop to encourage higher order thinking- what are the language (communication) as well as the content implications?
  - ❑ Which thinking skills will we concentrate on which are appropriate for the content?
- **Culture** is not a *post script* but rather a thread which weaves it way throughout the topic. Think of it as a circle which envelops the topic. It is not enough to justify pluriculturalism by using another language **without** explicit reference via the other 3Cs to cultural opportunities which would not have existed in a mother tongue setting. Eg Using target language countries where there is drought so that case studies can be used to examine the project from an alternative perspective – interviews with children whose lives have been changed when *Water Aid* has provided them with a village well.
  - ❑ What are the cultural implications of the topic?
  - ❑ How does the CLIL context allow for 'value added'?
  - ❑ What about otherness and self?
  - ❑ How does this connect with the all Cs

KEY ISSUES

Download a copy of Bloom's Taxonomy

http://www.teach-nology.com/worksheets/time_savers/bloom/

http://www.teachervision.com/lesson-plans/lesson-2172.html?wt1AC

Read The Art of Teaching and Bloom's Taxonomy Verbs

Note

Create a grid/mind map/advanced organiser with 4 Cs for your topic.

Fill in demonstrating how each of the Cs interconnect and relate to each other. Always check finally in the communications column that all the other columns are covered- without communication no learning take place

---

3.0 CLIL Lesson Planning: the 3As tool

Whilst the 4Cs curriculum provides a useful guide for the overall planning of a unit of work, the 3As tool can be used for more detailed lesson planning. Whilst there is clearly some overlap between the tools, their suggested use is significantly different. The 3As tool operates in 3 stages. The 3As are used with specific content.

Stage 1:   **Analyse** content for the language **of** learning
Stage 2:   **Add** to content language **for learning**
Stage 3:   **Apply** to content language **through** learning

3.1 ANALYSE

The content focus for a period of teaching- eg a lesson or a short series of lessons, needs to be defined. Once defined, then the content can be analysed for the language needed in order for conceptual learning to take place. This is systematic content analysis to identify key words (including specialised contextualised vocabulary) phrases, grammatical functions for concept formation and comprehension. This is **NOT translation.** This is the language **of** learning and this is stage 1.

3.2 ADD

Stage 2 puts the focus on the learner. Language experiences are added to the lesson plan for specific attention which enable the learner to operate effectively in a CLIL setting (eg strategies for reading and understanding a difficult text). This includes meta-cognitive or learner strategies, classroom talk, discussion, task demands. It also involves the teacher in considering ways in which the learning will be scaffolded eg through the use of language frames to help and support. This is the language **for learning.** This is a crucial stage if the content and the language are to be truly integrated and if the learners are to fully realise the potential of CLIL.

3.3 APPLY/ASSURE

The application stage (3) is one where the language which emerges through the learning context is built on to assure that there is cognitive and cultural capital. It is at this stage that tasks and opportunities which enable learners to extend their cognitive skills and cultural awareness are made transparent to learners. This will involve exploring how thinking skills have been incorporated into the lesson plan in order to advance learning. This puts task types and learning activities at the core. It uses emergent knowledge and skills to apply thinking skills and high level questioning. It demands cultural awareness. Since language and thinking are explicitly related, this stage is also necessary to assure that a translated transmission model of learning will not evolve. This is language **through** learning. Attention to this process assures learner progression.

The 3As tool uses a pragmatic rather than a linguistic approach to language using and development. It is not built on a progressive grammatical model where there is chronology according to the perceived difficulty of acquiring grammatical concepts. Instead the language is related to the perceived progression of conceptual understanding. This approach to language is likely to be unfamiliar for both language and content teachers. However, there may be times when specific grammar is needed and teachers here will make decisions as to the range of options open.
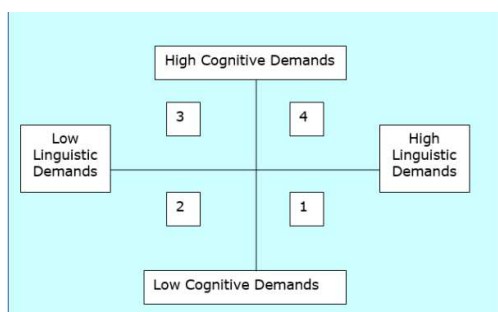
KEY ISSUES

- ✓ Take a content text and analyse it for the language of learning – how do you prioritise language needs? What tasks will you design to learn and remember the new language? (Stage 1)
- ✓ Now add the language for learning- consider classroom language and tasks associated with the text eg if you want the students to discuss issues or engage in group work, how can they do this well in a different language?
- ✓ Try to apply Bloom's Taxonomy to the tasks. Which skills are appropriate to develop given the context and the content? What about cultural awareness?
- ✓ Reflect on how differently you might have used the text in either a language lesson or a mother tongue subject lesson.

4.0 CLIL Task and Materials Evaluation: the Matrix

The relationship between language and cognition (thinking and understanding) is complex. However what we do know is that effective learning involves cognitive challenge and feedback (assessment for learning). In CLIL settings it is essential to ensure that the language does not get in the way of understanding whilst at the same time it can itself be cognitively demanding. Cummins developed a matrix for exploring the relationship between cognition and language. This has been adapted for CLIL settings. The matrix is a useful tool to audit teaching materials. Cognitively undemanding materials are difficult to justify. Cognitively demanding materials are fundamental to learning. The greatest challenge for CLIL teachers is to develop materials and tasks which are linguistically accessible whilst being cognitively demanding. Over a period of time the CLIL journey may be from quadrant 3 to 4.

The Matrix

KEY ISSUES

What does cognitively demanding really mean?

What does linguistically accessible mean?

How can we make materials linguistically accessible especially when the concepts are difficult?

Use the matrix to plot a set of work sheets- how can these be improved?

Which quadrants are desirable and which are not?

5. Summary of the 3 CLIL tools

These tools are meant as a guide to planning and monitoring processes in CLIL. They are not meant to be formula that are rigidly applied. Instead they are meant to be used, explored, adapted and reformulated according to different contexts. The tools are for guidance and support they are not inspection measures. Using the tools will hopefully encourage professional debate and reflection in longer term thematic/curricular planning, lesson planning and materials or task auditing.

6. Professional Development: LOCIT

To develop as CLIL teachers we need to belong to a learning community where everyone considers themselves as learners. One of the most highly recommended ways of achieving this is through LOCIT. The LOCIT processes involve you working closely with a colleague, a critical friend, or another CLIL teacher in the project. It is important that your LOCIT 'buddy' is someone whom you trust.

The LOCIT process involves lesson observation (LO) followed by the critical incident technique (CIT) for reflection and collegial support. What does this mean?

- Lesson Observations are essential if experienced teachers are to continue to reflect upon their practice. Therefore the teacher decides which particular lesson will be targeted. You might wish for your observer to be present and take notes. Recording either through video or audio is essential however (following the usual protocols). This is for personal use only between the two paired colleagues but analysis is crucial to LOCIT.

- The focus for the observation is always negotiated and the use of a lesson observation schedule is agreed beforehand (either as a group or as a pair).
- The lesson is observed according to the focus using a form as a memory aid. There is immediate feedback orally.
- The next process is that the recorded lesson is then replayed separately. Each person selects a series of critical incidents. A critical incident usually lasts for up to 3 minutes and related to the focus. CI can be positive and exemplars of good practice or they can be problem areas- this will depend on the pre-observation negotiation.
- Each person selects no more than 5 or 6 CIs and these are edited.
- At a following meeting each person plays their CIs to the other ie the teacher and the observer.
- The discussion that follows can then be used in many different ways.
- This is professional and non-public although the results can be shared as agreed.
- A follow up is then agreed.
- This is LOCIT

NB You will need to design your own lesson observation schedule.

This tool is highly effective in contributing to promoting confidence in CLIL teachers and CLIL

practice.

KEY ISSUES

- Discuss how LOCIT might work in your school
- Design an observation schedule for CLIL
- Agree on the format as a group whilst ensuring that there is flexibility for individual and paired use
- Plan a LOCIT programme with a colleague

Appendices

Planning the CLIL curriculum	
Stage One: **Guiding principles** **Looking at Learning** **Ethos**	• Decide what **YOU** mean by CLIL in your own context/school/class • Discuss these with other colleagues in your own department and in other departments • Discuss guiding principles for learning, e.g. implications for group work, independent learning, whole class teaching • Define aims and objectives of CLIL teaching programme as well as learning outcomes as they fit in with the whole school vision

Stage Two:	Starting to use the **4Cs Planning Tool** for the Topic/Module
Analysing the Teaching Curriculum **Overview planning for the topic/theme/ Module**	• Carry out curriculum subject audit, i.e. identify the content knowledge, skills and understanding to be taught in the topic/theme/module • Carry out a thinking skills or cognitive processing analysis, i.e. relate the content defined in 1 to thinking skills • Consider the culture/citizenship implications • Identify the linguistic elements to carry out 1, 2 and 3 • Create a schema or wall chart (with 4 columns – content; cognition-thinking skills; citizenship – leave the final column blank at the moment) showing interrelationship and interconnectedness of 1, 2, and 3 • Now fill in the final column. Identify the communication (language) needed to carry out the above by the learners • You can use this 4Cs document as self evaluation
Stage Three: **Preparing the Learning Context**	Using CLIL tools: **3As** for detailed lessons planning. **The Matrix** for task and materials design • Use schema above to define tasks • Identify appropriate related teaching strategies – how to support learners • Identify appropriate related learning strategies – how learners can learn to support their own learning • Ensure teaching objectives and learning outcomes are clear and achievable AND that tasks are sequenced to build in progression. Such as: 'By the end of the year/term/week/series of lessons I want my learners to …' • Prepare appropriate materials – with special attention to those incorporating learning strategies and pedagogical scaffolding • Use matrix or similar to analyse the teaching materials and/or tasks

Stage Four: **Monitoring Progress**	Monitoring the programme: **LOCIT** • Collaboration with other teachers, e.g. observing each others' lessons and analysing according to negotiated criteria, e.g. record and transcribe sections of lessons to compare what is going on with what has been planned • Collaboration with learners, e.g. make learning aims explicit, explore use of learner talk, learner diaries • Use of <u>assessment for learning</u> procedures which relate to process rather than outcome • Check sequencing of tasks
Stage Five: Evaluating	Evaluation of teaching and learning process • Decide how you will evaluate the CLIL work you have done before you start – parents' evening? Other teachers to observe? Presentation by pupils to other pupils? • Revisit your 4Cs overview topic to evaluate how successful you have been (self-evaluation) • Always relate this to schema **and** involve learners: relate to explicit learning aims, revise or adjust the schema and set new targets • Publish your results

4Cs Planning Grid

School: Topic:

Content (1)	Cognition (3)	Culture (4) ⟶	Communication (2)
• Teaching aims: • Learning Outcomes: • List content to be taught:	• Thinking skills (content determined): • Other thinking skills: • Learning skills: • Questioning: • Class activities:(eg G work) • Scaffolding	• Connect to topic: • Other cultural elements:	• Content language: (key words, phrases etc) • Thinking/learning to learn language: • Scaffolding • Organisational language: • Other:

Planning a CLIL Project: A Paper Chase

Aim: To show the relationship between paper consumption and deforestation. Discover the negative consequences and discuss conservation and recycling methods.

Teaching objectives:

Content:

paper production

deforestation

recycling

environmental protection

Communication:

explain processes (how paper is made, how the forest is cut down, how this harms the environment)

make suggestions (ideas for recycling, protecting the environment, taking action at school and in daily life)

discuss ideas

present and defend an argument / plan (students make posters about the issue and their proposals and present them to the headmaster to convince him to implement their plan)

Cognition:

understanding of the relationship between paper consumption and its negative effects on the environment

problem solving (how can these negative effects be alleviated)

the logic of making an argument

Culture: civility and environmental sensitivity and sense of responsibility

Outcomes: At the end of the lesson (which spans over several classes), students will be able to:

Understand the relationship between paper consumption and deforestation, and appreciate the negatives consequences on the environment.

Know how to recycle and take measures to protect the environment.

Suggest a plan of action for saving paper to be carried out at their school and present their argument to their headmaster in an attempt to convince him to implement the plan.

Tasks planned: We would like to make our students conscious about the implication of their own paper waste. We know that assuming this idea implies a huge cognitive domain because it' s necessary to connect a long chain of causes and consequences. For this reason we have planned some different tasks to guide our students to the final aim. We think these

tasks could be helpful to understand properly well the paper process and also to prepare our students to make cognitive relations between different facts and analysis these relations.

Warm-up: Some significant images will be shown to our students. We want to promote thinking through these pictures, just wake up some ideas about the subject.
Tasks given will be:

Step 1: We have focused our attention into four stages of paper making process: logging, paper industry, paper waste and consequences on the environment. Each step will be described trough four pictures which are connected like a sequence of facts. Students working in groups of 4 or 5 persons will be asked to explain what is happening in these draws. They will be helped with a frame (see materials) to learn how to organize into the speech different stages of a process.
Step 2: Groups should explain to the class what happen to the matter they have been working on. The objective of this step is to let our students to have a general view of the whole process through their peers' work.
Step 3: Now groups should think about causes and consequences. We will give out some frames (see materials) to organize the big amount of facts that will have appeared on Step 2. They should reflect on their schedules what the most significant facts are, what are their causes and their consequences.
Step 4: We hope that these activities bring to make a clear idea of what is paper making process, what implies to the environment and how each student's waste means something (take responsibility of their actions). Now it's time to put these ideas into the practice. We want to design a plan action into the school for saving paper. Students should try to convince headmaster to change school paper policy using the arguments we have deal with during the task. We want to create a real situation to make sense to the whole activity.

 Matrix: We think this activity implies a high cognitive domain but a medium lingüistic domain. We are really worried to create a sense of responsibility of our students' actions.

Scaffolding:
As we have seen on task explanation, scaffolding will be provided by language boxes and mind frames (as well as teacher support).

Talk: Students will have the opportunity to talk when they discuss each other's posters and proposals. The scene is also set for talking during their evaluation and reflection on how their presentation to the headteacher went.

Assessment: The task of designing and making a poster about paper consumption, its negative effects on the environment and what can be done in response is a demonstration of what the students have learned. Students are asked to assess each other 's posters and presentations.

CLIL UNIT PLAN

TITLE: Geometry / triangles
LEVEL: 6th
TIMING: 8 sessions
GENERAL TEACHING AIMS:

To describe processes.
To discuss in groups using English.

To find out properties that all triangles have.

To classify triangles.

To reach conclusions.

	TEACHING OBJECTIVES
Content	Studying triangles: properties and classification
Communication	Discussion in work groups. Description of processes. Asking questions / answering questions. Understanding / giving instructions
Cognition	Using strategies to solve a problem. Classifying triangles according to sides and angles. Finding out a property from observation. Reaching conclusions from experimenting. Taking notes on the processes they have used. Reflection on the results they have obtained
Culture	Importance of the triangle as a solid and common structure. Encouraging an attitude of observation and analysis in our everyday life.

DEVELOPMENT OF TASKS/ACTIVITIES TAKING INTO ACCOUNT THE FOLLOWING ITEMS AND THE SCAFFOLDING STRATEGIES

The activities in this unit are all useful to improve the knowledge that pupils have about triangles and to develop their ability to analyze polygons and to find out conclusions about them.

Session 1

1, 2 or 3 equal sides?

DESCRIPTION

In this first session, students have to observe the sides of some different triangles and classify them according to the number of equal sides they have. Pupils measure the sides of each triangle and sort them into the sets of a graphic, sticking them in the correct place with glue.

After this work, teachers ask children to explain the result of their classification to their classmates, to make them work orally, expressing what they have done and comparing their own work with their colleagues' one.

LANGUAGE NEEDED

We introduce vocabulary related to polygons such as **sides, scalene, isosceles, equilateral.**

INTERACTION

The first part of the activity is developed individually. Every child measures the sides on his/her own. Whereas they measure and cut out triangles, teachers can work orally with pupils, one by one, making them speak about what they have observed, the number of equal sides that each triangle has, where they are going to stick them and why.

The second part of the session is oral and children explain to their classmates what they have observed, they check their own classification and teachers help them to use the new vocabulary asking questions such as **What kind of triangle is number 3?, Why?, How many equal sides are there?**

MATERIALS NEEDED

We need photocopies of a sheet where many triangles are drawn. Pupils use it to measure sides and to cut the triangles out.

It's also necessary another photocopied sheet that shows a graphic divided in three parts (one for each kind of triangles), where students can stick the triangles on.

Session 2

Acute, right or obtuse?

DESCRIPTION OF ACTIVITIES

In this session, pupils have to observe the angles of some different triangles. They measure the biggest angle or angles of each one, using the angle indicator, and they draw a cross in them.

The second step is to classify the triangles according to the angles. They have to distinguish if the biggest angle or angles are acute, right or obtuse. The students use a colour code to mark the angles, for example:

> blue - acute
>
> red - right
>
> green - obtuse

The third step is a short written activity, based on their previous observation work. The students have to answer three short questions related to the number of equal angles in triangles.

At the end of this work, they are asked by the teachers about what they have observed and how they have classified triangles. Then, all the pupils can speak and can listen to their classmates opinion and compare it to their own one.

LANGUAGE NEEDED

In this session we can help children to achieve new vocabulary related to angles: **angle indicator, acute, obtuse, right, degrees, acute angled triangle, right angled triangle and obtuse angled triangle.**

It's also the time to introduce structures to talk about triangles and angles: **this is a right angled triangle because the biggest angle is right.**

We review structures such as **how many…?, there are…**

INTERACTION

This aspect is worked more or less as in the first session: first, students work on their own, measuring the angles, and the teachers can talk to them, one by one, making them practice the structures and the new vocabulary and checking if they use the angle indicator correctly.

After this individual part, the teachers talk to the whole group, asking them to explain to their classmates what they have observed.

MATERIALS NEEDED

We need photocopy for each pupil of the sheet where all the activity has to be done. There are six triangles drawn, three questions and a "tip" to help them to remember and understand the most important information.

Session 3
Conclusions

DESCRIPTION OF ACTIVITIES

After the previous session, where students classified and named triangles according to their angles, teachers ask them to find out a property that all triangles have. This activity is developed in small groups. Pupils measure all the angles in all the triangles and they discuss about which is the common property. They have to observe the degrees of all the angles and reach the conclusion that **in any triangle, the sum of the three interior angles is 180°.**

When a group of pupils find out the conclusion, teachers ask them a new question: **Is there a triangle with two right angles? Why?** So they have to check it and reflect on the results they have obtained to explain the reason why it is impossible.

At the end of the session, every group of children explains to their classmates their conclusions. They can see, then, if everybody agrees or not.

LANGUAGE NEEDED

In this session no new vocabulary is introduced. Pupils use the vocabulary about angles they learnt in the previous session and the structures they need to express their conclusions.

INTERACTION

The most important interaction in this session is the one that is developed between children of each group. They manipulate, observe and say what they think, so it is a situation that promotes the oral expression discussing in work groups.

As the teachers are talking with all the groups all the time, the structures are given by them at the moment, depending on the group's need. Teachers help pupils to put ideas in order and to express them.

MATERIALS NEEDED

The same activity sheet that was used in the previous session and the angle indicators.

Session 4
Properties of triangles

DESCRIPTION OF ACTIVITIES

The first step in this session is to explain to the students how to draw a triangle using the compass. Children have an instructive text where all this process is explained step by step. Teachers read the text together with children, in a loud voice, and showing the process on the blackboard, to help them to get a good understanding. After this first reading, they have to read it and try to draw a triangle following the instructions. To draw the triangles, they have a photocopy of an activity sheet, divided in two parts: on the left side of the paper, there are the measures of the length of the three sides of a triangle and on the right side there is a free space where pupils can draw it.

So, the second step is to try to draw three triangles.

When they do it, they can notice that two of the triangles can be drawn, but there is one which is impossible to do.

The teachers' question is **why does it happen?**

Students start here, the final process of the unit: at the end of all the sessions they have to find out the property that all triangles have.

But, in this session, they only start thinking about it.

LANGUAGE NEEDED

There is some new vocabulary that is introduced by the text. This vocabulary is mainly related to the compass, its parts and the way to use it to draw a triangle: **bottom side, point of the compass, end, length.**

 Imperative use of the verbs is also introduced by the text, because this is the tense we use when we are giving instructions: **put, draw, make a mark, choose, open, join.**

INTERACTION

Teachers interact with all the pupils, because they move all the time from table to table, to get sure that everyone has understood the instructions.

After drawing the triangles, pupils are asked by the teachers about what they think is the reason why there is a triangle that can't be drawn.

MATERIALS NEEDED

Photocopies of the instructive text, photocopies of the work sheet, compass, ruler.

Sessions 5 and 6
Properties of triangles

DESCRIPTION OF ACTIVITIES

The aim of this activity is to help students to think about the question that appeared in the last session.

Teachers give them the length of the sides of three triangles and ask the pupils to draw them. Two of them are possible and one is impossible. Every side is named (a, b, c).

But in this work sheet, teachers offer a clue to the students: they also ask them to add a+b, a+c and b+c.

This helps the students to work with the lengths of the sides and to think about them.

There is another activity in this session: students have to invent the length of the sides to draw a possible triangle and to draw an impossible one.

In these two sessions pupils work in small groups, so the discussion can be developed all the time.

At the end of session number 6, most of the groups find out a property, thinking that it's right:

The sum of any two sides of a triangle is always more then the third side.

LANGUAGE NEEDED

There is no new language in these two sessions.

Students need to use what they have already learnt about triangles, sides and properties when they are discussing and they also need to focus on the aim of the activity: to find out the property.

INTERACTION

Interaction between classmates takes place all the time, because they do every thing in groups.

At the same time, interaction is also developed between teachers and students, because the teachers move through all the groups, talking to the pupils and asking them questions to make them think. They are questions like these:

- **Is there a relationship between the length of the sides in any of the triangles?**
- **Are there any similarities between the triangles you can draw?**
- **Are there any similarities between the triangles you can't draw?**
- **What conditions do the sides have to fulfill to make a triangle?**
- **Can you think of the rules you have to follow to draw a triangle?**

MATERIALS NEEDED

Photocopies of the activity sheet, ruler, compass.

Sessions 7 and 8

Properties of triangles

DESCRIPTION OF ACTIVITIES

Students work in small groups.

They have to think of a set of measurements to form a triangle and a set of measurements that can't form a triangle taking into account the conclusions they have reached in the last session.

Then, they have to try to draw them to check if they are right or wrong.

If they change their conclusions after these two sessions, they write the new one.

At the end of session number 8 teachers lead pupils to explain to their classmates the measurements they have chosen and the reason why they are possible or not. Then, the discussion takes place between all the students, in the whole group.

When every group is explaining their own work and teachers are asking them questions, it's used by the teachers as an oral assessment activity.

LANGUAGE NEEDED

No new vocabulary.

Structures are thought by children to express their conclusions and teachers help them to express correctly.

INTERACTION

Interaction between students takes place all the time, because they are thinking and discussing in groups, and they have to find out a common final conclusion.

Interaction between teachers and students takes place all the time, as well, because teachers move from group to group, making them speak and asking them questions to make them think, such as:

- **Why have you chosen these measurements? Why do you think it's possible to draw this triangle?**
- **Why do you think that a triangle with this set of measurements can't be drawn?**
- **Think of an equilateral triangle. What happens if the three sides are equal? Is the property useful?**
- **Think of an isosceles triangle with sides of 2,2,1. What about the property now?**

At the end of session number 8 there is also interaction between all the students in the whole group. Teachers first ask questions to the group who is explaining the work they have done but, after this, they ask questions to the rest of the classmates, to know if they agree or not and why.

MATERIALS NEEDED

Activity sheet, compass, ruler.

LEARNING OUTCOMES

By the end of the unit pupils will be able to classify triangles according to their sides and their angles, to use strategies to solve a problem, to describe processes, to find out properties from observation and to express them, to discuss in groups and justify their own opinions, to reflect

on the results they have obtained, to use the compass properly to draw triangles, to distinguish if it's possible to draw a triangle or not taking into account the length of its sides, to ask and answer questions, to give and understand instructions, to read comprehensively an instructive text, to use a wide vocabulary to talk about polygons.

ASSESSMENT

At the end of session number 8 there is an oral assessment activity. When students explain to the others their work, teachers ask them questions to lead them to justify it and to express their conclusion. They also have to draw on the blackboard the triangle they have chosen, explaining step by step the way to do it. So, teachers can evaluate the oral expression observing the way they explain their ideas and paying attention on the vocabulary they use, to see if they have assimilated the new vocabulary related to the topic. Teachers can also observe the structures they use to give instructions, when they are explaining the way to draw a triangle.

There is also a written assessment activity, we could call it session number 9.

It's very similar to sessions 1 and 2, but in this case, students have to classify triangles according to their sides and angles at the same time. They have a sheet of paper with several different triangles. They cut them out and stick them on a graphic like this:

	Scalene (no sides equal)	Isosceles (two sides equal)	Equilateral (three sides equal)
Acute angled			
Right angled			
Obtuse Angled			

Appendix 5: **Lesson plan made by me using the 4C framework and implemented by Purva on 8 August 2016**

Maths lesson plan – Grade 3

Number work

Objectives (Content):

- SWBAT identify places and their values in a given 3 digit number.
- SWBAT order numbers in ascending and descending order (3 to 4 numbers).
- SWBAT make smallest and biggest number out of given 3 digits.
- SWBAT compare numbers by using <, > or = .
- SWBAT write expanded form of numbers up to 999.

Vocab (Communication: Analyse):
- Topic related: Place value, units, tens, hundreds, 3-digit, single digit, double digit, figures
- Questions related: identify, expand, compare, ascending, descending, count
- Sentences and phrases:
    o What comes before _____?
    o What comes after _____?
    o What is the expanded form of _____?
    o What is the place value of _____ in _____?
    o Write in words/write in figures
- Discussion related:
    o What is _____? (Structure to be taught explicitly)

Culture: Collaborative group work for most activities and all revision. Talk in group work is to be explicitly taught.

As part of collaborative group work: It is necessary to teach explicitly – no prompting answers, waiting patiently, listening to everyone in team, in case someone isn't answering – to encourage them to speak up or let the teacher know.

Assessment:
- What is in tens place for the following numbers: 145, 789, 345, 987, 342
- What is in units place for the following numbers: 145, 789, 345, 987, 342
- What is in the hundreds place for the following numbers: 145, 789, 345, 987, 342
- What comes before these numbers: 145, 569, 345, 117, 342
- What comes after these numbers: 589, 789, 985, 847, 999
- Write expanded form of number: 786, 111, 900, 345
- What is the largest 3 digit number?
- Compare and put the correct sign:
    o 567   897
    o 678   811
    o 123   674
    o 999   234
- Arrange numbers in ascending and descending order:
    o 674, 234, 999, 111
    o 101, 435, 232, 189
    o 900, 231, 453, 102
- Write in words
    o 123, 678, 896, 900
- Write in figures
    o Six hundred and fifty two
    o Seven hundred and two
    o Nine hundred and twenty

o   Hundred and nine

Classroom activities:
Daily drill 5 minutes:
Students work in their groups. Model for first 3-4 days.
-   2 minutes: Dictation for writing figures of dictated numbers
-   3 minutes : exchange and check work

How?

Introduction to place value (15 minutes)

Teacher writes on board: 500

Teacher	ESR [Exemplar student response]
I am going to give you money to buy choco-lates for everyone. I will give you the money written on the board. Here it is (Takes out 5 rupee coin). Is that ok?	No. It's not the same. You are giving Rs. 5 and you have written Rs. 500 on the board.
But see this 5 is same.	No. it is 5 hundred and not 5. (If students don't respond here, ask them to read the number on the board loudly)
Someone come and write 5 and 500 on the board. (Pick a student who generally doesn't answer)	Student writes big
What is the difference?	There are 2 zeroes after 5.
(Write the number 1 and 10) Are these the same number?	No. This is ONE and other is ELEVEN
What matters is where is the 1 in the num-ber? (Write in big: 1, 10, 100) IF one is in the last – it is one (show one ru-pee coin) If one is second from last – it is ten (show Rs. 10 note) If one is third from last – it is hundred (show Rs. 100 note)	
Ok. So which is small? 1, 10 or 100?	1
Which is next biggest?	10
Where is 1 in this number	Second from last
Which is the next biggest?	100

Where is 1 in this number	Third from last
Let us give names to all the places in a number so that we can understand quickly: the names are UNITS for last, TENS for middle and HUNDREDS for first. (Write on board) (Repeat and students repeat) (Write 123 in big and point to digits for the places)	
What is in **the** units place?	3
What is in **the** tens place?	2
What is in **the** hundreds place?	1

Few more practice questions:

345, 678, 754, 321, 567

Draw the following on board and ask to draw in the book:

NUMBER	HUNDREDS	TENS	UNITS
234			
198			
674			
321			

Tell them you will write numbers on the board and they should write in the correct column in the table.

Check the work in groups.

Independent group practice (15 minutes)

We are now going to practice in groups. Ask a group to come in front to model. Listen to instructions:

- One person (Abdul) in group will make a number from cards I am giving. For example, (ask someone to hold up the cards). You will then ask anyone else in the group (Sri) – What is in units place? Repeat – (Students repeat – What is in units place?). Then that person answers. Answer is …. Now this person (Sri) will ask the next person (Shweta) what is in tens place? Repeat (students repeat). Then that person answers. Now everyone writes in their book – in the table above. Then Shweta will make a new number and ask (Ram) – What is in units place? Ram will ask (Shyam) what is in tens place – group is over – so go back to Abdul. Abdul will ask what is in hundreds place?
- Repeat it one more time. And make the group practice.
- Everyone will continue writing all new numbers in the table. When you are done with 5 numbers – you will raise your hands. I will come and check. Now you are not helping by telling everyone's answer. We will show ownership and empathy and help someone by keeping quiet.

Let them do this in groups while teacher walks around and checks if everyone is following instructions.

Revise again: Place names before closing this class.

Homework: What is in **the** *units place? What is in* **the** *tens place? What is in* **the** *hundreds place?*

Class 2:

Revision: Units, tens, hundreds and revise with few numbers. Revise also "What is in **the** units place?" "What is in **the** tens place?" "What is in **the** hundreds place?"

5 min: Drill

5 min: Do place value group practice from last class for 5 minutes.

Game (10 min)

Students will get their number cards. Teacher will call out numbers and they have to put the number together. Example: The number in tens place is 7. The number in units place is 2 and number in hundreds place is 4. (472). Every group will hold out the answers and show the teacher.

Every time new member of group will raise the number and show.

- The number in units place is 0, hundreds place is 6, tens place is 9
- The number in hundreds place is 2, tens place is 0, units place is 2
- The number in units place is 4, tens place is 2, hundreds place is 6
- The number in tens place is 4, units place is 8, hundreds place is 7
- The number in units place is 6, hundreds place is 6, tens place is 8
- The number in hundreds place is 2, tens place is 0, units place is 0
- The number in units place is 1, tens place is 4, hundreds place is 9

Great work!!!

Write on board: 678945 - Each number is called a digit. (Repeat)

How many digits are there in the above number? ESR: 6

Write on board 234 – how many digits? ESR: 3

So this is called 3 digit number.

Write on board 67 – how many digits? ESR: 2

So this is called a 2 digit number.

Write on board - 1 – how many digits? ESR: 1

So this is called 1 digit number. Or single digit number.

Repeat and practice with few more numbers.

Give the following on chits of paper to think and work out in groups (5 minutes) (it is ok if they discuss in Hindi – the final answer – insist on full sentence)

(Check if students know the meaning of biggest and smallest)

- What is the smallest 1 digit number? ESR: 0   The smallest one digit number is 0
- What is the biggest 1 digit number? ESR: The biggest one digit number is 9
- What is the smallest 2 digit number? ESR: The smallest two digit number is 10
- What is the largest 2 digit number? ESR: The biggest two digit number is 99
- What is the smallest 3 digit number? ESR: 100
- What is the largest 3 digit number? ESR: 999

Clues to help students think: Think of the first three digit number to find out smallest three digit number and think of the number before that to find largest two digit number.

Group work:

What comes before and what comes after – practice for 10 min

Give the 100 number bunch. Make them practice in groups – asking each other. Model in front of them first. Write in books as well.

Class 3:

5 minutes - Drill

5 minutes - Place value practice

5 minutes - Revision of 1 digit, 2 digit, 3 digit. Revise smallest, biggest 2 digit and 3 digit numbers.

Group work (5 min):

- What comes before?
- What comes after?

Ascending: This word means going up – becoming bigger

Descending : this word means going down – becoming smaller. Repeat 3 times

If I ask you to put numbers in ascending order – I want you to put numbers from small to big (Show actions)

For example: 5, 9, 1, 3: So you think what is the smallest number? 1

What is bigger than 1: 3

What is next : 5

What is next 9

So you write 1,3,5,9

2 more examples: model

3, 7, 1, 0

9, 1, 0, 2

Now try with 2 digit numbers: 88, 34, 56, 75

How do you arrange these: look at tens place first. (Revise the tens place of all numbers) What is the smallest tens place?

3 – so that will be first

34

Next 5

56

….

34, 56, 75, 88

Now let's try one more: 31, 35, 21, 22. What is in tens place?

They have same tens place: then look at units place. Whatever is smaller – 2 is small so 21 and 22 are first. Then look at units place: is 1 small or 2 small?

So 21, 22. Same for 31 and 35. Which is smaller? 31 and then 35.

So answer is 21, 22, 31, 35

Let's try one more example (make them write in books):

Write in ascending order: 98, 23, 67, 24

Answer: (Think through with them): 23, 24, 67, 98

Write in ascending order:

- 56, 24, 90, 78
- 22, 21, 23, 29
- 11, 78, 10, 99

Let's try 3 digit number:

123, 456, 789, 532

Look at hundreds place first: which is smallest hundreds place: 123

So that's first: 123

Then? 456

Then? 532

Then? 789

Write in books:

Arrange in ascending order:

- 345, 789, 899, 999
- 989, 564, 321, 101

(If time is up, stop) Else

Now if we had same number in hundreds place, we will see tens place and last we will see units

place.

(Repeat)

345, 789, 732, 752

Look at hundreds place: which is smallest?

Now between 789, 732 and 752: Look at tens place

3 is smallest so 732 is small

…..

Give more examples

Class 4: Drill, revision of place value, revision of smallest, largest, revision of words ascending

and descending – 15 minutes.

Next 20 minutes: Do same thing with descending order

Give them to write in books many problems for practice

And last 10 minutes: Practice in groups using number cards

Class 5: Drill, revision of place value, revision of ascending-descending (in groups) and before-after in groups – 25 minutes

15 minutes: introduce symbols < > =

Class 6: Drill – 10 minutes

Expanded form using 10 blocks (2 classes at least)

Formative assessment for the week: to be taken for whichever objective is done

Appendix 6: **Consent letter to parents**

Swathi Rangarajan
University of Jyvaskyla
Finland
Date: 1 August 2016

Subject: Permission for research　（अनुसंधान की अनुमति）

Dear Parents,

My name is Swathi Rangarajan and I am currently doing my Master's degree in Education. I would like to conduct research in the classroom where your child studies. This research is related to my studies and will specifically study how children learn together (Collaborative learning) and the structure to teach maths and science in English (Content and Language Integrated learning). I will not use any identifying information of your child or use his/her name anywhere. I will also try to make sure that my research work does not cause any difficulties to the child. I will be conducting the research in the school hours in the month of August and the regular studies of the child will not be affected in any way. You have complete rights to not give permission for this study and at any time, you can withdraw your permission for this study. By signing this letter, you are agreeing to allow your child to participate in the research work.

आदरणीय माता-पिता

मेरा नाम स्वाति है। मै अपनी उच्च पढाई कर रही हुँ।इस के लिए मै आपके बच्चे के कक्षा मे अनुसंधान करना चाहती हुँ। मै पुरी कोशिश करुंगी कि इस अनुसंधान के दौरान आपके बच्चे को कोई कठिनाई नही होगी। उनकी पढाई मै रुकावट नही आएगी। उनका नाम या किसी भी प्रकार की जानकारी बताई नही जाएगी किस से उनकी पहचान हो सके। बच्चे साथ साथ कैसे सिखते हैं और वह कैसे गणीत और विज्ञान अंग्रेज़ी मै सिख सकते हैं - मै इन विषयों मे अनुसंधान कर रही हुँ। यह अगस्त के महिने मे होगा। आप चाहें तो अनुमति किसी भी वक्त वापस ले सकतें हैं। इस पत्र पर आपकी हस्ताक्षर करने से आप मुझे अनुमति दे रहें हैं।

नाम: बच्चे का नाम:

Name of school:

Class and grade: