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1. Introduction

Over the past couple of decades, the idea of an integrative approach for foreign language teaching has received major support from the European Union as it is seen as a way of increasing students' employability in an ever-growing transnational workforce. Content and language integrated learning (CLIL) provides a holistic approach to language learning (Mehisto, Marsh & Frigols 2008: 30) that not only focuses on the development of foreign language proficiency and the acquisition of subject-specific content but also the attainment of higher-order thinking skills. However, teachers are often faced with the problem that content subjects and foreign languages are organised around different curricula with different approaches and goals students are supposed to achieve. To overcome this gap, Dalton-Puffer (2013) has suggested the construct of cognitive discourse functions (CDFs). She argues that all learning, whether it is concerned with language or other content, follows certain patterns or cognitive functions that can be observed through verbalisation. Her set of CDFs provides a summary of academic language skills that are often promoted in curricular documents. The usefulness of her construct has been supported by several empirical small-scale studies on the implementation of CDFs in CLIL classrooms (e.g. Kröss 2014, Hofmann & Hopf 2015, Bauer-Marschallinger 2016).

One effective way of getting students to produce the desired discourse functions is by asking questions. Although there has been a myriad of studies concerned with the use of questions in classrooms and lectures, and their effects on learning and participation, most of them have not focused on the effects of questions on the cognitive processes involved in students' responses and even less so in the context of CLIL. One exception is Dalton-Puffer's (2007) investigation of questions in CLIL classroom discourse. For this purpose, she devised a set of question categories that are organised around the increasing complexity of cognitive processes needed to provide the information the questions are asking for. However, seeing as this distinction of question functions was formulated before her construct of CDFs, establishing a connection between the two classifications has not been attempted to date. This is the primary objective of this paper.

The paper starts with an outline on the basics of CLIL, its origins and principles. Chapter 3 will then go into more detail on the 4 Cs that are often seen as the basis for quality CLIL instruction and elaborate on the connection between cognition and language learning. In order to see whether there is a correlation between the questions employed by teachers and the cognitive

discourse functions in students' answers, the underlying cognitive processes of the two will be outlined and discussed in chapter 3 and 4. Chapter 4 will also provide a preliminary alignment of the question functions devised by Dalton-Puffer (2007) and her CDFs (2013, 2016). In chapter 5 the research questions will be formulated in detail and the instructional setting as well as the collection of and methods of analysis for the data will be given. Chapter 6 will provide quantitative and qualitative findings on Dalton-Puffer's individual question functions, including their linguistic forms as well as the elicited CDFs. These findings will then be discussed in detail in chapter 7. Furthermore, the discussion will also include a revised construct of question functions and CDFs and investigate influences on the complexity of student responses. Chapter 8 will summarise the main findings of this paper and propose further research questions on this topic.

2. The basics of CLIL

In the past decades, the term CLIL and its concept have become more prominent among the language teaching community of English as a Foreign Language (EFL) in Europe (Ioannou Georgiou 2012: 495-496). Content and Language Integrated Learning (CLIL) promotes a "dual-focused, learning and teaching approach in which a non-language subject is taught through a foreign language" (Ioannou Georgiou 2012: 495). Although the term CLIL was only coined in 1994, the idea behind it is thousands of years old (Mehisto, Marsh & Frigols 2008: 9). The approach was originally driven by a desire to understand and use the language as well as the content knowledge provided by a foreign culture (Mehisto, Marsh & Frigols 2008: 9). Since then, the idea has received growing attention not only from teachers and parents but also from the European Union (EU) (Ioannou Georgiou 2012: 496-497, Dalton-Puffer 2011: 184). In order to increase European cohesion and competitiveness in a globalised society (Mehisto, Marsh & Frigols 2008: 10), and thus improve student and worker mobility not only within Europe but also worldwide, the European Centre for Modern Languages (ECML) actively supported the development of an online CLIL Matrix from 2004-2007 to help teachers create quality CLIL lessons (Marsh & Frigols 2007: 34-35) according to four guiding parameters: content, cognition, communication and culture, which Coyle (1999: 53) has appropriately summarised as the 'four Cs'. Simultaneously, it has been found that Austrian parents often seem to favour schools offering bilingual education (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 4) as they "believe that CLIL promises their children an edge in the competition for employment" (Dalton-Puffer 2011: 184). Because of its support

from both high-level policymakers and "grass-root actions" (Dalton-Puffer 2011: 184), CLIL has successfully been implemented in "all sectors of education from primary through to adult and higher education" (European Justice 2019).

Seeing as the idea behind CLIL is not exactly new, many more similar theories and approaches, which have been developed to adapt to specific educational contexts (Marsh 2002), are often subsumed under its umbrella term (Ioannou Georgiou 2012: 496-497). In the context of Austrian language teaching, CLIL makes itself known under the name *Englisch als Arbeitssprache (EAA)* or English as a Medium of Instruction (EMI), English Across the Curriculum (EAC), and the Dual Language Programme (DLP) (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3). EMI views language as a tool that is used to teach subject-specific content with the ultimate goal of equipping students with knowledge concerning both the mediated content and the language used as a medium (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3). Furthermore, the country report for CLIL at Austrian schools identifies the following educational aims for EMI:

> increasing linguistic ability (in the subject matter as well as generally), increasing reflection on the usefulness of the foreign language through using it with the subject matter (increasing motivation), better preparation for the future, as well as for the professional career and for social changes, improving knowledge of and communicative competence in the foreign language, and equipping learners with the skills required to cope successfully in a foreign language in a variety of workplace-related settings. (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3)

Essentially, EMI seeks to "achieve functional proficiency […] while also mastering subject content in accordance with the curriculum" (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3) which is overall congruent with the CLIL goals noted above. Because of its potential benefits, EMI has spread to all types of schools in Austria (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3). Another term that is often associated with CLIL is 'English Across the Curriculum' (EAC). Even though the definition of EAC is not clear-cut (Mewald 2004: 50, cited in Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3), it seems to differ from EMI in the sense that it encourages cross-curricular networking and integration of a foreign language in whole schools and not only with individual teachers, and therefore can be applied to a wider range of contexts (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 3). One implementation of EAC can the found in the Dual Language Programme (DLP) that fosters

the development of foreign languages in lower secondary education (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 4). DLP classes are usually taught in the target language by German-speaking teachers who have received an in-service training in CLIL foundations in order to teach their subject in the foreign language (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 14). Their audience is predominantly German-speaking as well, which differs from the 'Vienna Bilingual Schooling' (VBS) project that was implemented by the Vienna Board of Education (*Stadtschulrat für Wien*). In VBS lessons, half of the students have German as their mother tongue, while the other half mostly uses English as their first language. In addition to German-speaking teachers, VBS classes also engage qualified English-speaking teachers in order to provide bilingual education in most subjects throughout the school year (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 4). This project was originally designed in 1991 to integrate children that had come from other European countries to meet the demands of increasing globalisation (Directorate-General for Education, Youth, Sport and Culture & Eurydice 2012: 14). While English is the most common foreign language taught through these CLIL programmes, other languages are catered for as well, including minority languages.

As these approaches all have been subsumed under the 'CLIL umbrella', caution must be taken not to neglect CLIL's basic principles (Ioannou Georgiou 2012: 497). Marsh (2005) warns against mistaking "teaching in English" with "teaching through English" and emphasises that one of CLIL's major features is its integrative methodology (Marsh & Frigols 2007: 34). While simply teaching in English without adopting modified language-sensitive curricula leads to "widespread school wastage [and] confusion, despair and high drop-out rates" (Marsh 2005), CLIL differs from traditional EMI by putting language into the centre of the curriculum and thus changing "the whole educational enterprise" (Marsh 2005). However, despite CLIL being an approach for language learning, Ting (2010) stresses that it should award equal importance to both language and content teaching, adhering to its original conceptualisation (Mehisto, Marsh & Frigols 2008: 11). Instead of being the main object of learning, the language is treated as a tool for communication which helps students complete content-based tasks and form constructive knowledge (Ting 2010: 12). This focus on subject-specific tasks is also why most CLIL lessons are timetabled as content lessons (Dalton-Puffer 2011: 184). Using task-based learning also means moving away from a "passive explicit-information-absorption format" where the teacher acts as a "walking-talking encyclopaedia" to an "active you-work-it-out-using language format where knowledge is gained implicitly" (Ting 2010: 12), a point which is

also mentioned by Coyle (1999: 59), and in doing so creating opportunity for "authentic, meaningful communication" (Ioannou Georgiou 2012: 495). Thus, CLIL is often considered to be a natural progression of the Communicative Language Teaching (CLT) approach of the 1970s (Ioannou Georgiou 2012: 495, Marsh 2005). Furthermore, Ting (2010: 13) emphasises that in order for CLIL to fulfil its task of teaching content according to subject-specific curricula the materials used in this context must not be simplified for the language teachers' sake. Instead of relabelling EFL exercises, CLIL tasks have to provide information that meets the goals prescribed by the subject syllabus even if this lies outside language teachers' comfort zones. This might be one of the reasons why the majority of CLIL teachers come from a subject-specific background (Dalton-Puffer 2011: 183-184). Teaching in a foreign language like English, which is relatively well-known by a lot of people in the world due to its lingua franca status, may seem less daunting than familiarising oneself with the ins and outs of a specific content subject.

In order to create a fulfilling educational experience for the students that caters for language-driven content learning, Mehisto, Marsh and Frigols (2008: 27) point out that language teachers and content teachers need to work together and exchange knowledge as well as skills regarding each other's subjects. After all, CLIL is an integrative approach with "[i]nterdisciplinary fusion" at its core (Mehisto, Marsh & Frigols 2008: 27). On the one hand, "content teachers need to support the learning of those parts of language knowledge that students are missing and that may be preventing them mastering the content" (Mehisto, Marsh & Frigols 2008: 11). On the other hand, language teachers are supposed to "support content teachers by helping students to gain the language needed to manipulate content from other subjects" (Mehisto, Marsh & Frigols 2008: 11) in addition to teaching the standard foreign language classes. This also means that students receive increased input in the target language seeing as they attend both traditional foreign language classes as well as CLIL classes. It is only logical then that most studies which compare non-CLIL students with CLIL students report that the latter have enhanced language skills in written as well as oral communication (Dalton-Puffer 2011: 186-188). As far as content learning is concerned, a lack of standardised testing in content-subjects has made transnational comparisons difficult (Dalton-Puffer 2011: 188). While some studies report that using a foreign language prompts learners to work on a task more persistently and thus acquire a better understanding of the underlying subject concepts, other research suggests that students are deterred by using a language less known to them and therefore become more passive (Dalton-Puffer 2011: 188-189). Most studies,

however, show no significant difference in the performance of CLIL and non-CLIL students, suggesting that CLIL content teaching at least matches the one in L1 instruction (Ioannou Georgiou 2012: 501).

The underlying problem with fusing content and language is not the lack of teachers' cooperation, though. What seems to be more precarious is that content subjects and foreign languages are organised around different curricula that are set in a multitude of cultures and countries with different approaches and goals students are supposed to accomplish (Dalton-Puffer 2013: 221). In order to achieve true integration, these pedagogies need to find a point of convergence, a unifying aim. In its bare essentials the ultimate objective of teaching, and of education really, is to enable students to think independently. Therefore, CLIL is not only organised around content and language but also predominantly around cognition (Mehisto, Marsh & Frigols 2008: 30). However, as cognition cannot be observed and judged from the outside, "observable analogues" must be used as indicators of learning (Dalton-Puffer 2013: 220). These present themselves as verbalised instances of co-constructed knowledge, so-called cognitive discourse functions (CDFs) and occur during classroom interaction between teachers and students. In her article, Dalton-Puffer (2013) has established seven different categories of CDFs in order to identify and classify students' linguistic outputs and investigate the cognitive processes behind them. Since the most common way for eliciting student responses is for teachers to ask questions, it seems logical to have a closer look on how teachers formulate these questions and whether certain question types can be correlated to particular cognitive discourse functions in students.

3. Cognitive Discourse Functions (CDFs)

Before turning to the individual cognitive discourse functions proposed by Dalton-Puffer (2013, 2016), an introduction to the theory behind this construct must be given. As the main goal of this paper is to link CDFs to certain question types, the majority of this chapter will focus on the description of the distinct CDFs, though[1].

3.1. The connection between content, communication, cognition, and learning

As already mentioned, CLIL is founded on four underlying principles: content, cognition, communication and culture. While the importance of integrating content and language has

[1] For a more detailed analysis on the theoretical foundation of the CDF construct, see Dalton-Puffer (2013) or Hofmann and Hopf (2015).

already been discussed in the previous chapter, this section of the paper will be dedicated to establishing a connection between the other categories and learning, especially since this connection is what builds the foundation of Dalton-Puffer's (2013) construct of cognitive discourse functions.

The first important step towards discovering what constitutes successful learning is to examine the relation between content and cognition. For this purpose, several taxonomies for describing the cognitive processes behind integrating new knowledge into pre-existing one have been devised. Mohan (1986), for example, developed a knowledge framework for curricula where various thinking processes are linked and sorted according to three distinct structures of knowledge: *classification*, *principles* and *evaluation*.

Table 1 Knowledge framework for thinking processes in subject curricula (Mohan 1986: 91)

Structures of knowledge	Thinking processes
Classification	Classifying, defining, using operational definitions. Understanding, applying or developing concepts or classifications.
Principles	Explaining and predicting. Interpreting data and drawing conclusions. Formulating, testing, and establishing hypotheses. Understanding, applying, or developing generalisations (causes, effects, means, ends, motives, reasons, rules, norms, strategies, methods, techniques, impacts, influences, responses, results).
Evaluation	Evaluating, ranking, appreciating, judging and criticising. Forming, expressing and justifying preferences and personal opinions. Understanding, analysing and deciding on goals, values, policies, and evaluation criteria.

As can be seen from Table 1, the three categories are not equally populated. While the first and the last group are relatively concise in their specifications, the middle section subsumes a number of diverse thinking processes. Therefore, Dalton-Puffer (2013: 233) remarks that despite it being "beautifully constrained", the "important processes in knowledge creation" subsumed under 'principles' should be allowed, in her opinion, "more visibility". These include "*causation*, *inference*, *prediction*, *hypothesising*, [and] *generalising*" (Dalton-Puffer 2013: 233). Another, similar model was devised by Bloom (1956) who sought to "facilitate the exchange of test items among faculty at various universities in order to create banks of items, each measuring the same educational objective" (Krathwohl 2002: 212). His hierarchical organisation of thinking skills included *knowledge*, *comprehension*, *application*, *analysis*, *synthesis* and *evaluation*. These were ordered from "simple to complex and from concrete to abstract" (Krathwohl 2002: 212) and were considered to be cumulative, meaning that "mastery of each simpler category was prerequisite to mastery of the next more complex one"

(Krathwohl 2002: 212-213). This taxonomy was revised by Anderson and Krathwohl et al. (2001) who added another dimension to these cognitive processes, resulting in a matrix where thinking skills could be combined with different types of knowledge allowing for free combination of the two. Along with *factual*, *conceptual*, and *procedural knowledge*, which were all described in Bloom's original taxonomy, another category was included: *metacognitive knowledge*. It was added to "demonstrate the importance of students being made aware of their metacognitive activity, and then using this knowledge to appropriately adapt the ways in which they think and operate" (Krathwohl 2002: 214). Enhancing students' metacognitive processing by using learning strategies is, as Coyle (1999) points out, to make them more autonomous and independent (Coyle 1999: 58). These taxonomies are amongst the most often referred ones amongst CLIL literature, but other researchers have devised similar categories to account for the organisation of content through cognitive processes (for an extensive list of sources, see Dalton-Puffer 2013: 251-253). For her construct, Dalton-Puffer (2013) revised and organised these categories around seven prototypical functions which will be discussed in detail later.

The next relationship that should be examined is the one between language/communication and cognition. In this regard, one of the most influential theories is Halliday's (1994) Systemic Functional Linguistics which establishes that one major purpose of language is to represent thought (Dalton-Puffer 2013: 228). He proposes two meta-functions of language: ideational or reflective, and interpersonal or active (Halliday 1994: xiii). In its ideational function, language is used to understand speakers' experiences of the environment but also of their inner cognitions and perceptions (Dalton-Puffer 2013: 228), which they then share with others, hence interpersonal. This not only means that thinking is structured by language, a concept which has been much discussed since the Sapir-Whorf hypothesis, and "expressed through [non-arbitrary] identifiable language forms" (Leung 1996: 34), but also allows for the idea that "speakers share [their] cognitions with others in the social space" (Dalton-Puffer 2013: 229). In education, it is the classroom in which teachers and students work together to create and share knowledge with each other (Leung 1996: 28). Therefore, communication plays a pivotal role in fostering learning. The dialogic nature of developing knowledge in the classroom was summarised by Mercer (2002) as follows:

> For a teacher to teach and a learner to learn, both partners need to use talk and joint activity to create a shared framework of understanding from the resources of their common knowledge and common interests or goals. Talk is the principal tool for creating this framework, and by questioning, recapping, reformulating, elaborating and so on, teachers are usually seeking to draw pupils into a shared understanding of the activities in which they are engaged. (Mercer 2002: 143)

Furthermore, he proposes an Intermental Development Zone (IDZ) where teachers and students work together on an activity to create this framework of understanding and claims that if it is maintained successfully "misunderstandings will be minimized and motivations will be maximized" (Mercer 2002: 143). The ultimate goal, of course, is to "enable a learner to become able to operate just beyond their established capabilities, and to consolidate this experience as new ability and understanding" (Mercer 2000: 141), so to acquire new knowledge. While this IDZ requires both teacher and learner to cooperate, the teacher is responsible for creating this zone and keeping it active by using the means listed in the quote above. Through this interthinking (Mercer 2000: 141), learners are provided with the opportunity to "appropriate the 'linguistic tools' for intramental thinking on their own" (Wells 2009: 270) and thus develop both content as well as linguistic knowledge. In order to make their "subject-specific thought processes intersubjectively accessible and thus available for learning" (Dalton-Puffer 2013: 230), students may result to using routine verbalisations of their communicative intentions (Dalton-Puffer 2013: 230), so-called cognitive discourse functions, which will be explained in detail later.

Here an important distinction needs to be drawn between language that is used for interpersonal communication and academic language, so-called BICS and CALP (Cummins 1984). Basic interpersonal communication skills (BICS) are used in everyday conversations and are normally aided by non-verbal cues (Coyle 1999: 49). Cognitive academic language proficiency (CALP), on the other hand, is developed by "manipulat[ing] or reflect[ing] on the surface features of language outside the immediate environment, typically in academic context [and thus] makes major cognitive demands on the learner, usually in the absence of paralinguistic and situational cues" (Coyle 1999: 49). Leung (1996) points out that the development of CALP might be assisted by using appropriate contextual support. As it cannot and should not be assumed that BICS will turn to CALP automatically (Leung 1996: 27), using learner sensitive contextual support can be seen as an "attempt to render cognitively demanding academic content and language more like everyday communication" (Leung 1996: 38). As research has shown, L2 learners are often rather conversant in BICS, but lack the

competence in academic language (Dalton-Puffer 2013: 225). In the case of CLIL students, however, it may be the other way around, depending on the intensity of the classroom work on academic literacy (Dalton-Puffer 2013: 225-226).

An alternative view of students' proficiency in academic language has been offered by Bunch (2006). He argues that instead of juxtaposing everyday language with academic proficiency, it is necessary to examine how language is used for academic purposes. By investigating students' interaction in group work activities, Bunch (2006: 298) concludes that interactive communication, which he calls the *language of ideas*, is used to discuss the task at hand while the *language of display* is used for preparing formal answers for an audience outside their groups. As both of them deal with subject-specific ideas, they both represent "two different *academic uses* of language" (Bunch 2006: 298, original emphasis) and therefore a "broader notion of 'academic English' is necessary to understand the language demands of contemporary classrooms" (Bunch 2006: 298). Therefore, Dalton-Puffer (2013) stresses that classroom interaction needs to "provide a stage for juxtaposing different oral and literate uses of language, with teachers guiding students in extending their repertoires towards the literate end" (Dalton-Puffer 2013: 227).

All in all, it can be said that there is a clear connection between content, communication, language and learning. As it is thinking that "drives the teaching/learning process" (Mehisto, Marsh & Frigols 2008: 30), CLIL classes must primarily aim at strengthening students' cognitive capacity in order to increase the "mental faculty of knowing" (Mehisto, Marsh & Frigols 2008: 30). In order for successful learning to take place, content must be communicated through contextually aided language. With respect to culture, Cazden and Beck (2003: 107) mention that teachers "must actively work to make the discourse environment of the classroom welcoming to and respectful of students from all cultural backgrounds if the classroom is to afford learning opportunities for all children" which is especially important considering the influx of refugees into Europe in the past couple of years. Coyle (1999) neatly summarises the connection between the 4 Cs as follows:

> The guiding principles [of CLIL] […] focus on a complex interrelationship between the **four Cs – content, cognition, communication and cultural awareness.** Fundamentally, I would suggest that it is through **progression** in the knowledge, skills and understanding of the content, by **engagement** in associated cognitive processing, **interaction** in the communicative context, and a deepening awareness and positioning of cultural self and otherness, that learning takes place. (Coyle 1999: 53, original emphasis)

Having established the relationship between cognition, content and language, it is now possible to turn to Dalton-Puffer 's (2013) construct of cognitive discourse functions. Drawing on Speech Act theory, she proposes that CDFs are "patterns which emerge from the needs humans have when they deal with cognitive content for the purposes of learning, representing and exchanging knowledge" (Dalton-Puffer 2016: 31). So, basically CDFs are verbalisations of learning processes and as such make this learning accessible to others (Dalton-Puffer 2013: 230). These verbalisations were analysed by Dalton-Puffer and grouped together to form seven distinct categories that represent different communicative intentions. These CDF types will be introduced in the following section of this paper.

3.2. The CDF construct

The CDF construct is based on the assumption that speakers want to share their inner cognitive processes behind dealing with a subject-specific topic through communication (Dalton-Puffer 2016: 32). To investigate which processes are most often required in the content subjects, Dalton-Puffer (2013) analysed various curricular documents and compiled a list of over 50 different functions which she grouped together according to their underlying communicative intention. These as well as the labels of the CDF types and verbs which are often used to describe cognitive processes are shown in the following table.

Table 2 The Cognitive Discourse Function construct (Dalton-Puffer et al. 2018: 5)

Underlying communicative intention	CDF type	Performative verbs
I tell you how we can cut up the world according to certain ideas	CLASSIFY[2]	Classify, compare, contrast, match, structure, categorise, subsume
I tell you about the extension of this object of specialist knowledge	DEFINE	Define, identify, characterise
I tell you details of what can be seen (also metaphorically)	DESCRIBE	Describe, label, identify, name, specify
I tell you what my position is vis a vis X	EVALUATE	Evaluate, judge, argue, justify, take a stance, critique, recommend, comment, reflect, appreciate
I give you reasons for and tell you cause/s of X	EXPLAIN	Explain, reason, express cause/effect, draw conclusions, deduce
I tell you something that is potential	EXPLORE	Explore, hypothesise, speculate, predict, guess, estimate, simulate, take other perspectives
I tell you about sth. external to our immediate context on which I have a legitimate knowledge claim	REPORT	Report, inform, recount, narrate, present, summarise, relate

[2] Later publications refer to this CDF type as CATEGORISE (Dalton-Puffer & Bauer-Marschallinger 2019, Evnitskaya & Dalton-Puffer 2020).

As Dalton-Puffer points out, the labels of the CDFs are deliberately formulated as English lexemes to leave room for interpretation. As they represent "observable analogues" (Dalton-Puffer 2013: 220) of thinking processes, they form categories "which have an internal structure" (Dalton-Puffer 2016: 32) and therefore may be expressed differently in the various scientific disciplines and their respective school subjects. Some of these expressions are given in the right column of Table 2.

What can be seen is that the performative verbs listed above are not equally distributed. Some CDFs are more "populated" than others (Dalton-Puffer 2013: 235) because they are operating at different scopes (Dalton-Puffer 2016: 33). Dalton-Puffer refers to Kidd's (1996) distinction of micro- and macro-functions but criticises that their distinction is solely based on length and thus cannot suffice to explain the complexity of the CDF structure (Dalton-Puffer 2016: 33). In addition to this internal complexity, the individual types cannot be neatly distinguished from another and may even be part of each other (Dalton-Puffer 2013: 236). For instance, in order to define something, it is necessary to classify the item in focus. However, classifications need not always be part of a definition (Dalton-Puffer 2013: 236). This integration can also be observed at a larger level. As a meta-analysis of several studies on CDF realisation in Austrian CLIL classrooms has shown, "CDFs can also group together into episodes, since classroom interaction sometimes features longer stretches that clearly serve an overall communicative function but include other CDFs" (Dalton-Puffer et al. 2018: 8), thus showing that CDFs operate on multiple levels. Similar observations were made by Mehan (1979a: 65), who found that "elicitation sequences are organized into larger units [which] […] seem to be organized around topics" and termed these organisational units *topically related sets*.

Furthermore, Dalton-Puffer et al. (2018) have also analysed the frequency of the CDF types within the subjects examined in the individual studies and compared their results, demonstrating that certain disciplines value some CDFs more than others. However, across all investigated subjects the functions that were realised most often were DESCRIBE, EXPLAIN and DEFINE (Dalton-Puffer et al. 2018: 13). They explain this phenomenon by assigning DESCRIBE a central role in classroom discourse in general since it serves the purpose of "establish[ing] an intersubjectively validated 'state of affairs'" (Dalton-Puffer et al. 2018: 13). While DESCRIBE seems to be a characteristic for all classrooms, L1 and L2 alike, the high frequency of DEFINE might be linked to the fact that CLIL and EFL classes necessitate definitions of unknown words, either by translation, which is often performed by students, or

by clarifications in the target language, predominantly given by the teacher (Dalton-Puffer et al. 2018: 13-14).

After having given the theoretical basics of the construct, the individual CDF types need to be briefly outlined in order to be able to propose a correlation to question functions later in this paper. The following sections will be dedicated to giving short characterisations of the different CDFs as well as research findings of their use in class, if available[3].

3.2.1. CATEGORISE

The first cognitive discourse function described by Dalton-Puffer is CATEGORISE. At its heart CATEGORISE is used to tell others "how we can cut up the world according to certain ideas" (Dalton-Puffer 2013: 234) and thus plays an important role in the construction of knowledge (Dalton-Puffer 2016: 34). Unlike remembering facts and terms, classification and categorisation requires students to understand "the connecting links between and among specific elements" (Anderson et al. 2001: 49). Therefore, Anderson et al. (2001) assign CATEGORISE to the realm of conceptual knowledge rather than factual knowledge and proclaim it the first step towards forming principles and generalisations which in turn are a prerequisite for developing theories (Anderson et al. 2001: 49). As a consequence, "[*k*]*nowledge of classifications and categories* is an important aspect of developing expertise in an academic discipline […] [and] a classic sign of learning and development" (Anderson et al. 2001: 49, original emphasis). Mohan (1986) ascribed similar importance to classification as it forms the first part in his three-tiered structure of knowledge (Mohan 1986: 91). He also specifies a range of thinking processes that might be necessary to arrive at a certain classification (Mohan 1986: 79), a point he shares with Trimble (1985) who also includes the "linguistic steps required for its verbalisation" (Dalton-Puffer 2016: 35).

Furthermore, Trimble (1985: 85-86) describes two possible processes of classification: direction and amount of information. In the case of direction, classes may be assigned different members and vice versa. By considering the amount of information provided, three subtypes of classifications become possible: complete classification, which includes the name of the class, its members and the underlying basis of classification, partial classification, which only offers the class's name and its members, and implicit classification, which usually contains the same information as complete classification but is used implicitly as a rhetorical function

[3] For a more in-depth theoretical analysis of the CDFs, see Krösss (2014) or Hofmann and Hopf (2015).

(Trimble 1985: 93). Students who are new to the concept of CATEGORISE have been found to be confused by "both the direction of the classifying process […], and […] the nature of the base of the classification (similarity or difference?)" (Dalton-Puffer 2016: 35, referring to Trimble 1985: 20). Trimble's concept of classification was further expanded by Evnitskaya and Dalton-Puffer (2020) who added and differentiated several sub-categories within their notion of CATEGORISE (Evnitskaya & Dalton-Puffer 2020: 7). In addition to classifications, they argue that the CDF formerly known as CLASSIFY should rather be called CATEGORISE since classifications and comparisons are "a fundamental step towards putting things into categories" (Evnitskaya & Dalton-Puffer 2020: 2), making them "co-hyponyms and members of the superordinate and more general group of categorizing functions" (Evnitskaya & Dalton-Puffer 2020: 3).

The cognitive process of categorising has been assigned different levels of importance in various disciplines. While some researchers have ascribed CATEGORISE and its members a major role in their subjects, for instance Beacco (2010: 21) for history and Pieper (2011: 20) for literature, others, especially those concerned with natural sciences, have described it as a micro function that is only prominent in certain contexts (Vollmer 2010: 23, Linneweber-Lammerskitten 2012: 27-28). Empirical studies have shown that, unlike proposed by Beacco (2010) and Pieper (2011), CATEGORISE tends to be one of the least realised CDFs (Dalton-Puffer et al. 2018: 13). Even though Beacco (2010: 21) stated that matching and contrasting data and interpretations is one of the central features of academic discourse in history, which is supported by Achugar and Carpenter (2012: 263) who declare that "[e]xpert readers in history classify, corroborate, source and contextualize documents", Bauer-Marschallinger's (2016) study in CLIL history classes has shown that CATEGORISE only comes in fifth place of the CDFs proposed by Dalton-Puffer in terms of frequency. Vollmer's (2010) and Linneweber-Lammerskitten' (2012) expectations have, on the other hand, been preliminarily confirmed by similar findings in CLIL physics and biology lessons. Interestingly, Evnitskaya and Dalton-Puffer's study (2020), which exclusively focused on the CDF CATEGORISE in CLIL history and science classrooms, found that there is a significant difference in the types of categorisations generated by the students. While classifications, as defined by them, were predominantly produced in science classes, comparisons were more frequent in history classes (Evnitskaya & Dalton-Puffer 2020: 17) thereby indicating that different subjects tend to promote the use of different categorisation types.

As far as classifications are concerned, it was found that CATEGORISE seems to be a CDF that is mostly realised in teacher monologues, while students are often only asked for the members of a class which leads to very short answers and is therefore not conducive to "learning and understanding their thematic pattern" (Lackner 2012: 102). Similarly, Evnitskaya and Dalton-Puffer (2020) point out that "more than half of the classifications produced were highly schematic and incomplete" (Evnistkaya & Dalton-Puffer 2020: 18) with the basis-of-classification often missing or underdeveloped. They argue that formulating complete classifications "with an explicitly built basis-of-classification requires a higher level of abstraction and a clear identification of the basis-of-classification" (Evnitskaya & Dalton-Puffer 2020: 18). Operating with abstract concepts seems to prove difficult for students as suggested by their findings which show a tendency for learners to use concrete nouns instead of abstract ones thereby displaying an "age-appropriate tendency to remain in the realm of the concrete visible tangible world […] due to students' level of cognitive development" (Evnitskaya & Dalton-Puffer 2020: 18).

3.2.2. DEFINE

The second CDF in Dalton-Puffer's construct is DEFINE which tells others "about the extension of this object of specialist knowledge" (Dalton-Puffer 2013: 234). Similar to CATEGORISE, definitions are needed for disciplinary knowledge creation because it is necessary to know "what is and is not part of the field and also how field-specific knowledge objects are circumscribed and related to each other" (Dalton-Puffer 2016: 36). However, while CATEGORISE is concerned with structuring multiple members in a class, DEFINE "deals with only one member of a class" (Trimble 1985: 86). Seeing as they are so closely related, definitions can be used for teaching classifications (Trimble 1985: 85). This is also suggested by Mohan (1986: 91) who includes DEFINE in his knowledge structure of classification.

As far as linguistic form is concerned, simple definitions have been identified to follow a certain pattern: 'X is a Y that does/is/…' (Dalton-Puffer 2007: 131). In this case X stands for the thing that needs to be defined and which has been termed definiendum (Dalton-Puffer 2007: 131), or species (Trimble 1985: 75). It is linked to a superordinate class Y, also called definiens (Dalton-Puffer 2016: 36) or genus (Trimble 1985: 75), from which it is differentiated by specifying features (Dalton-Puffer 2007: 131), which are referred to as differentia (Trimble 1985: 76). These specifying features may take different forms, such as relative clauses or simple adjectives, and can be "descriptive, comparative, functional, historical or any

combination of these" (Dalton-Puffer 2007: 132, Dalton-Puffer 2016: 36). In order to form definitions, it is therefore necessary to have both "formal-linguistic and extralinguistic" knowledge (Dalton-Puffer 2007: 132).

Similar to the different subtypes of CATEGORISE, Trimble (1985) distinguishes between three categories of DEFINE: 1) formal definitions, which contain all the information described above, so species, genus and differentia (Trimble 1985: 75-76), 2) semi-formal definitions, which only mention the species and its specifying features because the class is either obvious from context or too large and therefore meaningless (Trimble 1985: 77), and 3) non-formal definitions, which define the item through synonyms or antonyms, among other possibilities (Trimble 1985: 78). Another category is offered by Kidd (1996), namely implicit definitions, which, like implicit classifications, show the meaning of a term through a reference in another sentence with a different purpose. In addition to these categories, translations of the item in question into the language learner's L1 have also been included in DEFINE by researchers on CLIL classrooms (Kröss 2014, Hofmann & Hopf 2015). As mentioned in section 3.2., translations are a rather frequent phenomenon in foreign language discourse and are often, but not exclusively, given by students whereas teachers opt for providing synonyms or elaborations (Dalton-Puffer 2007: 136).

Because of their importance in the creation of disciplinary knowledge, definitions are seen as crucial discursive operations to be fostered in foreign language education. Beacco (2010), for instance, awards them a central role for describing "academic discourse in history" (Beacco 2010: 21), which seems to be confirmed by Bauer-Marschallinger's (2016) study on acquiring historical competences in CLIL classrooms. She found that along with DESCRIBE, DEFINE was the second most frequently realised CDF in upper secondary classes. Similar results were found by Hofmann and Hopf (2015) and Kröss (2014) who investigated the role of CDFs in biology and physics lessons. These findings seem to contradict Vollmer's (2010: 23) assignment of DEFINE as a micro-function in science. Their results are also in disagreement with Dalton-Puffer's (2007) findings. To Dalton-Puffer's surprise, definitions were relatively rare in her dataset, especially because most of the lessons observed were predominantly concerned with "covering new or revising old content, which seems to [her] a type of classroom activity which should favor the explication of concepts and therefore foster the occurrence of oral definitions" (Dalton-Puffer 2007: 132).

Particularly relevant for this paper are Lackner's (2012) findings on DEFINE. He found that the majority of definitions came from teachers, whereas students rarely gave definitions (Lackner 2012: 56). Instead they opted for translations, which he explains by the high frequency of Initiation-Response-Evaluation (IRE) patterns in the classroom discourse (Lackner 2012: 57). The triadic dialogue pattern, which will be explained in detail in the next chapter, allows for more control by the teacher who is often the one asking for definitions but in a form that seems to favour the elicitation of translations (Lackner 2012: 57). Furthermore, he remarks that the IRE pattern has a "tendency to minimise students' answers to one word or short phrase answers" and as a result is "more likely to lead to translations instead of definitions" (Lackner 2012: 57). In his study, he also found that translation was also a common avoidance strategy for teachers (Lackner 2012: 57), which does not seem like the best way of teaching academic language competence to learners. It will be interesting to see whether the occurrence of translation can be traced to a specific question format as was implied by Lackner (2012: 58) and whether there are other question formats that are more conducive to eliciting and encouraging formal or semi-formal definitions.

3.2.3. DESCRIBE

Closely related to DEFINE is Dalton-Puffer's (2013) third CDF DESCRIBE. It even shares one of its class members, 'identify', with DEFINE. However, while definitions require specialist knowledge, DESCRIBE is primarily concerned with details "of what can be seen (also metaphorically)" (Dalton-Puffer 2013: 234) and therefore "does not seem to imply a comprehension difficulty on the part of the addressee" (Dalton-Puffer 2016: 38). Furthermore, DESCRIBE can also be linked to EXPLAIN and REPORT (Dalton-Puffer 2013: 236) because descriptions may be based on what the item in question does and thus explain the cause and effect relation (Kröss 2014: 20).

Again, as with the previous two CDFs, researchers in academic discourse have found that descriptions fall into four distinct categories. Firstly, descriptions may focus on the physical attributes of an object, including "the spatial relations of the parts of the object to one another and to the whole, and of the whole to other objects concerned, if any" (Trimble 1985: 71). Secondly, an object may be described by referring to its structure (Lackner 2012: 51-52), for example describing a medieval castle by naming its components, such as "the drawbridge, the moat, the curtain wall, the bailey etc" (Lackner 2012: 52). Thirdly, describing an object may be done by referring to its function or the function of its parts (Trimble 1985: 71-72), giving the

cause/effect pair that is usually associated with EXPLAIN (Kröss 2014: 20). Lastly, closely related to functional descriptions, process descriptions give "a series of steps or stages that are interrelated in that each step (but the first) is dependent on the preceding step and that all steps lead toward a definite goal" (Trimble 1985: 72).

Being able to DESCRIBE has been acknowledged as a "crucial feature of specialist knowledge construction" (Dalton-Puffer 2016: 38) and is therefore mentioned as a significant academic skill by several researchers. Whether it be scientific or humanistic subjects, descriptions have been nominated as desirable macro-functions in all of the reviewed literature (Beacco 2010: 21 for history, Vollmer 2010: 22 for science, Pieper 2011: 20 for literature, Linneweber-Lammerskitten 2012: 27 for mathematics). Their assumptions are supported by the results of Dalton-Puffer et al. (2018: 12-13) who found that DESCRIBE was the most frequent CDF and called it a "defining characteristic of the communicative setting of the 'lesson'" (Dalton-Puffer et al. 2018: 13). They explained this high frequency by the necessity of establishing an "intersubjectively validated 'state of affairs'" between the teacher and the students in order to progress in the co-construction of knowledge (Dalton-Puffer et al. 2018: 13).

The relevance of descriptions to multiple disciplines means they "can take different forms in different contexts" (Schleppegrell 1998: 187). What unites them, however, is that they are "typically timeless and generic, omitting reference to self and addressee and focusing attention on the object presented" (Schleppegrell 1998: 187). That being said, Lackner (2012) found that the target of the descriptions was often physically present and therefore describing was a "highly contextualized practice" (Lackner 2012: 73) with many colloquial language features that he attributed more to BICS than to CALP, stressing that especially structural descriptions "cannot be seen as sufficiently realized in an academic way in the CLIL history classroom" (Lackner 2012: 83). Furthermore, he noticed that the prevalent IRE pattern lent itself particularly to the elicitation of process descriptions with teachers using an initiating question to encourage students to describe the first step in a process, which in turn was then followed by follow-up questions or incomplete sentences as a way of continuing the description (Lackner 2012: 88).

3.2.4. EVALUATE

The fourth and largest category in terms of members is the CDF EVALUATE. In contrast to the previously described CDFs, it is a category that focuses on subjectivity, which makes it rather distinct from the other discourse functions proposed by Dalton-Puffer (Kröss 2014: 22). The

underlying communicative intention expresses a "personal stance towards" something which is based on "evidence, […] previous knowledge and values" (Dalton-Puffer 2016: 41). According to Anderson et al. (2001: 83) this evidence can be quantitative as well as qualitative. Dalton-Puffer (2016) stresses that her definition of EVALUATE "also subsumes what in rational academic procedures/discourse must be part of an evaluation and is required to be explicitly expressed, namely the evidence, criteria, standards or reasons which support the evaluation" (Dalton-Puffer 2016: 42), which means that opinions must always have some sort of reasoned background and cannot stand on their own. Anderson et al. (2001) further distinguish between two subcategories of EVALUATE, namely checking and critiquing (Anderson et al. 2001: 83). While checking tests for "internal inconsistencies or fallacies in an operation or a product" (Anderson et al. 2001: 83), critiquing judges "a product or operation based on externally imposed criteria and standards" (Anderson et al. 2001: 84). They also mention that critiquing has been associated with critical thinking, a topic which is highly relevant for developing academic skills and which will be discussed in depth in chapter 4.

This importance has also been stressed by researchers in various disciplines, whether it be mathematics (Linneweber-Lammerskitten 2012: 27), where evaluating and arguing is seen as a key skill, science (Vollmer 2010: 22), or humanistic subjects like literature (Pieper 2011: 20-21) and history, where justifying deductions is seen as a macro-function (Beacco 2010: 21). Mohan (1986: 91) also acknowledged the importance of EVALUATE by making it one of his knowledge structures. Despite their claims, empirical evidence has shown EVALUATE to be a rarely realised CDF (Dalton-Puffer et al. 2018: 12-13). In fact, in the studies on CLIL classrooms in biology (Hofmann & Hopf 2015) and physics (Kröss 2014) EVALUATE was the least frequent CDF, whereas in economy (Brückl 2016) and history (Bauer-Marschallinger 2016) they occurred slightly more often (Dalton-Puffer et al. 2018: 13), which seemingly supports the notion that "social science and humanities subjects provide more space for students to position themselves vis-á-vis the content than natural science subjects" (Dalton-Puffer et al. 2018: 14), a point also postulated by Mohan (1986: 92). However, Dalton-Puffer et al. (2018: 14) also warn against generalising their results as the individual studies were dealing with small data sets.

Apart from its value in developing academic literacy, evaluation is also a key factor in giving feedback to students as it is part of the Initiation-Response-Evaluation pattern mentioned earlier. While students are in theory also able to pass judgment on their teachers, practice has

shown that the hierarchical relationship between them is likely to be a "decisive factor for [an] unequal distribution of evaluative judgments" (Hofmann & Hopf 2015: 45). They summarise this paradox rather fittingly:

> It is an interesting phenomenon that teachers do most of the asking and learners most of the answering, although the first assume a professional status in their subject, while the latter is the group who generally lacks subject-related knowledge. In the rare cases that students do ask their teachers questions, the answers to these questions are hardly ever evaluated, be it due to the belief that teachers are all-knowing, or because students avoid to threaten their teacher's face openly in fear of possible consequences. (Hofmann & Hopf 2015: 45)

This inequality in knowledge distribution was also observed with EXPLAIN by Dalton-Puffer (2007: 159), which will be the topic of the next section.

3.2.5. EXPLAIN

The next CDF type in Dalton-Puffer's construct is EXPLAIN. It is often used synonymously with DEFINE in classroom contexts (Dalton-Puffer 2016: 37). However, unlike DEFINE, which is primarily concerned with giving information about a definiendum and oriented "inwards", EXPLAIN seeks to bridge a knowledge gap between speaker and listener and, thus, is directed outwards (Dalton-Puffer 2007: 139-140). Therefore, it is a particularly relevant function in learning (Dalton-Puffer 2007: 140), which is supported by its high frequency in the analyses of CLIL classrooms (Dalton-Puffer et al. 2018: 13).

Because explaining is used so broadly, Dalton-Puffer (2016: 44) stresses the need for precision when using EXPLAIN as a CDF. In order for a sample to be counted as an instance of EXPLAIN, it either needs to express causality (Dalton-Puffer 2013: 239) or provide "deductive explanations of phenomena" (Dalton-Puffer 2016: 44), which, Dalton-Puffer (2016) mentions, is especially relevant for developing scientific literacy (Linneweber-Lammerskitten 2012: 27, Vollmer 2010: 22) but has also been deemed important for teaching literature (Pieper 2011: 20) and history (Beacco 2010: 21). Anderson et al. (2001: 75-76) propose that in the natural sciences cause-and-effect may be "derived from a formal theory" (75), whereas social sciences and humanities rather support their explanations with "research or experience" (76). The tendency to base explanations on experience and behaviour has especially been observed in history, where students often personalise historic events and institutions (Halldén 1998). The cause/effect relationship that is characteristic for EXPLAIN is also one of the key factors behind Mohan's middle category, *principles*. However, Mohan includes other thinking processes as

well, for instance “inferring conditions from effects” or “predicting effects of conditions” (Mohan 1986: 83) which fit more into the CDF EXPLORE than EXPLAIN.

As far as empirical research is concerned, EXPLAIN was found to be among the top three CDFs used in classrooms of physics, economy and history (Dalton-Puffer et al. 2018: 13). In history it was often observed in upper secondary classes where students used more varied forms to express their explanations than in lower secondary lessons (Bauer-Marschallinger 2016: 85). Bauer-Marschallinger (2016) also found that students sometimes employ rhetorical questions or interrogative clauses to introduce their explanations in presentations. She further notes that other CDFs were commonly used in connection with EXPLAIN, such as DESCRIBE for supporting explanations or underlying definitions with causal relationships (Bauer-Marschallinger 2016: 86).

Similar to the other CDFs so far, Lackner (2012: 69) observed that most of the students’ explanations concerned with causal relationships where triggered by teacher questions, and in particular questions that started with “why?”. This is not surprising, however, as Dalton-Puffer (2016: 45) points out that “explanations are always about answering the question ‘why?’ and are thus always causal in this sense”.

3.2.6. EXPLORE

One of the most highly regarded academic skills is EXPLORE. Its underlying communicative intention is to talk about “something which is not in the here and now, and which is not past fact either” and is not based on “conclusive evidence” but something potential that “can serve […] as a basis for further reasoning” (Dalton-Puffer 2016: 46) and is linked to “perceived factual reality” (Dalton-Puffer 2007: 159). Dalton-Puffer (2016) provides several closely related synonyms, such as *assume*, *suppose, presume,* and *conjecture*, as well as semantically more distant verbs like *predict, guess,* and *speculate* (Dalton-Puffer 2016: 46). In previous publications she referred to this academic language function as hypothesising and predicting (Dalton-Puffer 2007) but takes care to mention that her notion is not restricted to a specific scientific theory but is rather a “general, semi-expert” one (Dalton-Puffer 2007: 159). The ability to build assumptions on the base of existing facts makes this CDF an “integral part of knowledge building in educational contexts” (Dalton-Puffer 2016: 47).

Forming hypotheses or predictions is often considered to be rather complex as it not only involves higher order thinking skills (Anderson et al. 2001: 86) but also requires using elaborate language forms (Dalton-Puffer 2007: 159), such as modal verbs and adverbs, and

conditional clauses (Dalton-Puffer 2016: 47). This high level of complexity induces students to avoid using EXPLORE in the classroom context as they may feel that their foreign language proficiency is not sufficient enough to form predictions (Dalton-Puffer 2007: 168). Attempts of encouraging hypothesising through personalisation by the teacher are also often unsuccessful, either because the addressed student does not want to share any personal thoughts on the topic in question, or because he/she only gives a short answer as way of avoiding having to use complex language (Dalton-Puffer 2007: 162-163) and instead opts for "accuracy and safety rather than risk-taking and complexity" (Dalton-Puffer 2007: 163). Risk-taking, however, is something that needs to be encouraged in order to "move beyond the status quo" (Wells 2009: 129) and foster learning. Students' minimalised answers could also be grounded in the prevalent use of the IRE pattern in classroom discourse, which has been shown to be responsible for yielding short responses from the students, as already mentioned above (Dalton-Puffer 2007: 163). As a result of its complexity, instances of EXPLORE are relatively rare in empirical studies on CLIL classrooms (Dalton-Puffer 2007: 167, Dalton-Puffer et al. 2018: 13). When they do occur, however, they are usually constructed with the help of the teacher or other students as learners seem to be "reluctant 'to go at it alone'" (Dalton-Puffer 2016: 48).

Despite being emphasised as a macro function, especially in scientific subjects (Linneweber-Lammerskitten 2012: 27, Vollmer 2010: 22), many of the lessons Dalton-Puffer (2007) investigated did not show any instances of discourse about "possibilities, probabilities, predictions or consequences" (Dalton-Puffer 2007: 167). Instead the main focus seems to lie on passing on facts (Dalton-Puffer 2007: 167), which Dalton-Puffer calls the "bread and butter of Austrian CLIL classrooms" (Dalton-Puffer 2007: 118).

3.2.7. REPORT

The last of Dalton-Puffer's devised CDF types is REPORT. It is used to describe "what happened, when, who did it and to whom and under what circumstances" (Dalton-Puffer 2016: 49). Thus, its primary function is to inform someone about something that is "external to [the] immediate context" (Dalton-Puffer 2013: 234) but on which the speaker has a "legitimate knowledge claim" (Dalton-Puffer 2013: 234). This knowledge claim can either be based on the speaker's own experience or on something that he/she has read or heard (Kröss 2014: 28). Dalton-Puffer (2016: 49) gives several synonyms that are semantically very close: *report, recount, relate, give an account of, narrate, present,* and *summarise* for REPORT. Due to their

semantic congruence, the difference between them can be attributed to “conditions of use, register and/or connotation” (Dalton-Puffer 2016: 49).

These conditions can, for instance, be based in the different curricular goals for individual school subjects. One example would be the varied emphasis on *report* and *narrate*. While reporting is trying to give an objective account of what happened, narrating allows for a subjective representation and even some fictionality (Vollmer 2011: 6-7). Dalton-Puffer (2016: 51) states that “a story is basically the reproduction of a report in a fictional space: real-life events are turned into stories with a plot and characters”, which can pose a challenge, especially in history where students tend to personalise external information. Nonetheless, Bauer-Marschallinger (2016: 24) mentions that narrating is an integral skill in teaching history as students are required to “reconstruct validated historical pieces of information into a comprehensible narrative”. Not surprisingly, narrating is also important in literature education, where it is seen as a macro-function along with summarising (Pieper 2011: 20-21). With regard to scientific subjects, such as mathematics or biology, one might suspect that reporting is more desirable than narrating. Interestingly, both Linneweber-Lammerskitten (2012: 27) and Vollmer (2010: 22) include narrating in their macro-functions and give more details about reporting in their micro-functions. In mathematics, for example, it might be necessary to report or recount “on a solution of a problem” and represent “mathematical objects, relations or data” (Linneweber-Lammerskitten 2012: 28). In science education, reporting is more concerned with “recounting […] on an experiment” or representing “textual or factual data” (Vollmer 2010: 23). Both reporting and narrating, however, must be well-structured (Vollmer 2011: 7).

Another member of REPORT that needs to be examined more closely is *summarise*. Even though some theories on academic language functions treat summarising as a separate process where students need to compile information into a representation (Anderson et al. 2001: 73), Dalton-Puffer (2016: 49) includes it in REPORT because the cognitive processes behind *summarise*, where students actually need to filter the information and select only those points that are the most important, are “part of the activities that form this particular complex of discourse functions” (Dalton-Puffer 2016: 49).

As far as realising REPORT in classroom discourse is concerned, Dalton-Puffer (2016) mentions that there are three typical constellations in which reporting is used. Firstly, students who have been working in groups may provide short summaries of their results to the rest of the

classroom (Dalton-Puffer 2016: 50, Bunch 2006). Secondly, students may give longer reports during monologic presentations, a mode that, according to Dalton-Puffer, is "hugely popular in Austrian classrooms" (Dalton-Puffer 2016: 50). Lastly, teachers can also give short accounts of "a matter related to the topic" (Hofmann & Hopf 2015: 58), which are, however, not overwhelmingly frequent (Dalton-Puffer 2016: 51). Within episodes of REPORT, other CDF types may be used for support. While descriptions and classifications are very likely to be part of reporting, Kröss (2014: 30) points out that in theory "any CDF type can be part of REPORT, especially since it might be referring to something someone else has said, which can involve any CDF type".

Even though REPORT is often emphasised as a desired language skill in curricular documents, empirical data have shown it to be a very infrequent CDF (Dalton-Puffer et al. 2018: 13). With the exception of economy, where REPORT constitutes a quarter of the realised CDFs (Dalton-Puffer et al. 2018: 12), REPORT only makes up between 7 and 14% of the CDFs in the other investigated subjects (Dalton-Puffer et al. 2018: 12). This suggests that curricular emphases do not necessarily reflect classroom practices (Dalton-Puffer et al. 2018: 13).

4. Questions in the classroom

After having introduced the CDF construct and discussed the role of cognition and communication for the learning process in chapter 3, the following pages will be dedicated to characterising how dialogic teaching is achieved. One way of opening the floor to students' contributions and thus to the co-construction of knowledge is by asking questions (Mercer 2002: 144). Asking questions has always been an integral part of learning and therefore also of education (Crawford Camiciottoli 2008: 1217). Within the classroom discourse, they have an array of purposes. For instance, questions can be used "to discover the initial levels of pupils' understanding" (Mercer 2002: 144), which then allows for the teachers to "adjust their teaching accordingly" (Mercer 2002: 144). Furthermore, they can be used to guide learners' reasoning processes of their own actions (Mercer 2002: 144) but also of the topic by prompting issues and stimulating thought (Crawford Camiciottoli 2008: 1217). Most importantly, they allow for an exchange between the one who asks the question and the one who answers, providing opportunities for linguistic output and are thus a key measure for communicative teaching (Nystrand & Gamoran 1997: 36), which is especially relevant in a CLIL context since research has shown that CLIL teachers opt for dialogues instead of monologues as a preferred teaching mode (Dalton-Puffer 2007: 93). In the classroom dialogue, teachers

can lead students to discovering answers through "mutual reflection and reasoning, thereby developing an inquisitive and critical approach to learning" (Crawford Camiciottoli 2008: 1217) which ultimately serves the purpose of synchronising educational knowledge (Dalton-Puffer 2007: 93-94) within a larger group.

Questions come in many forms and functions and can serve different purposes. Especially in whole-class interaction, teacher questions have often been found to be part of a so-called Initiation-Response-Feedback/Evaluation (IRF/E) pattern (e.g. Sinclair & Coulthard 1975, Mehan 1979ab, Cazden & Beck 2003, Wells & Arauz 2006: 380). First, the teacher initiates the conversation by asking a question. Second, the student responds, either by answering the question or by denying an answer. Lastly, the student's response is typically followed by a feedback from the teacher which, according to Tunstall and Gipps (1996: 391), can either be evaluative or descriptive and task-related in its nature. Evaluative feedback is either positive, which marks the end of an IRE sequence (Mehan 1979a: 64), for instance *well done* or *good work*, or negative, such as *not really* or *not exactly*, which prompts the continuation of the sequence (Mehan 1979a: 64), and "may serve not only to let learners know how well they have performed but also to increase motivation and build a supportive classroom climate" (Richards & Lockhart 1994: 188); descriptive feedback, however, is more focused on achievement or improvement of the student's actual competence (Tunstall & Gipps 1996: 393), either with regard to the content or the language the student has produced (Richards & Lockhart 1994: 188-192), for instance when correcting a student's pronunciation. Richards and Lockhart's (1994) distinction is supported by Tunstall and Gipps (1996: 393) who found that evaluative feedback is more concerned with "affective and conative aspects of learning" (Tunstall & Gipps 1996: 393) whereas descriptive feedbacks emphasise the cognitive learning dimension.

As already mentioned in the previous chapters, the IRE pattern is a common feature in CLIL classrooms (Dalton-Puffer 2007, Lackner 2012). In her study of questions in CLIL discourse, Dalton-Puffer discovered that questions in the IRE pattern often generated "short, minimal answers which simply provide individual facts without encoding them in a full proposition" (Dalton-Puffer 2007: 113) irrespective of whether the initiating question was designed to elicit longer answers or not. Similar findings were also obtained by Lackner (2012) in his study of the four academic discourse functions CLASSIFY, DEFINE, DESCRIBE and EXPLAIN. Lackner found that the predominant use of the IRE pattern provided few opportunities for teacher

monologues where students might have been able to observe "the use of lexico grammatical features to realize discourse functions" (Lackner 2012: 104) as well as provide fewer opportunities for understanding the underlying cognitive concepts behind the discourse functions.

Apart from their pattern of use in the ongoing classroom discourse, it is also necessary to consider the impact of the forms and functions questions can take. Furthermore, questions can be used strategically by the teacher and thus have different purposes. While some questions are merely asked to guide the content of a conversation into a new direction, other questions might require deep reflection and thought to be answered. The following sections are dedicated to outlining the various frameworks that have been devised over the past decades for classifying question forms and functions.

4.1. Question forms

Question can take many different forms. An intuitive distinction would be to categorise questions according to the forms of their answers. Thus, it makes sense to draw an initial difference between questions which elicit a "yes" or a "no" as an answer, and questions which require more elaborate responses. However, there are more forms that questions can take and that are reliant on their syntactic form. The following characterisation represents an overview of often-investigated question forms.

To begin with, two basic categories of question forms can be distinguished: *interrogative question forms*, which are phrased in a typical question-type format that requires and inversion of subject and verb, and *declarative questions*, which take the form of a declarative sentence but function as a question as is often indicated by a rise in intonation towards the end. This distinction primarily relies on syntax as its foundation. Within the *interrogative* format, further distinctions can be made. These represent the ones mentioned above, namely *yes/no-questions*, also termed *polar questions* (Stivers 2010), and *question-word questions* (Stivers 2010) which can be further divided according to the question words they use (*what, how, why, who, when,* and *where*).

Some studies equate *polar questions* with so-called *closed questions* (for instance Dalton-Puffer 2007: 97), where only one particular answer is seen as a correct response to the question. However, it has been noted that a broader definition of *closed questions* might be necessary, one that not only includes *yes/no-questions* but also *question-word questions* that

allow for a limited set of possible correct answers (Dalton-Puffer 2007: 97). Although *question-word questions* can generally be seen as *open*, meaning that they do not seek a particular response, some researchers remarked on the difficulty in differentiating between *open* and *closed questions*; especially in oral interaction (Cazden & Beck 2003: 111). Dalton-Puffer (2007: 97), for instance, noticed that "[i]dentification by opener alone is certainly not reliable since some questions may be open in form but closed in function in a specific situation" (Dalton-Puffer 2007: 97). So even though on the surface it looks like the teacher is allowing for a range of answers, he/she is actually looking for a specific response instead (Cazden & Beck 2003: 111). Because *open questions* are not restricted in their responses, they are less predictable and thus more difficult to answer by the student and to integrate in the ongoing classroom discourse by the teacher (Dalton-Puffer 2007: 97).

The last question forms that are investigated by researchers are *alternative questions* (Stivers 2010; Crawford Camiciottoli 2008) and *tag questions*. The former request the respondent to make a choice, e.g. "*Were you drunk or were you sober?"* (Stivers 2010: 2775) and are, thus, often used to clarify an issue. *Tag questions* can further be divided into a canonical form (e.g. *isn't it?*) and an invariant form (e.g. *right?*) (Baker 2005: 315). They are mainly used to elicit confirmation (Stivers 2010: 2777) and agreement (Thompson 1998: 141-142).

While the research on the occurrence of these question forms can deliver important insights towards student participation (Morell 2004), the functions of questions and their purposes within discourse seems to be more relevant in predicting their efficiency of eliciting responses.

4.2. Question functions

In contrast to question forms, the classification of question functions is more subjective. While some researchers focus on the effect of questions on and their influence in directing the classroom discourse (Thompson 1998), others emphasise their authenticity (Nystrand et al. 1997, Wright 2016). To shed light on the prevalent terms concerning question purposes, an outline of influential question functions will be given.

In addition to the binary question distinctions already discussed, questions can be used for various purposes within regulative or instructional phases in the classroom. While the abovementioned forms primarily focus on eliciting information, *rhetorical questions* are meant to provide it (Athanasiadou 1991: 108) as they do not require an answer (Morell 2004: 329) and actually "minimize the emphasis on information" (Athanasiadou 1991: 109). Instead

they can be used to attract the interest of the listener, give "emphatic prominence" (Athanasiadou 1991: 109), or express wonder. Another question type that is supposed to elicit a non-verbal response is that of *indirect questions* (also *indirect directives*). These questions leave the respondent in a dominant position as they serve as an inducement for action (Athanasiadou 1991: 110), even though they take the form of an interrogative (Cazden & Beck 2003: 108). An example for *indirect requests*, as they are called by Athanasiadou (1991), would be to ask, "*Is there anybody who doesn't have this handout?"* (Morell 2004: 329) and students are expected to raise their hands in response. Other uses of indirect requests include indirect suggestions, invitations, and polite requests (Athanasiadou 1991: 110).

One of the most frequently used models to investigate questions in the classroom distinguishes between *referential* and *display questions* (e.g. Searle 1969: 66, Mehan 1979b). It is based on whether the person who asks the question already knows its answer. On the one hand, teachers can ask display questions to which they already know the correct response (Wright 2016: 161). Their purpose is to allow students to display the knowledge they have gained during class (Searle 1969: 69, Wright 2016: 161), which is why Athanasiadou (1991: 109) has also termed them *examination questions* (also *test questions* in Nystrand et al. 1997, *exam questions* in Searle 1969). Display questions are infamous for eliciting short simple answers (Brock 1986: 55) that can often even be restricted to only one word (Dalton-Puffer 2007: 96). Because they are only used to elicit prespecified answers, they are often asked by teachers and rarely by students. In fact, display questions make up most of the questions in classroom interaction (e.g. Farahian & Rezaee 2012, Nystrand & Gamoran 1997, Yang 2010), which has been widely criticised (Mercer 1999: 316) because they "deprive[…] the learners from opportunities" (Farahian & Rezaee 2012: 162) not only concerning communication practice but also with regard to contributing their own thoughts and thus aiding the co-construction of knowledge (Farahian & Rezaee 2012: 162, Nystrand & Gamoran 1997: 38).

Referential questions, on the other hand, are asked by teachers and students alike as the answers to those questions are not previously known by the questioner (Wright 2016: 161). Dalton-Puffer (2007: 101) remarks that student questions are, in fact, always referential, a point that is also made by Nystrand and Gamoran (1997: 39). Brock (1986) found that referential questions tend to elicit responses that are "on average more than twice as long and more than twice as syntactically complex as their responses to display questions" (Brock 1986: 55). This outcome has inspired many studies to encourage the integration of more

referential questions in teaching in hope of increasing the language output of students. However, Brock's findings have also been called into question. Yang (2010), for instance, found that "referential questions themselves will not make students produce longer responses unless the teachers are able to encourage their students to elaborate further rather than just accepting […] brief and syntactically less complex responses" (Yang 2010: 181) and Dalton-Puffer (2007) noticed that referential questions only "trigger extended students responses or discussions […] if the questions are also 'open'" (Dalton-Puffer 2007: 124).

Furthermore, the integration of referential questions into classroom communication has also been encouraged because they are often perceived to be more authentic with regard to natural language use outside the classroom (Wright 2016: 163-164). It must be said, however, that a classroom does not reflect a relaxed conversational setting but rather a very specific kind of work environment where the primary purpose is learning (Breen 1985: 67-68). Widdowson (1990: 164) even stresses that "the whole purpose of pedagogy […] is to contrive economical and more effective means for language learning than is provided by natural exposure and experience" and thus the classroom language is authentic with regard to language learning, even if it may not be authentic to 'outside' language use (Widdowson 1990: 46)[4]. He (1998) also notes that it is impossible to achieve 'real-world' authentic language use in the classroom because "the classroom cannot provide the contextual conditions for it to be authenticated by the learners" (Widdowson 1998: 711). In order to facilitate learning and cater to students' intellectual needs, teachers need to constantly monitor their students' knowledge and understanding (Mercer 1999: 317), which requires the use of display questions. Moreover, Dalton-Puffer (2007) points out that display questions are also used to put "a topic or knowledge item center stage, thus making it available for collective access and reference" (Dalton-Puffer 2007: 95). Although referential questions can serve the same purpose, they are used less frequently because of the unpredictability of their answers (Dalton-Puffer 2007: 95). Consequently, referential questions from teachers are usually rarer during classroom discourse than display questions (Mercer 1999: 317). Nystrand and Gamoran (1997: 38) also equate referential questions with authentic questions. However, they base this authenticity on the unforeseeable nature of the question, not some notion of usefulness for communication outside the classroom. According to Nystrand and Gamoran, the purpose of authentic questions in the classroom is to signal interest in the students' own thoughts and

[4] For more information on the various types of authenticity in the language classroom, see Breen (1985) or Gilmore (2007).

knowledge and thus invite them to "contribute something new to the discussion that can change or modify it in some way" (Nystrand & Gamoran 1997: 38), which makes them an important factor for dialogic work. Test questions, on the other hand, can be seen as monologic because they do not encourage an exchange of ideas (Nystrand & Gamoran 1997: 38).

Another influential typology of question functions differentiates between *content*- and *audience-oriented questions* (Thompson 1998, Crawford Camiciottoli 2008, Chang 2012). Thompson (1998) originally devised this distinction to investigate how presenters and lecturers create interactivity in monologic talks. She concluded that questions are an effective method to engage with the audience. Audience-oriented questions are directed at the audience of the monologue and "at least symbolically allow the audience an opportunity to provide an actual verbal or non-verbal response" (Thompson 1998: 140). Thompson further distinguished three main purposes of these questions: "to *check* something with the audience" (Thompson 1998: 141), to *evoke a response* from the audience, which allows for a dialogic exchange within the monologue, and to *seek agreement* from the audience (Thompson 1998: 141, original emphasis). In contrast, content-oriented questions do not expect a response from the audience and are meant to guide the listener through the content of the lecture (Thompson 1998: 143). Although they can be regarded as rhetorical, Thompson (1998: 143) points out that content-oriented questions may also focus on bigger aspects of the research field, which may even be difficult to answer by the presenter or the discourse community as a whole. Their main purpose is to *raise issues* (Thompson 1998: 143) and to *introduce information* (Thompson 1998: 144). This framework was adapted by Crawford Camiciottoli (2008) and Chang (2012) in their analyses of academic lectures. Although Crawford Camiciottoli (2008) renamed Thompson's micro-functions into *requesting confirmation/clarification*, *eliciting response,* and *soliciting agreement*, most of them convey the same purposes. Within content-oriented questions, however, Crawford Camiciottoli (2008: 1222) distinguished between *stimulating thought* and *focusing information* rather than *raising issues* and *introducing information*. Chang (2012) mainly relied on Crawford Camiciottoli's distinction but added a few categories under audience-oriented questions. In addition to Crawford Camiciottoli's three subdivisions, he also found that lecturers use questions to *check comprehension* and to *manage* the class and students' engagement (Chang 2012: 105, original emphasis). While comprehension checks on new information or learning tasks can be a helpful way of providing contextual support (Leung 1996: 29-30), questions for

managing the classroom are meant to "enhance the teaching flow" (Chang 2012: 106) by building rapport and increasing the interactivity of the lecture.

Chang's (2012) addition of classroom management loosely correlates with Dalton-Puffer's (2007) distinction of a *regulative* and an *instructional* register in the classroom. Dalton-Puffer argued that it is necessary to differentiate between procedural questions (Richards & Lockhart 1994: 186) that deal with matters such as learning materials, group work, and speaker nomination (Dalton-Puffer 2007: 102), which correspond to Chang's (2012) *class management/engagement* function, and content questions since both registers give rise to diverse language functions (Dalton-Puffer 2007: 99). Her analysis showed that even though teachers, as opposed to students, ask most of the questions in both registers, there is a more balanced distribution within the regulative register. Here students ask 44.2% of the questions while they only ask 18.8% in the instructional register. Dalton-Puffer (2007) explained this phenomenon by referring to the teachers as "primary knowers" (Dalton-Puffer 2007: 100) of educational content, which leaves students fewer opportunities to function as experts. Interestingly, students seem to distinguish between content questions and procedural questions instinctively since they almost exclusively use their L1 for regulative matters and for instructional questions that concern vocabulary and spelling (Dalton-Puffer 2007: 102-103). For the content subject core, however, they tend to use English as their language of choice (Dalton-Puffer 2007: 103). Teachers, on the other hand, rarely switch to their L1, even within the regulative register (Dalton-Puffer 2007: 107).

In her analysis, Dalton-Puffer (2007) not only distinguished between referential, display, open, and closed questions, she also categorised questions according to the complexity of information they seek to elicit. She devised the following questions types (Dalton-Puffer 207: 98):

- questions for facts
- questions for explanations
- question for reasons
- questions for opinions
- meta-cognitive questions

In order for these questions types to be used in the empirical analysis for this paper, their base of distinction as well as possible correlations with the already discussed CDF types will be outlined in the following sections.

4.3. Categorising questions according to cognitive load

In contrast to the previously mentioned distinctions of questions, Dalton-Puffer's (2007) construct of questions relies on the level of complexity that is involved in answering the question (Dalton-Puffer 2007: 118). Similar to other researchers (Anderson et al. 2001, Nystrand 1997, Richards & Lockhart 1994), Dalton-Puffer notes that questions concerned with factual knowledge do not involve higher thinking skills and are, thus, put on the lower end of her complexity scale (Dalton-Puffer 2007: 118). The level of complexity increases the more students need to think in order to answer a question. Nystrand and Gamoran (1997: 40) investigated the cognitive level of questions and whether an increased level of thinking led to more dialogue. Their basis of analysis was whether the question could be answered "through the routine application of previously learned knowledge" (Newmann 1990: 44, cited in Nystrand & Gamoran 1997: 40). If the answerer needed to generalise, analyse or speculate in order to respond, Nystrand and Gamoran (1997: 41) ranked the question higher on the cognitive level scale. Furthermore, they listed several factors that influence the cognitive level, such as the source of the question, meaning that a question may be referential or display, as well as the "experience, ability, and prior knowledge" of the answerer (Nystrand & Gamoran 1997: 40). Their results showed that learning was not necessarily enhanced by a higher cognitive level itself but instead was dependent on "the ways teachers and students interacted as evidenced by authentic questions, uptake, and especially discussion" (Nystrand & Gamoran 1997: 57). They also noted that these ways do not "categorically produce learning" (Nystrand & Gamoran 1997: 72) in themselves. Instead, learning seems to be primarily fostered by "*the extent to which instruction requires students to think, not just report someone else's thinking*" (Nystrand & Gamoran 1997: 72, original emphasis). Therefore, it can be concluded that questions for facts, whose main concern is to "recall […] previously presented information" (Richards & Lockhart 1994: 186), do not require deep thought and thus cannot be said to be an effective learning measure. They can be useful, however, for establishing a common 'pool' of knowledge before moving on to more demanding and, perhaps, more engaging tasks.

As "[d]emographic and technological changes in society" (Cazden & Beck 2003: 104) in the last decades have necessitated a shift towards more effective communication and teamwork, "[c]urriculum standards now place less emphasis on facts or procedures to be learned by heart and more emphasis on strategies for learning and doing" (Cazden & Beck 2003: 104), primarily by encouraging "discussions that stimulate and support higher order thinking" (Cazden & Beck

2003: 104) where students can "explain their reasoning, listen, learn from, and even argue with their peers" (Cazden & Beck 2003: 104). Empirical research, however, has produced sobering results in this regard. Nystrand (1997) notes that "[m]ost instruction is about what is already known and figured out. Indeed, learning and being prepared for class typically mean reliably remembering what is already known" (Nystrand 1997: 2). Students are rarely asked to "articulate, examine, elaborate" (Nystrand 1997: 3) or contribute their own thoughts to the construction of knowledge, but instead have to "recall what someone else thought" (Nystrand 1997: 3). These observations in American language classrooms are corroborated by Dalton-Puffer's (2007) findings on the question distribution in Austrian CLIL lessons. She found that the overwhelming majority of questions were concerned with eliciting factual knowledge. They made up 89% of the questions whereas all the other question functions together only comprised 11% (Dalton-Puffer 2007: 101). Similar observations were also made by Pascual Peña (2010) and Llinares and Pascual Peña (2015) who found that around 69.25% (Pascual Peña 2010: 68)[5] or 64.83% (Llinares & Pascual Peña 2015: 21) were questions for facts. Even though their numbers were much lower than Dalton-Puffer's (2007: 101), they still confirm the prevalence of factual questions in CLIL classrooms. Furthermore, the answers to factual questions were found to be of "low linguistic and conceptual complexity" (Dalton-Puffer 2007: 113). Her findings are confirmed by Llinares and Pascual Peña's (2015) investigation of the length and complexity of student responses that suggests that "[q]uestions for facts appear to elicit the simplest and shortest responses" (Llinares & Pascual Peña 2015: 25) with shorter turns and lower lexical density, among other features. Nystrand (1997: 5) proposes that students' short answers can be grounded in the role they take in the teacher's recitation of knowledge. Students are trying to guess what the teacher is thinking of and, thus, only give tentative answers for fear of being wrong (Nystrand 1997: 5-6). What needs to be considered in a second language context is that, in addition to figuring out what somebody else is thinking of, learners also need to be able to express their thoughts in a language that is less known to them than their L1, which might be a contributing factor for the low level of linguistic complexity. Another possible reason for their high occurrence is that questions for facts "may serve as effective means of social and verbal control in the classroom (Dillon 1983: 62). In

[5] In Pascual Peña's study (2010: 68) two different percentages were given for two teachers. In order to receive an overview of the question distribution, the number of questions asked by these two teachers as well as their respective question functions were totalled up and then re-calculated following the formula (*questions for X: questions asked) *100 = question functions* [in percent]. This calculation showed that questions for facts made up 69.25%, followed by questions for explanations (5.78%), questions for reasons (12.73%), questions for opinions (11.40%), and meta-cognitive questions (0.83%).

order to formulate complex answers to questions, students need to be allowed uninterrupted time to think, which is why the classroom must be disciplined and well-ordered (Dillon 1983: 62).

In contrast to questions for facts, the other types proposed by Dalton-Puffer (2007) seem to require higher order thinking skills. Dalton-Puffer (2007: 118) has devised the following ranking for her question types according to complexity:

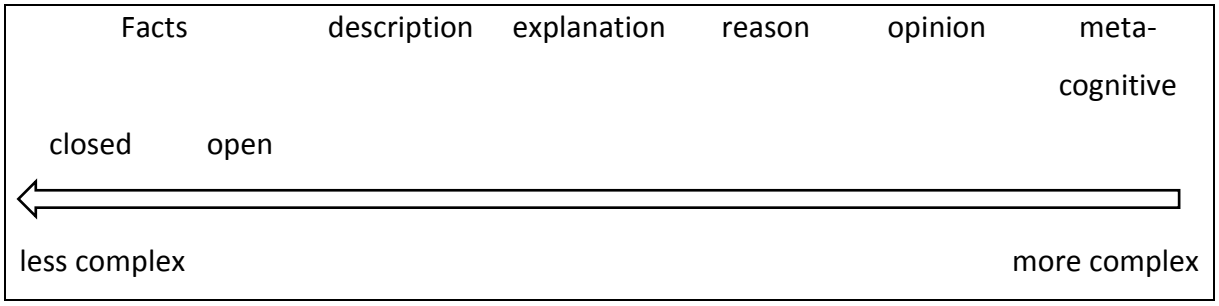

Figure 1 Complexity ranking of questions according to the required thinking level for their responses (adapted from Dalton-Puffer 2007: 118)

Dalton-Puffer (2007: 117) noticed a downward trend with the use of complex questions by teachers. When students are unable or unwilling to answer a complex question, the teacher often reformulates the question on a less complex level until the question is answered, as is indicated by the arrow in Figure 1. Mehan (1979a: 55, 1979b: 288) observed the same phenomenon in primary school classrooms. Furthermore, Mehan (1979a: 43) also devised a similar distinction to Dalton-Puffer. He categorised teacher's elicitation attempts as follows: 1) choice elicitations, 2) product elicitations, 3) process elicitations, and 4) metaprocess elicitations. When teachers use choice elicitations, they want the students to "agree or disagree with a statement provided by the questioner" (Mehan 1979a: 44). These questions already contain the information needed for the response. In that sense they are very closed as the students can either choose between yes/no or from a limited set of choices. Higher thinking skills are not required. Product elicitations, on the other hand, are more closely correlated with questions for facts because the ask "respondents to provide a factual response such as a name, a place, a date, a color" (Mehan 1979a: 44). Mehan's (1979a: 45) process elicitations ask the students to give their "opinions or interpretations" and therefore they are congruent with Dalton-Puffer's (2007) questions for opinions and reasons. The fourth type of Mehan's elicitations, metaprocess questions, require the students to "be reflective about the process of making connections between elicitations and responses" (Mehan 1979a: 46). They are, what Dalton-Puffer and others have called, meta-cognitive questions (cf. Cazden & Beck

2003). Mehan (1979a: 61) observed that teachers often used choice elicitations when they did not get a response on other, higher-ranking forms of elicitations. Perhaps questions for facts are employed in the same way, which might partially explain their high occurrence. Dalton-Puffer (2007: 117) further speculates that extended wait time on the side of the teacher may have positive effects on students' willingness to engage in more complex questions which is supported by Dillon who observed the "appropriateness of not moving in with a question but awaiting the forthcoming further expression of higher thought" (Dillon 1983: 62).

The cognitive processes behind Mehan's (1979a) and Dalton-Puffer's (2007) framework can be linked to the CDFs outlined earlier. The aim of this paper is to determine whether there is a pattern behind the cognitive demand required by these question functions and the CDFs that are used to answer them. For this purpose, a preliminary list of expected links has been devised:

Table 3 Preliminary correlation between question functions and CDFs

Question functions	Possibly elicited CDFs
Questions for facts	CATEGORISE, DEFINE, DESCRIBE, REPORT
Questions for explanations	all CDFs
Questions for reasons	EXPLAIN
Questions for opinions	EVALUATE
Meta-cognitive questions	EVALUATE, EXPLORE

Table 3 proposes that, in theory, there are certain CDFs that are more likely to be elicited by some question types than others. Whether these expectations are met is to be determined by the empirical section of this paper. Before a definite alignment between Dalton-Puffer's question functions and CDFs can be made, it is necessary to briefly outline what the individual question types are trying to elicit and how these responses might be linked to the CDFs proposed in Table 3.

4.3.1. Questions for facts

The first and most frequent type of question used in classrooms are question for facts. As already mentioned, they are primarily concerned with eliciting factual knowledge that has either been previously presented by the teacher or can be inferred from the students' own prior knowledge of the subject. Therefore, it seems reasonable to assume that the answers to questions for facts are either concerned with defining something, naming "the items of classification belonging to a class" (Lackner 2012: 97) or describing something that can be observed and does not require interpretation. Considering that REPORT can refer to anything

someone else has said or written (Kröss 2014: 30), it is likely to be involved in answering questions for facts. In fact, Nystrand and Gamoran (1997: 37) found that most of teacher questions "elicit a report of what is already known". It must be noted that Anderson et al. (2001: 42) draw a distinction between factual and conceptual knowledge. Whereas the former is only concerned with "specific content elements", the latter is oriented towards "more general concepts, principles, models, or theories" (Anderson et al. 42) and can, thus, be considered more complex. They note that "students often seem to acquire a great deal of factual knowledge, but they do not understand it at a deeper level or integrate or systematically organize it in disciplinary or useful ways" (Anderson et al. 2001: 41). Even though CATEGORISE technically belongs to conceptual knowledge as it requires the recognition of specifying features that unite a class (Anderson et al. 2001: 49), Lackner's (2012: 97) study has shown that teachers rarely ask for complete classifications and instead focus on eliciting class members, thus restricting the potential of CATEGORISE to individual content elements, which puts it within Anderson et al.'s category of factual knowledge.

With regard to form, it can be expected that most of the instances of questions for facts will start with *what*, especially considering the CDFs that are to be elicited. Dalton-Puffer (2007: 113) notes that questions for definitions typically take the form of "*what is a(n) X?*", which is supported by Lackner's (2012: 59-60) findings on the occurrence of DEFINE. Similar assumptions can be made for DESCRIBE and CATEGORISE, even though their various subtypes might be elicited differently (Lackner 2012). Dalton-Puffer (2007) puts questions for descriptions on a slightly higher level than questions for facts and remarks that "[d]escriptions and reasons are elicited through questions typically introduced by *how* and *why*" (Dalton-Puffer 2007: 114). However, she does not distinguish between the possible subcategories of DESCRIBE which are likely to be elicited by varying question forms and require different levels of cognitive processing. For example, a physical description where the object being described is present will probably produce answers of lower conceptual complexity than, say, a process description where the students have to remember the steps of a procedure. Whether this hypothesis is justified will be investigated in the empirical section of this paper.

4.3.2. Questions for explanations

The next of Dalton-Puffer's (2007) question categories is about giving explanations. Even though it would seem logical for these kinds of questions to be directly linked to the CDF EXPLAIN, matters are not so simple. As research has shown, the verb *explain* is often used as

a “hyperonym for other cognitive discourse verbs and acts like a dummy CDF” (Dalton-Puffer 2016: 37) by teachers which means that questions for explanations are not necessarily about EXPLAIN, but more about asking students to make explicit, elaborate on or expound a statement that could possibly contain any CDF. Because EXPLAIN in itself is about disclosing underlying reasoning processes, it is more likely to be elicited by questions for reasons than by questions for explanations. That being said, EXPLAIN could also be part of the CDFs that are used by students for answering questions for explanations.

4.3.3. Questions for reasons

Dalton-Puffer’s third category of questions are those concerned with eliciting reasons. As already mentioned, these questions are most likely to be linked to the CDF EXPLAIN because they focus on investigating how students come to a certain conclusion. Respondents need to explain their reasoning processes and “establish causal and argumentative connections” (Dalton-Puffer 2007: 115). According to Schraw et al. (2011: 22), reasoning involves either deductive or inductive processes by which students are able to draw “valid conclusions based on evidence and [generalise] conclusions to new cases” (Schraw et al. 2011: 23). Dalton-Puffer (2016: 44-45) mentions that deduction is the key process in explaining phenomena in the ‘hard sciences’, which supports the assumption that EXPLAIN is linked to reasoning and consequently to questions for reasons. Once a conclusion has been reached, it needs to be argued. Argumentation requires an “exchange of views, [and] the seeking and provision of good evidence to support claims and propositions” (Andrews 2005: 110, cf. Andrews 2007). Both reasoning and argumentation are regarded as key skills in higher order thinking typologies (Schraw et al. 2011) which justifies the higher ranking of questions for reasons.

Because students are asked to explain themselves, it can be assumed that questions for reasons trigger “more extended student turns” (Dalton-Puffer 2007: 114) and answers of higher complexity (Dalton-Puffer 2007: 115). This has been supported by Llinares and Pascual Peña’s (2015) study which discovered that, apart from meta-cognitive questions, questions for reasons were most successful in generating complex responses in terms of length and lexical density (Llinares & Pascual Peña 2015: 25). If questions for reasons primarily elicit the CDF EXPLAIN and “explanations are always about answering the question ‘why?’” (Dalton-Puffer 2016: 45), then it can be inferred that questions for reasons are most likely to begin with the question word *why*.

4.3.4. Questions for opinions

The fourth question type that is described by Dalton-Puffer (2007) is questions for opinions. These questions require students to take a personal stance towards a topic and can, thus, be correlated with EVALUATE. Evaluating evidence and generating arguments is also one of the higher-order thinking skills proposed by Schraw et al. (2011: 25). According to Schraw et al. (2011: 25), an argument is a "claim that supports a premise using credible evidence", which is congruent with Dalton-Puffer's (2016) definition of the communicative intention behind EVALUATE: "I am going to tell you my personal stance towards this. I have reasons for this position based on evidence, my previous knowledge and values" (Dalton-Puffer 2016: 41). In contrast to EXPLAIN, which is more concerned with revealing causal relationships and thus more likely to be elicited by questions for reasons, EVALUATE foregrounds giving informed opinions. Questions for opinions can also be linked to Mehan's (1979a: 45) process elicitations where the respondent is asked for interpretations or opinions.

According to Dalton-Puffer (2007: 115-116) questions for opinions can take different forms. Often teachers use signal words like "*opinion* or *you think* and possibly also […] subjunctives in display questions" (Dalton-Puffer 2007: 115). Additionally, teachers may sometimes return student questions to the whole class or ask general referential questions (Dalton-Puffer 2007: 116). Because these question forms "open up the floor to a wide range of responses" (Dalton-Puffer 2007: 116), the classroom discourse is at risk of going "into unplanned directions" (Dalton-Puffer 2007: 116), which might explain why they are used so infrequently by the teacher.

4.3.5. Meta-cognitive questions

The last category of Dalton-Puffer's (2007) questions is concerned with disclosing meta-cognitive processes. Instead of explaining somebody else's reasons for their actions (Dalton-Puffer 2007: 98), students need to evaluate their own stance towards a topic, "formulate the grounds of their [own] reasoning" (Mehan 1979: 46) and connect their answers to underlying rules or procedures (Mehan 1979: 46). As students are required to reflect on their own thinking (Cazden & Beck 2003: 111) to answer meta-cognitive questions, they need to employ various higher order thinking skills (Dalton-Puffer 2007: 116), which is why they form the most complex question types of Dalton-Puffer's (2007: 118) construct and are seen as highly beneficial to student learning (Cazden & Beck 2003: 108). So far, higher order thinking has not been discussed in detail and a comprehensive elaboration of its origins and theoretical

groundworks would go beyond the scope of this paper[6]. However, as it is deemed especially relevant for meta-cognitive questions, a brief overview of its most important components shall be given here. Schraw et al. (2011) divide higher order thinking skills into *reasoning skills, argumentation skills, problem solving and critical thinking,* and *metacognition* (Schraw et al. 2011: 21).

Because of its potential for learning, meta-cognition has received a lot of attention in the literature concerned with academic skills and instructional discourse. It has been found to operate on two levels, namely "knowledge about cognition" and "control, monitoring, and regulation of cognitive processes" (Anderson et al. 2001: 43, cf. Schraw et al. 2011: 26, Halpern 2003: 19). Anderson et al. (2001), for instance, emphasise that self-regulation and controlling one's cognitive processes is an important aspect of learning how to learn. Unlike their other knowledge dimensions – factual, conceptual and procedural, which "pertain to subject matter content" (Anderson et al. 2001: 44) – meta-cognitive knowledge draws on the cognitive processes of the other dimensions, cognition itself and examines how one stands "in relation to various subject matters" (Anderson et al. 2001: 44).

Schraw et al. (2011: 26) establish further subcategories of knowledge of cognition and its regulation. Knowledge about cognition subsumes *declarative knowledge*, which is "knowledge about ourselves as learners and what factors influence our performance", *procedural knowledge*, which refers to strategies for learning, and *conditional knowledge*, which "includes knowledge of why and when to use a particular strategy" (Schraw et al. 2011: 26). Regulation of cognition, on the other hand, involves no less than three components: *planning*, which means selecting appropriate strategies and allocating resources (Schraw et al. 2011: 26), *monitoring* one's skills for controlling learning (Schraw et al. 2011: 26-27), and *evaluation* of one's products and regulating learning (Schraw et al. 2011: 27). Especially regulation of cognition has been found to be crucial for critical thinking (Halpern 2003), which is considered to be a separate higher order thinking skill by Schraw et al. (2011). This shows that even though Schraw et al. (2011) propose meta-cognition as a separate category, it is linked to and has influence over other thinking skills and can be seen as the "executive or 'boss' function that guides how adults use different learning strategies and make decision about the allocation of limited cognitive resources" (Halpern 2003: 19).

[6] For more information on cognition and thinking in general, see Schraw et al. (2011).

As a matter of fact, critical thinking, as it is used by Halpern (2003) shares a lot of its regulating functions with Anderson et al.'s and Schraw et al.'s definition of meta-cognition. According to Halpern (2003: 7), critical thinking has a strong evaluative component, which is primarily focused on one's own thought processes:

> […] [E]valuation can and should be a constructive reflection of positive and negative attributes. When we think critically, we are evaluating the outcomes of our thought processes – how good a decision is or how well a problem has been solved. Critical thinking also involves evaluating the thinking process – the reasoning that went into the conclusion we've arrived at or the kinds of factors considered in making a decision. (Halpern 2003: 7)

From this citation, it is evident that critical thinking includes two components, namely judging the product of the thinking process as well as the reasoning process itself. The latter is, thus, directly connected to meta-cognition. This definition of "constructive reflection" (Halpern 2003: 7) is in concordance with Ennis' (1987) rendering of critical thinking. According to Ennis (1987), critical thinking is "reasonable reflective thinking that is focused on deciding what to believe or do" (Ennis 1987: 10) which emphasises the outcome-oriented and problem-solving part often associated with critical thinking (e.g. Schraw et al. 2011)[7]. He devised a comprehensive overview of the different requirements and activities involved in critical thinking. However, as they are more directed towards problem-solving and not directly relevant for meta-cognition, they shall only be outlined briefly here. Firstly, each person has a certain affective *disposition* for approaching a task, such as "open-mindedness; an attempt to be well-informed; and sensitivity to others' beliefs, feelings, and knowledge" (Schraw et al. 2011: 25). Halpern (2003) comprised a similar set of attitudes which includes a willingness to plan and monitor one's thinking process, a flexibility towards new ideas, a persistent approach towards a problem, the willingness to self-correct oneself should new evidence arise, and the desire to share one's solution and seek consensus from one's colleagues (Halpern 2003: 15-18). Secondly, Ennis (1987) proposes the need for a set of cognitive *abilities* to approach a problem critically which include, among others, focusing on a question, analysing arguments and judging the credibility of sources (Ennis 1987: 12-13). Because critical thinking is directed at solving a problem, there is a need to "monitor [one's] thinking process, check whether progress is being made toward an appropriate goal, ensure accuracy, and make decisions about the use of time and mental effort" (Halpern 2003: 19), in short, using meta-cognition.

[7] For more information on critical thinking and its entailed cognitive processes, visit: http://www.criticalthinking.org/pages/defining-critical-thinking/766

Moreover, she states that "good learners and thinkers engage in more metacognitive activities than poor learners and thinkers" (Halpern 2003: 19), thereby stressing the positive effect of meta-cognition on learning[8].

Regarding possibly elicited CDFs, meta-cognitive questions can be assumed to include evaluative as well as explorative processes. EVALUATE was already shown to be connected to questions for opinions as they require the consideration of evidence to form convincing arguments. From the above definition of critical thinking (Halpern 2003: 7), it is clear that evaluating plays an important role in judging one's thought processes as well and therefore, it can be assumed that meta-cognitive questions elicit instances of EVALUATE. In addition to basing evaluations on facts, meta-cognitive questions also emphasise the inclusion of students' own knowledge and internal reasoning processes. As a matter of fact, students are allowed to formulate propositions "without conclusive evidence" (Dalton-Puffer 2016: 46), making them purely hypothetical, which is why meta-cognitive question can be related to EXPLORE. Because of its high complexity, hypothesising is often regarded as a desirable academic skill and therefore "accorded a position among the highest order functions" (Dalton-Puffer 2016: 47, referring to Anderson et al. 2001: 85-88, Biggs & Tang 2011: 91).

Despite their potential benefits for student learning, instances of meta-processing have been deplorably rare. Mehan (1979a: 46), for example, noted that meta-cognitive elicitations occur very infrequently, they only comprised 1% of all questions initiated by the teacher. Similar results were reported by Dalton-Puffer (2007: 116) who only found one question among a corpus of approximately 500 teacher questions, thus making up 0,2% of her data.

5. Study design

In the following three sub-sections, the collection of data, the process of analysis and the research questions of this paper will be outlined.

5.1. Data set

The analysis of this paper is based on three pre-recorded videos that were filmed in lessons on the subject English for Natural Science (*Englisch für Naturwissenschaftler*). This subject is

[8] Problem-solving competence and critical thinking have become increasingly important due to the challenges of the modern workplace in the 21st century (Halpern 2003: 2). Therefore, numerous programs for the implementation of problem-based learning as a means of developing critical thinking have been developed (Schraw et al. 2011: 26, cf. Ennis 2018).

offered as an elective for upper secondary students in an Allgemeinbildende Höhere Schule (AHS)[9] in Lower Austria. In English for Natural Science, students are encouraged to develop and deepen their understanding of scientific knowledge in English either through presentations or discussions. These classes are jointly taught by an English teacher and a physics teacher who take turns covering a certain topic. The videos analysed in the current study were all recorded in the lessons of the English teacher, who uses them as part of his data set for his PhD thesis. They were selected for analysis because it was suspected that they would show a high degree of teacher-student interaction.

In these three recorded lessons, two different classes were involved. The first class, which was formed by 28 16-17-year-old students (Grade 11) was filmed in the first video, which only filmed one activity, namely a worksheet comparison that lasted 7 minutes and 14 seconds. Even though only a part of this lesson was recorded, the activity produced a considerable number of teacher questions, which will be analysed in more detail in chapter 6. Out of these 28 students, only 12 also appeared in the third video which featured a panel discussion of renewable energy sources. This reduction of class size was deliberately planned to allow for a maximisation of student talking time. The other students of that class had their discussion with the physics teacher of English for Natural Science. Nevertheless, the third video recording lasted for 1 hour and 51 seconds, which exceeds the standard 50-minute-lesson commonly found in Austria. The second video featured another class of eleven 16-17-year-olds and recorded another worksheet comparison that was similar to that in the first lesson. However, the worksheet comparison of the third lesson was followed up by the teacher's presentation of appropriate vocabulary used for evaluating and analysing.[10] This recording was 45 minutes and 30 seconds long and is thus more typical for Austrian school lessons in terms on length. These specifics are summarised in Table 4.

[9] Higher School of General Education (translation by the author)

[10] Even though class A was not recorded receiving this teacher input, it can be assumed that they were presented similar if not the same linguistic information by the teacher. Differences in the quality of student output between classes as well as before and after teacher input form the focus of the teacher's PhD thesis (Hasenberger forthcoming).

Table 4 Data overview

Lesson	Ls1	Ls2	Ls3
Duration	7 min 14 sec	1 h 51 sec	45 min 30 sec
Class	A	B	A (partially)
Number of students	28	12	11
Activities	WT 1.1	WT 2.1 WT 2.2 Teacher presentation	Panel discussion

All of the three recorded lessons were focusing on the theme of energy consumption and preservation. In Ls1, the teacher compared a task on a worksheet (WT 1.1) which asked the students to think of different daytime activities. The main question was *What do you usually use for this activity and what can be used instead that requires less or no energy?* Topics included, among others, waking up, entertainment or personal hygiene. The purpose of this task was to make students aware of energy consumption and energy-saving alternatives and gather their ideas, thereby allowing them to contribute to the collective construction of knowledge.

Ls2 started with the same activity (WT 2.1) but was followed up by another worksheet task (WT 2.2) where students were asked to integrate certain words and phrases in meaningful sentences. Here, the teacher performed a more controlling function as he checked students' contributions for their grammatical correctness and whether the constructed sentences integrated the given vocabulary semantically well. This classroom activity was then followed by a presentation where the teacher introduced students to new lexico-grammatical phrases that are commonly used for analysing and evaluating, thereby preparing them for future content discussions. This presentation also included information on the grammatical use of these phrases, for instance whether they are used in the beginning or the end of a sentence, and integrated possible synonyms and their differences in meaning.

Analysing and evaluating were especially relevant in Ls3 where students were required to argue their standpoints in a panel discussion on renewable energy sources. During this forum, students formed pairs to present an energy source they had selected in a previous lesson which was then contrasted and compared to the other sources to determine the most useful one to be implemented on a large scale in Austria. In Ls3, the teacher assumed the role of a moderator as he gave the floor to the different groups and focused their attention on different aspects of renewable energy sources, such as costs and effects on the environment.

5.2. Data analysis

These video recordings were transcribed according to the mark-up conventions of the Vienna-Oxford International Corpus of English (VOICE) with the programme Voicescribe. Then, the teacher's questions were categorised into the question functions proposed by Dalton-Puffer (2007). Furthermore, the analysis included the distinction of open and closed, as well as display and referential questions. In the case of open questions, not all were introduced by a question word as they were often abbreviated versions of an overarching question and the teacher rather resorted to giving keywords that would steer the classroom discourse in the desired direction and cover the intended topic. When question words occurred, however, they were noted as well to determine whether they had any noticeable influence on the length and complexity of the student's response. Students' responses were analysed for the communicative intention and categorised according to Dalton-Puffer's CDF types.

Even though the students' panel discussion of the third lesson also contained a number of questions uttered by students, they were not further analysed as the main objective of this paper is to determine the correlation of teacher question functions with CDFs in student responses. However, as classroom discussion seems to play a vital role in promoting higher thinking skills, further studies that include students' question functions could provide interesting insights into the cognitive patterns of students' higher thinking skills.

5.3. Research questions

As already mentioned, the overall objective of this thesis is to investigate the relationship between Dalton-Puffer's concept of question functions (2007) and her construct of cognitive discourse functions (2013). The paper's primary focus lies on establishing a connection between different types of teacher questions and the cognitive processes verbalised in student responses. For this purpose, a number of sub-questions need to be addressed:

1. **Question functions**:
   1.1. What question functions occur within the data set?
   1.2. Is there a difference in distribution between the three recorded lessons and if so, how might these differences be explained?
2. **CDFs**:
   2.1. What CDFs occur within the data set?
   2.2. Is there a difference in distribution between the three recorded lessons and if so, how might these differences be explained?

3. **Correlation**:

   3.1. Is there a noticeable correlation between question functions and CDFs?

   3.2. If so, how can CDFs in student responses and functions in teacher questions be linked?

   3.3. Which questions need to be asked in order to elicit the different CDF types?

In order to answer these questions, the following chapters will be divided into three parts. The first sub-chapter will focus on the quantitative findings on question functions (RQ 1.1.) which is then followed by an analysis of the occurrences of question functions and their differences in distribution between the three recorded lessons (RQ 1.2.). A similar approach will be taken in the second sub-chapter that focuses on the CDFs found in the data set (RQ 2.1. and 2.2.). The possible correlation will be explored in section 6.3. where the individual question functions will be analysed in more detail with regard to the CDF types they elicit (RQ 3.1. and 3.2.). Chapter 7 will then present a revised list of question functions and CDFs as well as propose a hypothetical guideline for targeting the various CDF types through these question functions (RQ 3.3.). This section will also discuss the possible influence of CDF types on the complexity of student responses.

6. Results

The subsequent sections follow the same organisational pattern as suggested by the research questions. Section 6.1. will, therefore, focus on question functions, with section 6.1.1. providing a quantitative overview of the question types found in the data set and section 6.1.2. examining the distribution of question functions across the recorded lessons. Similarly, section 6.2. will deal with CDFs, their overall occurrence (6.2.1.) as well as their respective distribution in the individual lessons (6.2.2.). The last section (6.3.) will look at the correlation of question functions and CDFs and present the findings of CDFs in student responses to different teacher question types.

6.1. Findings on question functions

In order to answer the first two research questions, namely which question functions occur and whether there is a noticeable difference in their distribution across the three lessons, the following chapters will first give an overview of the questions found in the data set and then look at their occurrence in the individual lessons in more detail.

6.1.1. Quantitative overview of question functions

The three different settings gave rise to a varied set of questions types. Across all lessons, a total number of 113 questions were asked by the teacher. Apart from meta-cognitive questions, which did not appear at all, all the other question functions described by Dalton-Puffer (2007) occurred to a varying degree. Unsurprisingly, questions for facts constituted most of the questions, followed by questions for explanations, reasons and opinions. Table 5 shows the distribution of the teacher's question functions in total.

Table 5 Occurrences of question functions within the data set

Question functions	Absolute occurrences	Relative occurrences
facts	63	55.8%
explanations	28	24.8%
reasons	14	12.4%
opinions	8	7.1%
	113	100.0%

As can be seen from Table 5, questions for facts made up 55.8% of the questions asked by the teacher, which is drastically less than the 89% found by Dalton-Puffer (2007: 101). Other studies using Dalton-Puffer's question typology noticed that even though questions for facts were the most frequent as well, with 69.25% (Pascual Peña 2010[5]) and 64.83% (Llinares & Pascual Peña 2015), their percentages were also considerably lower than those of Dalton-Puffer's (2007) study. Llinares and Pascual Peña (2015: 26) explain this difference by referring to the prompts they had designed to elicit various historical genres which "required the teachers to ask, at least, some non-factual questions" (Llinares & Pascual Peña 2015: 26). The particularly low number of questions for facts in the current study could be grounded in the small data set of this paper where one of the recordings featured a discussion in which questions for facts were far less frequent than in the other two lessons where the teacher was asking for the answers to a worksheet. Questions for explanations, reasons and opinions together consequently comprised 44.3% of the teacher's questions in the current study, which is comparable to Llinares and Pascual Peña's (2015: 21) findings of 35.17% and 30.74% (Pascual Peña 2010[5]). However, interestingly both studies showed that questions for explanations were less frequent than questions for reasons and opinions. Llinares and Pascual Peña (2015) explain this unusual pattern by relating back to the context of historical genres observed in their CLIL lessons. Certain genres, such as historical explanation where "causes and consequences of certain historical events were developed" (Llinares & Pascual Peña 2015: 24) or arguments where "historical positions need to be defended" (Llinares & Pascual Peña

2015: 24), lend themselves to focusing on reasoning processes even though questions for facts are still addressed. Why questions for explanations per se are lower than questions for reasons or opinions is not mentioned in either of these studies.

With regard to the distinction of open and closed questions, differentiation was not always straightforward because especially during WT 1.1 and 2.1 the teacher was asking formally open questions that were, however, looking for a particular set of answers (cf. Cazden & Beck 2003: 111). However, when students gave an answer that did not exactly fit into the proposed category, the teacher did not mark the answer as wrong but instead opted for asking critical questions, as can be seen in Extract 1.

Extract 1 "Lighting", WT 2.1, Ls2

T: RIght. lighting (10) lighting. (4) {S4 raises her hand} [S4].

S4: erm you could use l ds {LDs} and we can er=

T: =l E ds you mean=

S4: =yeah <7> l e ds </7>

T: <7> yeah mhm </7>

S4: and we can use candles?

T: you could use candles <8> yeah </8>

S4: <8> or a </8> smartphone

T: yeah (.) yeah of course. (1) of course er the question is **how do you charge your smartphone then.** (.) if you use er the <9> the torch. </9>

S4: <9> with solar phones </9>

T: okay right. <chuckles> […]

In Extract 1 the teacher is asking the students to name objects that are normally used for lighting as well as energy-saving alternatives. When S4 proclaims that smartphones can be used as an alternative to LEDs, the teacher does not openly disagree with her but prompts her to justify her answer instead and does not negatively evaluate her follow-up answer of using solar phones. So even though the teacher's original question was open in form, he obviously expected a certain set of answers but did not overtly correct students if they gave answers that did not match his expectations. Therefore, these ambiguous questions were distinguished solely on their form and not on the intentions of the teacher. Across all three lessons, 64.6% of the questions were open and 35.4% were closed. These findings are congruent with Dalton-Puffer's analysis of the different question types (Dalton-Puffer 2007: 101) and show a similar

tendency in Pascual Peña's (2010: 68) study where most questions (roughly 83%) were open as well.

Because the teacher had some expectations towards the students' answers but did not correct them when they did not meet these expectations, the distinction between display and referential questions proved to be challenging as well. However, seeing as most of the questions during WT 1.1 and 2.1 were not asked to test the students' knowledge but rather to gather ideas, these ambiguous questions were categorised as referential. In total, referential questions made up 74.3% of the teacher's questions whereas display questions comprised 25.7%. Interestingly, display questions only occurred during Ls2, where the teacher gave a presentation after comparing WT 2.2, which required students to form sentences with certain phrases. When the teacher asked for those sentences, he expected the students to display their linguistic knowledge. During his subsequent presentation, the teacher also asked a number of questions on words and phrases that he wanted the students to define or describe, which can be seen in Extract 2.

Extract 2 Display question on *resemble*, Ls2

> T: resemble? the word (.) **you know the word. resemble?** (2) **could you describe it? wh- what does it mean. or WHEN is it also used. (.) in (.) what (3) sort of (.) um (2) word (3) family (4) or what topic.** {S4 raises her hand and is pointed at}
>
> S4: you can (.) use it if you want to (.) describe that a person is similar to another person=
>
> T: =yeah exactly so for example (.) the topic family yah? (.) we describe families and members of a family you can say that i don't know the son resembles the father or something (2) from the looks or (.) from the behaviour (.) yeah

To prepare the students for the panel discussion of Ls3, the teacher presented various linguistic strategies for evaluating and analysing a topic. This presentation not only included useful vocabulary, but also instructions on how these words and phrases are used in sentences. While most of the time, the teacher assumed his students to know the presented vocabulary, he sometimes checked the learners' understanding. This was the case in Extract 2 where the teacher asked his class to describe the functional use of *resemble*. Here the teacher expected a particular kind of answer as can be inferred from the specificity of his questions as well as from his feedback to S4's response.

In Ls1, where the teacher only collected the students' thoughts on typical daytime activities and their energy-conserving alternatives, no display questions were used which is also the case with Ls3, where the teacher asked students to argue their view on renewable energy sources. In both circumstances, only referential questions occurred. Because of the small

sample size and the diversity of the classroom activities, ranging from prespecified tasks to more free-flowing discussions, the relative occurrence of display and referential questions cannot be generalised for other lesson types or CLIL classes overall.

6.1.2. Distribution of question functions across the recorded lessons

As already indicated in the previous section, all of the Dalton-Puffer's question functions, except for meta-cognitive questions, could be found in the data set. However, they were not evenly distributed across the three different lessons and classroom activities. While questions for facts and explanations occurred in all of the lessons, questions for reasons only appeared in Ls2 and Ls3, and questions for opinions were exclusively asked in the latter. Table 6 shows how many questions of each type were asked within the three different lessons.

Table 6 Number of questions asked in the three lessons

Lessons	facts	explanations	reasons	opinions	Total of questions within the lessons	Questions per minute
Ls1	19	4	0	0	23	3.18
Ls2	40	6	3	0	49	0.81
Ls3	4	18	11	8	41	0.90
	63	28	14	8	n= 113	

The highest number of questions were asked in Ls2, followed by Ls3. Although Ls1 showed the lowest frequency of teacher questions, this could be explained by the fact that the recording of Ls1 was shorter than the other two and therefore fewer questions could be categorised. However, Table 6 shows that questions for facts occur much more frequently in the first two lessons, irrespective of the individual length of the recording. In order to get a better understanding of how the question functions are proportioned across the different lessons, Figure 2 gives a graphic overview of their relative distribution.

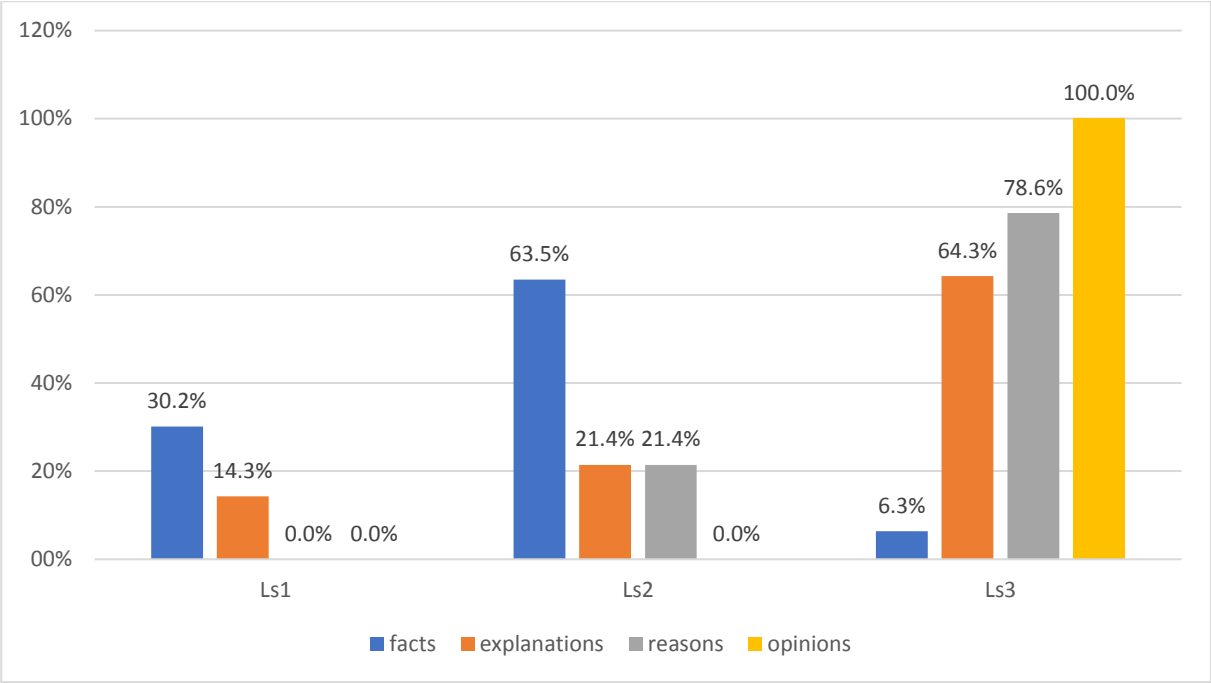

Figure 2 Distribution of question functions across the different lessons

As can be seen from Figure 2, 63.5% of questions for facts appeared in Ls2, followed by 30.2% in Ls1 and only 6.3% in Ls3 which can be explained by the fact that the main focus of the panel discussion was to allow students to express their views on saving energy and arguing their standpoints on renewable energy sources. Questions for explanations were common in all lessons but far more so in the panel discussion where they elicited various CDF types, which will be analysed in more detail in section 6.3.2. of this paper. Because of its argumentative nature, the panel discussion also featured most of the questions for reasons and all of the questions for opinions which is not surprising considering that the main focus of the discussion was to give students the opportunity to express their standpoints regarding energy consumption and to practise language concerned with analysing and evaluating. How the activities during the lessons impacted the distribution of questions functions will be investigated in the following sections.

6.1.2.1. Question functions in Ls1

As already mentioned, the first recording featured the elicitation of students' answers to a worksheet. The main focus of the exercise was to name daytime activities and what objects or practices are involved in those activities as well as energy-saving alternatives. Therefore, the teacher asked the central question *What is typically used and what can be used instead?* which was reiterated several times. This question functioned as a guideline during the exercise. As the lesson went on, however, the teacher shortened this question further and

further up to the point where he initiated the exchange of information between him and the students by only giving key words that were indicative of the daytime activity he wanted to talk about. This reduction of initiating questions is exemplified in the following extracts where the teacher starts with the central question in Extract 3 but by Extract 5 he already omits the question entirely and instead names the category students are supposed to talk about:

Extract 3 Central question, Ls1

> T: let's compare this together. first category is waking up. **what is typically used and what (thing) can be used instead**. [S1].
>
> S1: u:m typically used is an alarm clock?
>
> T: mhm?
>
> S1: and you can use a manual clock instead.

Extract 4 Keyword as well as repetition of the central question, Ls1

> T: […] <reading> **transport journey to school** </reading> {several students raise their hands} **what can be used what can be used instead.** [S11].
>
> S11: the bus (.) and the car (.) and (the) train.
>
> T: okay? **and instead?** <points to S2>
>
> S2: feet?

Extract 5 Initiation through keyword, Ls1

> T: <reading> **communication social contacts?** </reading> (.) <points to [S18]>
>
> S18: mobile phone?
>
> T: mobile phone.
>
> […]
>
> T: […] **alternatives with less or no energy?**
>
> S2: <sarcastically> speaking duh? </sarcastically>

While in Extract 3 the student's answer is still formulated in a sentence, the reiteration of the same question results in progressively minimalistic answers. Even though the teacher repeatedly prompted the students to use full sentences in their responses over the course of the lesson, most of them consisted of one-word answers as can be seen by S2's and S18's answers in Extract 4 and 5. These findings seem to confirm Dalton-Puffer's conclusion that "asking for facts generates student output of low linguistic and conceptual complexity" (Dalton-Puffer 2007: 113). However, these minimalistic answers are also to be expected considering the redundant nature of the immediate conversational context.

Considering the goal of this lesson was to gather and synchronise students' activated knowledge, it is not surprising that the overwhelming majority of the teacher's questions were

focusing on facts. The only other type of question that occurred during the comparison was when the teacher asked pupils to repeat or specify what they meant, which was marked as question for explanation. In total, there were only four instances of these questions, which amounts to 17.4% of the questions asked by the teacher in this lesson. The other 82.6% were questions for facts.

The nature of the task also meant that the teacher was not asking for prespecified answers and thus was not testing the students' knowledge. Therefore, all of the questions in lesson one were considered to be referential. As far as openness of the questions is concerned, 65.2% of the questions were open and 34.8% were determined to be closed. The keywords that the teacher gave were also categorised as open because they were considered to be shortened forms of the original question.

6.1.2.2. Question functions in Ls2

The second recorded lesson can be divided into two parts. The first part is comparable to the activity in Ls1 as it also featured a worksheet comparison, meaning that WT 1.1 and WT 2.1 are the same. However, as mentioned earlier, the worksheet in Ls2 contained an additional task to the one already addressed in Ls1, namely one that asked students to formulate sentences with certain words and phrases used for argumentation (WT 2.2). This elicitation was then followed by a presentation where the teacher introduced alternative vocabulary for analysing and evaluating as well as instructions on how to use these lexical items syntactically. Because of the two-fold nature of this lesson, a distinction was made between the two separate parts to allow for an investigation of the influence the different objectives had on the distribution of question functions and to contrast the worksheet comparison of lessons one and two.

In the first part of the lesson (WT 2.1 and 2.2), the teacher asked a total of 29 questions. Out of these questions, 25 were eliciting facts, three were questions for explanations and only one was asked to prompt a student to explain her reasoning process behind her answer. This question is shown in the following extract.

Extract 6 Question for reason, Ls2

T: […] so for waking up (.) what have you got. (5) [S1].

S1: uhm for waking up (.) uh a phone or (.) an alarm clock is typically used?

T: mhm

S1: bu:t we could use the daylight instead.

T: okay? daylight (.) yah (2) <points to S2>

S2: hens (1)

T: hands? (4) **in what way.** (1)

SX-f: ah: (2)

S2: that they (2) not shout how do- (.) how do you (.) say that (.) <1> (when the day comes) </1>

T: <1> oh okay </1> well you mean a male chicken (.) like a rooster (.) or a cock yeah (1) yeah okay (.) yeah of course.

This clarifying question is based on the teacher's misinterpretation of the student's pronunciation of the word *hens*. In order to understand her answer better, the teacher asks her to justify it by explaining her reasoning. Although S2 is not able to formulate a full sentence in her response, she gives enough hints for the teacher to guess what she originally meant.

Because only the first task of the worksheet (WT 2.1) was congruent with WT 1.1, a further distinction was made regarding the worksheet in Ls2. The following table shows the distribution of question functions within the two tasks.

Table 7 Numbers of questions asked in the individual worksheet tasks in Ls2

Worksheet	facts	explanation	reason
Task 2.1	11	3	1
Task 2.2	14	0	0
	25	3	1

If the tasks are analysed separately, it becomes evident that during the comparison of the second task only questions for facts were asked. Because this task required students to produce grammatically and semantically correct sentences with given words and phrases, their answers could be compared to regulated linguistic patterns, which rendered most of them display questions. All of these questions were concerned with eliciting the students' examples. There was no need for clarification requests as the teacher could judge their responses against his own understanding of the language. Task 1, however, was more open because it allowed students to integrate creative ideas of their own, which in turn sometimes demanded that the teacher ask clarifying questions, hence the occurrence of questions for explanations and reasons. Compared to the distribution of Ls1, the ratio of questions in WT

2.1 was slightly moved towards the latter two categories of questions which together comprised 26.7% of the teacher's questions, whereas questions for facts made up 73.3%, which is lower than the 83.3% in the previous lesson. Considering the small number of questions, however, these differences in percentage are not conclusive. What is more important is the prevalence of question for facts in both of these contexts. When combining the tasks and comparing the worksheet as a whole with that of Ls1, similar percentages emerge.

Table 8 Relative distribution of question functions between the worksheet comparison of lesson one and two

Worksheet comparison	facts	explanation	reason	Total
Ls1	82.6%	17.4%	0.0%	100.0%
Ls2 (WT 2.1 and 2.2)	86.2%	10.3%	3.4%	100.0%

As Table 8 shows, the comparison of the worksheet in Ls1 and Ls2 yielded approximately the same ratio of questions. The only relevant difference is that in Ls2 the teacher actually asked one question for reasons as opposed to lesson one where no such question was asked. On the whole, however, the difference in percentage remains inconclusive because of the low number of observations.

The second part of Ls2 focused on teacher-centred input on the language of analysis and evaluation. Even though this part was designed as a monologue, the teacher managed to include the students in his presentation by asking them a total of 20 questions. Out of these 20 audience-oriented questions, 15 were questions for facts, three were concerned with explanations and two asked students to give reasons, which is one more than in the first part of the lesson. This time, however, the students were asked to explain external processes instead of their own internal reasoning.

Extract 7 Question for reason, *importance of analysing and evaluating*, Ls2

> T: okay good (.) well then (.) let's have (.) a look at (.) analysing and evaluating (.) **why do you think in the context of (.) energy sources electricity why is (.) uh (.) being able to analyse and evaluate an important skill.** (3) [S2].
>
> S2: uh (.) to compare different (.) energy sources?
>
> T: to compare different energy sources (.) yah? (.) uh (.) also evaluate the BENEFIT or (.) the drawbacks (1) and (1) of course (.) because (.) you have to prepare the public forum (.) and more or less argue for (.) your own energy source that you're presenting (.) and argue against other energy sources (.) this is a vital skill.

Extract 8 Question for reason, "when and if", Ls2

T: and when if and because can also (.) uh (.) be used here (2) **why is (1) when (.) possible here as well. when and if (3) why are both possible here** {S4 raises her hand and is selected} (3) [S4].

S4: because (.) in the first part of the sentence (.) there is present and in the second part there is present=

T: =yeah so this is what kind of conditional.

S4: <23> yes </23>

T: <23> which </23> one.

S4: the first one (2) er the: <un> xx? </un>

T: zero <nods> exactly yeah (.) conditional zero (1) and whenever there is conditional zero we can use when (and if) (3)

The first question for reasons was actually asked at the very beginning of the teacher's presentation, as can be seen from Extract 7. It functioned as a way of justifying his input which is evident from his feedback to S2's response. The second question for reasons asks students to explain why *if* and *when* can be used interchangeably in a sentence using conditional zero. Even though S4's answer does not state the condition at first, the desired answer is eventually elicited by a series of questions for facts. As already speculated earlier, both of these questions are introduced with the question word *why* whereas the question for reasons in Extract 6 included the word *what*. Therefore, it appears that even though *why* seems to be a promising indicator for questions for reasons, other question words may be used for this purpose as well.

Questions for explanations in both parts of the lesson were mostly concerned with clarifying students' answers with the exception of the following question:

Extract 9 Question for explanation, "effect or influence", Ls2

T: effect or influence (.) uh (.) what does effect mean? (7) **is it completely the same as influence or** (2) **is there a slight difference** (4) {S4 raises her hand and is selected}

S4: you do something and there's er (.) an action?

T: yes (.) that's true (.) positive or negative

S4: er it can be both

T: yeah: but rather?

S4: er bad

T: yah. rather negative yeah (.) so (.) effect uh very often means influenced in a bad way

Here the teacher is asking the students to identify a semantic difference between *effect* and *influence*. Although he starts by asking for a definition of *effect*, he downgrades his open question to a choice elicitation (Mehan 1979a) when he gets no response. Interestingly, this choice elicitation prompts S4 to respond to his original question, giving a tentative definition

of *effect*. However, as the teacher's main focus was to point out the difference in meaning between *effect* and *influence*, he continues his line of questioning by offering choice elicitations until he gets the response he is looking for. His original choice elicitation functions as a question for explanation even though it seemingly asks for factual information because it aims at making explicit the semantic difference between two lexical items.

To sum up, in both parts of lesson two questions for facts, explanations and reasons could be identified. If the question patterns of the worksheet comparison and the presentation are compared, the following relative distribution can be observed:

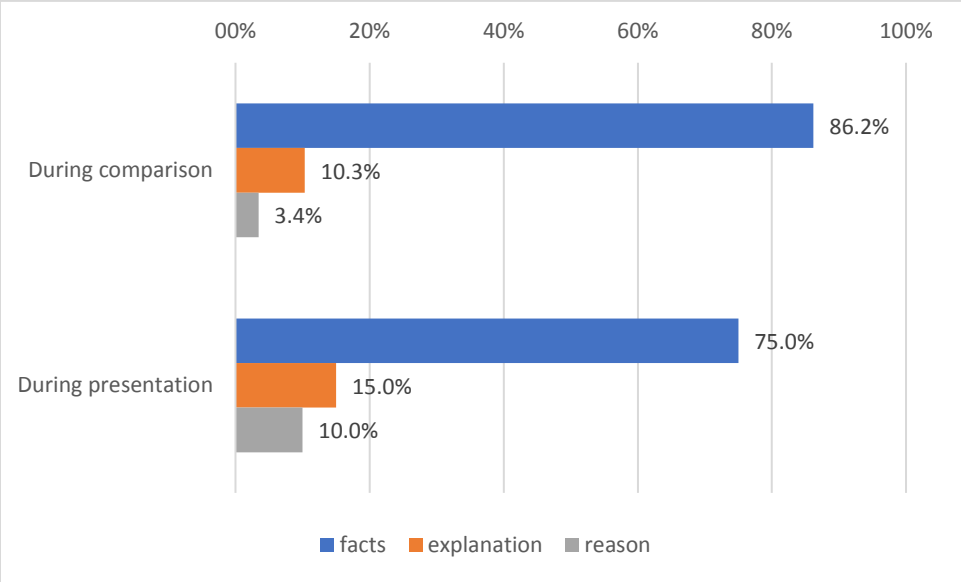

Figure 3 Relative distribution of question functions in the separate activities in Ls2

As can be seen in Figure 3, the order in terms of frequency was the same in both lesson parts, with questions for facts being the most frequent, followed by questions for explanations and then questions for reasons. Because fewer questions were asked during the teacher's presentation, the percentages for questions for explanations and reasons appear to be slightly higher even though both lesson parts contained three questions for explanations and the teacher only asked one additional question for reasons during his presentation, shifting the relative distribution of question functions in favour of questions for explanations and reasons. This shift, however, cannot be considered significant due to the low number of questions asked in that section.

After having analysed both parts of Ls2 separately, it can be said that in total 49 questions occurred. Out of these 49 questions, 40 were questions for facts, making up 81.6% of the question functions in this lesson. Question for explanations were asked six times, comprising

12.2% of the teacher's questions, and questions for reasons occurred only three times, which amounts to 6.1%. Overall, it can therefore be concluded that the distribution of questions between Ls1 and Ls2 was fairly similar. In contrast to Ls1, however, this lesson also included display questions which especially occurred during the language-focused task of the worksheet (WT 2.2) and the teacher's presentation. As the English teacher functions as a language expert in these classes, it can be assumed that the questions he asks on vocabulary are display questions that he judges vis-a-vis his own knowledge. Instances of these questions were exemplified in Extract 8 and 9. As Ls2 had a stronger focus on language than Ls1, it was found that referential questions only made up 40.8% of the teacher's questions, which means that 59.2% of the questions were testing the students' linguistic knowledge. Regarding the openness of the questions, comparable to Ls1, where 65.2% of the questions were open and 34.8% were closed, the open questions also prevailed in the current lesson, where the ratio between open and closed questions was 75.5% open to 24.5% closed.

6.1.2.3. Questions functions in Ls3

In contrast to the previous two lessons, lesson three was organised as a panel discussion where the students teamed up to promote a renewable energy source they had researched. Their ultimate goal was to convince the Austrian Minister, a role which was taken by the teacher, of the suitability of their energy source for large-scale implementation in the country. Unlike the other lessons, where the discourse was mostly organised in the IRF pattern, this discussion forum allowed for a more extended exchange between students, with the teacher only functioning as a moderator. As the students occupied the expert position for their energy source, they were much more eager to exchange their knowledge and argue for themselves than in the other lessons where the teacher had taken the expert role. Due to this interactive shift, there was a significant change in the frequency of the teacher's question types.

Table 9 Frequency of questions functions used by the teacher during the panel discussion

Question functions	Total occurrences	Relative occurrence in Ls3
facts	4	9.8%
explanation	18	43.9%
reason	11	26.8%
opinion	8	19.5%
	41	100.0%

Unlike in the other lessons where questions for facts were overwhelmingly dominant, the panel discussion gave rise to a variety of different question functions, with questions for facts actually being the least frequent. Instead, questions for explanations occurred most often as

they were regularly used to prompt students to elaborate on their arguments and for steering the discussion into a new direction. The second most frequent were questions for reasons where the students were led to explain or evaluate how their energy source could function throughout the whole country. As opposed to the other lessons, the panel discussion was the only context in which students were actually asked for their opinions. In fact, most of the time the students did not need the teacher to ask for their personal stance because they were arguing it by themselves and critiquing each other's statements by asking suggestive questions, such as in Extract 10.

Extract 10 Student asking a criticising question, Ls3

> S3: […] i have a question (.) uhm (4) it's true (2) that wind energy is very useful but (6) isn't it a- isn't it very loud (.) and if we produce MORE then **(.) the problem is in- in fact where should we (3) build them build them up?** because you can't build them up in the villages (3) because it's too loud there (.) and you ca- you can't also build them (2) i don't think there are many places where they can build so that they do not (.) uhm annoy the people yeah (4)
>
> S9: yes they're built up in between the villages of course in the (.) landscape (.) and they're not really space-efficient (.) so you can't place them quite uhm close to each other (.) so uh the land in between can be used otherwise so for agriculture and stuff like that (.) so {bell rings} there i don't see a problem <@> in this </@>
>
> S3: yeah it was just a question

These critical student questions occurred rather frequently and initiated a variety of CDFs. However, as the main purpose of this paper is to determine the effect of teacher questions on the elicitation of CDFs, these student questions were not further categorised. As they seem to play a significant role in student-centred discussions, though, further studies could provide important insights into promoting critical thinking through encouraging students to ask more questions.

Due to the students' roles as topic experts, the teacher only asked one display question to which, however, he got no answer. Instead the teacher had to answer this question himself.

Extract 11 Display question, Ls3

> T: […] right **so the colour codes mean what then?**
>
> S2: <soft> this one? </soft>
>
> T: no i can't see it (5)
>
> S2: <reads the specifics of the graph> it's er what's used one million btu?
>
> T: btu yeah that's the unit er normally used to describe energy use (2) uhm (3) so what we can see is that (.) the northern hemisphere (3) obviously (.) uses (.) lots of energy (1) whereas the (.) lower hemisphere (.) and the developing world except (.) australia of course (.) uh use (.) far less (.) energy. (3) right (.) […]

The question in Extract 11 can be regarded as display because the teacher wanted the students to elaborate on the colour codes used in a graph the students had presented. His aim was to test the students' understanding of the depicted information. As they, however, failed to present their interpretation of the graph, the teacher had to supply it himself. As this one question did not succeed in eliciting the desired response from the students and instead caused the teacher to DESCRIBE, it was not included in the analysis of teacher-student interaction. With this failed display question excluded, the remaining questions of lesson three were all referential as they asked for the students' own knowledge contributions instead of reiterating information provided by the teacher. As far as the open/closed distinction is concerned, the ratio was more balanced than in the other two lessons, with 51.2% being open and 48.8% being closed.

6.2. Findings on CDFs

Similar to the previous sections, the subsequent chapters will initially present an overview of the CDFs found in the data set which will then be followed by a more in-detail analysis of their distribution within the distinct lessons.

6.2.1. Quantitative overview of CDFs

The recorded lessons featured all types of CDFs to a varying degree. In total, the 113 teacher questions identified in the data set elicited 116 different CDFs as one question sometimes triggered more than one CDF in the students' responses or responses from different students. The distribution of CDF types can be seen in Table 10.

Table 10 CDF types in student responses

CATEGORISE	28	24.1%
DEFINE	18	15.5%
DESCRIBE	8	6.9%
EVALUATE	15	12.9%
EXPLAIN	7	6.0%
EXPLORE	15	12.9%
REPORT	25	21.6%
	116	100.0%

Table 10 shows that the most frequent CDF was CATEGORISE, followed by REPORT and DEFINE, which is rather different from those found in earlier studies investigating the frequency of CDFs in CLIL discourse (Dalton-Puffer et al. 2018). It has to be noted that this difference in findings is probably caused by two factors: the smaller sample size of the current study, which heavily influences the distribution of CDFs, and the fact that CDFs were only

analysed in student responses to teacher questions, thus restricting the data set further. Therefore, these two studies cannot really be compared as a wider research focus might have yielded a different set of CDFs altogether.

The high number of occurrences of CATEGORISE and REPORT can be attributed to the fact that during the comparison of WT 1.1 and 2.1, the teacher asked the students to name certain activities belonging to different categories, i.e. he asked them for class members. REPORT was also mainly used during the worksheet comparisons, but more so in Ls2 where the teacher wanted to know the students' sentences containing the listed words and phrases (WT 2.2). Interestingly, DESCRIBE, which had been found to be a relatively frequent CDF in the studies summarised in Dalton-Puffer et al. (2018), only played a minor role in the lessons analysed in the current paper. A more detailed description of the CDFs distribution across the different lessons, which can be found in the next section, might reveal more on this surprising peculiarity. As far as the correlation between the CDFs and the question functions is concerned, section 6.3. will provide a quantitative and qualitative analysis of the data set and discuss the possible influence of the CDFs and question types on the complexity of students' answers.

6.2.2. Distribution of CDFs across the recorded lessons

As already indicated, all of Dalton-Puffer's CDF types could be found in the data set. However, not every type occurred in each individual lesson. Instead, it was observed that the varied activities within the recorded lessons prompted students to engage in different cognitive processes.

Table 11 Occurrences of CDF types within the recorded lessons

Lessons	CATEGORISE	DEFINE	DESCRIBE	EVALUATE	EXPLAIN	EXPLORE	REPORT	Total
Ls1	15	3	1	0	0	0	4	23
Ls2	13	10	4	0	5	2	15	49
Ls3	0	5	3	15	2	13	6	44
	28	18	8	15	7	15	25	116

Unsurprisingly, the total number of CDFs within the lessons do not differ from the occurrences of question functions noted in 6.1.2. (Table 6, p.49), with the exception of the panel discussion where some questions sometimes elicited more than one CDF as the teacher's questions themselves of course remained unchanged but the responses of the individual groups varied in their interpretation of the questions. In order to get a better understanding of the

distribution of the CDF types across the recorded lessons, the following graph depicts the proportional shares of CDFs in the data set.

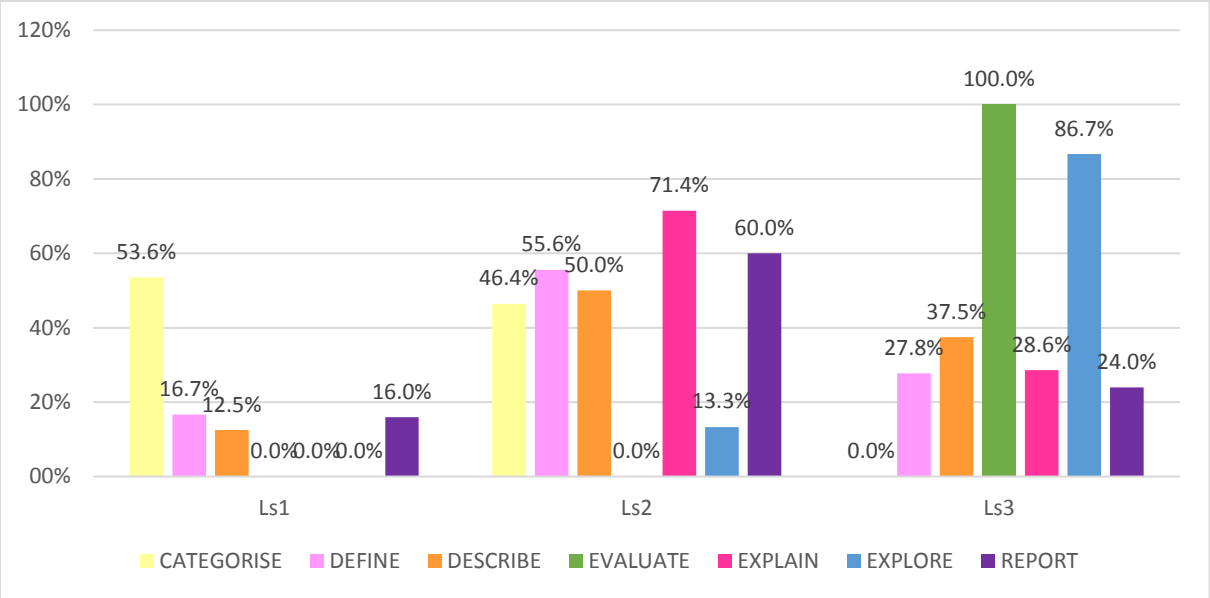

Figure 4 Relative distribution of CDFs across the recorded lessons

Due to their comparable activities, the distribution of CDF types in Ls1 and Ls2 was rather similar. In both, classification took a central role as students were asked to name class members in their comparison of the worksheet. In contrast, lesson three did not include any instances of CATEGORISE. The CDF DEFINE was used in all lessons, mainly to define vocabulary or clarify a student's statement. Descriptions were also common in all three lessons. Interestingly, most of these descriptions were functional in nature, with a focus on the grammatical and semantic functions of lexical items. Evaluations did not occur at all in the first two lessons, which is not surprising considering the prevalence on the exchange of factual information. Only during the panel discussion, students were required to EVALUATE as they not only defended their own views on their renewable energy source but also critiqued each other, as was already exemplified in Extract 10 (p.58). The disclosure of causal relationships through EXPLAIN only occurred in the Ls2 and Ls3. Its absence from Ls1 can partially be explained by the low number of questions, partially by the factual focus of the lesson where causal explanations were not really necessary. Although the CDF EXPLORE occurred in Ls2 and Ls3, it was given special emphasis during the latter where students were actively encouraged to speculate on the suitability of their energy source for the whole country. Similar to DEFINE, REPORT was also used in all three lessons as students were always asked either to present

their answers to the worksheet or to inform their classmates on the functions and use of their group's topic.

After having given an overall impression of the distribution of CDFs across all recordings, the following sections will provide a more in-depth analysis of their occurrences within the individual lessons.

6.2.2.1. CDFs in Ls1

In the first lesson, four out of Dalton-Puffer's seven CDF types could be identified. Apart from EVALUATE, EXPLAIN and EXPLORE, the remaining CDFs were all elicited at least once. Their absolute and relative occurrences can be obtained from Table 12.

Table 12 CDF types in Ls1

CDF types	Absolute occurrence	Percentage within Ls1
CATEGORISE	15	65.2%
DEFINE	3	13.0%
DESCRIBE	1	4.3%
REPORT	4	17.4%
	23	100.0%

The predominant CDF of Ls1 was CATEGORISE, which made up 65.2% of the students' responses. As the focus of this lesson was to collect different kinds of day-time activities within certain categories, it is not surprising that categorisaton was so prominent, even if complete classifications never occurred and students were only prompted to name class items, a practice which was already observed by Lackner (2012: 97). Some instances of CATEGORISE were already given in Extracts 3-5 (p.51).

With 17.4%, REPORT was the second most used CDF. The four instances that were counted as reports focused on the elicitation of energy-saving alternatives. Even though they could also be interpreted as classifications, the students' acts of listing their ideas seemed more like an act of presenting than categorisation.

Extract 12 REPORT, Ls1

T: […] **alternatives?** (4) again let's try full sentences [S16]

S16: uhm maybe dictionaries or o- or books or magazines?

T: okay (.) dictionaries and magazines.

S6: you can ask somebody?

T: you can ask somebody.

S17: you can write a letter?

T: you can write a letter.

Extract 12 shows that multiple students take turns in presenting their ideas with the teacher reiterating their answers as a way of validation. Technically, these rapid exchanges of utterances could also be regarded as naming class members, showing that the differentiation between the distinct CDF types is not always straightforward as was already noted by Dalton-Puffer (2013: 236), who noted the fuzziness of the individual categories, and Kröss (2014), who showed that various CDF types might be used within larger episodes. Therefore, the current paper regards teacher-student interaction, such as in Extract 12, to be reports that are used within the context of categorisations.

The next CDF that could be observed was DEFINE which occurred three times and thus comprised 13.0% of the CDFs used by the students. In this lesson, all instances of DEFINE were used when students had to clarify what they had meant in their previous turn.

Extract 13 Repetition request (DEFINE), Ls1

T: okay? (.) and instead? <points to S2>

S2: feet?

T: **once again?**

S2: feet (.) you cou- just you could start walking?

T: okay yes (.) you could use your feet of course yeah sure.

The request for repetition in Extract 13 triggered the student to specify his answer even though it would probably have been sufficient for him to repeat his previous utterance. Because definitions were always used as a way of elaborating on a statement, they were, in this lesson, always prompted by questions for explanations.

In Ls1, there was only one instance of DESCRIBE. In the following extract, the teacher tries to specify a student's reply by describing how the named item might actually be used, thus giving a functional description.

Extract 14 Functional description, Ls1

S2: uh a river?

T: okay? (.) **it's uh (getting) used instead?=**

S2: =yeah=

T: **=or normally?**

SS: <7> @@@@</7>

S2: <7> yes <loud> yeah (.) BOTH (.) my own personal river= </loud> </7>

T: =okay right.

Here, the teacher was trying to elicit ways of keeping oneself clean, to which S2 replied that a river might be used without stating whether it is used normally or alternatively. This induces the teacher to ask a clarifying question that the student jokingly answers by stating that he might use a river as his typical way of achieving personal hygiene. Despite its shortness, the student's response is therefore counted as a description.

6.2.2.2. CDFs in Ls2

In the second recorded lesson, six out of seven CDF types were found in student responses. The number of CDFs corresponds with the number of questions asked in Ls2 as the teacher's question typically only elicited one student answer or was geared toward activating a specific cognitive discourse function. The number of individual CDF types as well as their relative share within Ls2 are listed in Table 13.

Table 13 CDF types in Ls2

CDF types	Absolute occurrence	Proportion within Ls2
CATEGORISE	13	26.5%
DEFINE	10	20.4%
DESCRIBE	4	8.2%
EXPLAIN	5	10.2%
EXPLORE	2	4.1%
REPORT	15	30.6%
	49	100.0%

Similar to Ls1, CATEGORISE, REPORT and DEFINE are the most used CDF types. However, while in Ls1, categorisation was the most common discourse function, Ls2 elicited more instances of REPORT which were especially prominent in WT 2.2, where the teacher asked students to present their example sentences. In addition to the CDF types in Ls1, the current lesson also prompted students to EXPLAIN and EXPLORE. In order to determine whether these changes were caused by the slightly different activity profile or because of the teacher's personal

choice of questions, the two parts of the lessons as well as the separate tasks of the worksheet will be analysed in further detail.

In the first part of the lesson, the worksheet comparison (WT 2.1 and 2.2), five out of the six identified CDF types for Ls2 occurred within 29 student responses. These included CATEGORISE, DEFINE, EXPLAIN, EXPLORE and REPORT.

Table 14 CDFs within the worksheet comparison (WT 2.1 and 2.2)

CDF types	Absolute Occurrences	Percentage within worksheet comparison
CATEGORISE	8	27.6%
DEFINE	1	3.4%
EXPLAIN	3	10.3%
EXPLORE	2	6.9%
REPORT	15	51.7%
	29	100.0%

As can be seen from Table 14, over half of the CDF types during the worksheet comparison were concerned with reporting, followed by 8 instances of categorisation, which made up about 28% of the CDFs for this part of the lesson. The remaining CDFs were realised at least once. However, the CDF types in Table 14 were not distributed evenly across both tasks of the worksheet. Instead, WT 2.1 showed considerably more variation than the CDFs for WT 2.2.

Table 15 Number of CDF occurrences in WT 2.1 and 2.2 (Ls2)

Worksheet	CATEGORISE	DEFINE	EXPLAIN	EXPLORE	REPORT	Total within the tasks
Task 2.1	8	0	3	1	3	15
Task 2.2	0	1	0	1	12	14
Total Worksheet	8	1	3	2	15	29

Unlike WT 2.1, Task 2.2 elicited only three different CDF types, of which the majority were instances of reporting. While EXPLORE occurred once in both tasks, CATEGORISE and EXPLAIN were exclusively found during the first task of the worksheet whereas DEFINE was only used in Task 2.2. The strong presence of CATEGORISE in Task 2.1 can be attributed to its purpose, which was the same as WT 1.1 in Ls1. A contrastive analysis between WT 1.1 and Task 2.1 shows that in both cases categorisations were the most prominent cognitive discourse function prompted in students' answers. However, they were more dominant in Ls1 due to the lower variation in CDF types. There they made up 65.2% of the CDFs while in WT 2.1 they only accounted for 53.3% of the CDF types. The second most frequent CDF type in WT 1.1 as well as WT 2.1 is REPORT which comprised 17.4% of the CDFs in Ls1 and 20% in Task 2.1. After

this, the frequency of the CDF types starts to diverge. While in Ls1 DEFINE took third place with 13%, in Task 2.1 EXPLAIN also makes up 20% of the student CDFs and thus occurs as often as REPORT. In contrast, EXPLAIN was not found at all in Ls1. Two instances of EXPLAIN in Ls2 were already exemplified in Extract 1 (p.47) and 6 (p.53), while the last one is shown in Extract 15.

Extract 15 EXPLAIN, Task 2.1, Ls2

S9: we could er move our daily routine or schedule?=

T: =mhm=

S9: =to later hours of the day (.)

T: mhm=

S9: =especially in winter (.)

T: mhm=

S9: =so (.) we don't have to use (.) that much (.) lamps early in the <10> night </10>

T: <10> okay </10> right

S9: because we can use daylight=

T: =yes (.) mhm (.) but it would rather be moving the routine forward rather than backward. (.) because if you (.) kind of

S9: did i say backwards?

T: ya-yeah you kind of said later in the day (.) so if we're actually (able to take advantage of the) sunshine (.) **is that what you meant?** (3)

S9: when you get up (.) you use the most (1) electricity (.) i think?

T: true (.) yeah?

S9: because i read it (1) one should think about (the) beginning when waking up= <11> <un> xxx </un> </11>

T: =<11> okay well i thought </11> i thought about (.) kind of <fast> doing the things where you need light (.) you do this while the sun shines </fast>

In this extract the teacher is trying to clarify S9's answer. However, while the teacher is usually right with his clarifications, this time he misinterprets the student's reasoning process. In Extract 15, S9 is trying to explain how moving the daily routine backwards can help conserve energy. By offering his understanding of using daylight, the teacher prompts the student to explain his reasoning process behind his original statement, justifying it by saying that he has read it somewhere. The student thus draws conclusions from an external source and appropriates the information for the context of his argument. Technically, S9's statement could also be interpreted as EVALUATE within a section of EXPLORE. However, as the teacher's

question focuses on the reasoning process of the student, his response was categorised as EXPLAIN.

Another difference between Ls1 and WT 2.1 is that the former features instances of DESCRIBE. On the other hand, Task 2.1 contains an example of EXPLORE, which was not the case in Ls1, making up 6.7% of the CDFs for this task.

Extract 16 EXPLORE, Task 2.1, Ls2

> T: […] shower bath or personal hygiene. (18) the first part of the type of activity actually tells you what you use <points to S5>
>
> S5: a lot of energy is used to heat up water (.) to use the shower=
>
> T: =okay (.) alright (.) yeah (2) **what's the alternative? (1) or what could be an alternative?**
>
> S2: shower wi- with colder water?
>
> T: <nods> shower with colder water.
>
> S7: <u>if there is a sea nearby?</u>
>
> T: yeah? so if you live near the sea (.) then you could kind of (.) <@> wash </@> yourself in the sea of course yeah (.) […] or a lake […]

Even though the first question of the teacher seems to target CATEGORISE, the teacher reformulates his question to encourage hypothetical answers as well, thus prompting S7's creative answer of using a lake/the sea for personal hygiene.

To sum up, there are some similarities between WT 2.1 and the worksheet comparison of Ls1. While the high frequencies of CATEGORISE and REPORT seem to be based on the purpose of the activity, the occurrences of the other CDF types can be attributed to the variations of natural discourse between interactants.

In contrast to Task 2.1, where there was a strong focus on eliciting class members, Task 2.2, whose primary focus was the students' correct use of vocabulary in sentences, gave rise to a different set of CDFs, as was already indicated in Table 15. Out of 14 occurrences, 12 were focused on REPORT, one was an instance of DEFINE and one of EXPLORE.

Extract 17 REPORT & EXPLORE, Task 2.2, Ls2

> T: let's turn to your sentences. **who's got a GOOD sentence with comparable** or as (.) in (.) standard english it's actually <ipa> ˈkɒmp(ə)ɹəbl̩ </ipa> <points to S4> [S4].
>
> S4: nothing is comparable to living? (1)
>
> T: okay? that's an interesting sentence (.) it's almost philosophical? (1) yeah (.) **any other (.) suggestions?** (6) with comparable (2) okay (.) contr- {S9 raises hand and is selected by teacher}
>
> S9: humanity has been seeking for comparable alternatives to using oil as a <14> (source) </14>
>
> T: <14> great good <nods> </14> yes well done (.) CONTRAST. (11) **who has got something with contrast** (3) {S4 raises hand and is selected} yes [S4]
>
> S4: <fast> in contrast to (.) our energy problem it is generally accepted <pvc> saince </pvc> {since} (.) forever </fast> you don't want to make compro- <pvc> compromisses </pvc>
>
> T: yeah once again it's compromises (.) <15> let- </15>
>
> S4: <15> compromises </15>

Extract 17 is prototypical of the majority of the discourse concerned with WT 2.2. The teacher usually states the keyword in question and students present their sentences, which is why REPORT is so dominant in that part of the lesson. The extract also contains the only instance of EXPLORE, as S4's first answer to *comparable* was tentative and speculative in nature. The teacher, however, did not validate or discuss what she meant with her example, but simply remarked that it was an interesting sentence. The following extract shows the only instance of DEFINE during the comparison of Task 2.2:

Extract 18 DEFINE, Task 2.2, Ls2

> S9: <un> xxxx </un> if it wasn't generally accepted in society to drink alcohol (.) far less people would suffer from dependency or an overdose
>
> T: yeah (1) good. (2) instead of dependency **what else could you say?** (1) (that's)
>
> S9: <soft> addiction </soft>
>
> T: yeah addiction probably yeah so addiction dependency […]

In this case, the teacher wanted to elicit an alternative vocabulary item for describing an alcohol dependency. Similar instances of DEFINE were also used in the second part of Ls2, the teacher's presentation.

In total, the teacher's presentation yielded four different types of CDFs across 20 student responses. The most common CDF was DEFINE, followed by CATEGORISE, DESCRIBE and EXPLAIN.

Table 16 CDFs during teacher presentation

CDF types	Absolute Occurrences	Percentage within teacher presentation
CATEGORISE	5	25.0%
DEFINE	9	45.0%
DESCRIBE	4	20.0%
EXPLAIN	2	10.0%
	20	100.0%

While DEFINE only occurred once during the worksheet comparison of this lesson, it took a prominent role in the teacher's presentation as he frequently asked the students to define a lexical item mentioned on his slides. Interestingly, the students usually responded with a definition in the target language instead of giving a translation in German, even though such behaviour had been previously noted (Dalton-Puffer 2007: 114, also Kröss 2014, Hofmann & Hopf 2015).

Extract 19 DEFINE, teacher presentation, lesson 2

T: <reading> soft (.) heavy (.) diluted </reading> **what is diluted?** {S4 raises hand and is selected}

S4: like a substANce is muddled (.) <L1de> also </L1de> it's not (.) pur (2) it's (2)

T: y::: **what do you do to dilute something** (.) let's put it that way (2)

S4: you (use other stuff)

T: you ADD <20> something </20>

S4: <20> yeah </20>

T: exactly yeah. so uh (.) for example (2) syrup (.) yah (.) if you (.) drink these syrup drinks (.) you know those you dilute them with water (.) yeah so you've got (.) syrup (.) and then (.) you've got water. **what's the german word for dilute?** <nods to S4>

S4: <L1de> verdünnen= </L1de>

T: <L1de> =verdünnen </L1de> mhm

Here the teacher wants to know if students are familiar with the term *dilute*. Instead of giving a translation, S4 tries to contrast a diluted substance with an undiluted one and thereby relies on a physical description. In order to help her, the teacher asks for a process description which the student provides even though she does not use the proper term for it. The teacher then goes on to give an example and only at the very end he asks for a German translation, perhaps to clear up any misunderstandings that might have occurred or to check whether the students have actually understood his description. The only other instance of a translation regarding definitions occurred when the teacher asked the students whether they knew what ivy was, to which a translation seemed the most straightforward answer. Extract 19 also shows how more than one CDF can be involved in a larger episode, as both the student's and the teacher's

descriptions were used for a definition. Another instance where DESCRIBE might be used for definitions was already given in Extract 2 (p.48) in which the teacher wanted the students to define the word *resemble* by describing its contextual use. In addition to descriptions, categorisations were also used for definitions during the teacher's presentation.

Extract 20 Categorisation within DEFINE, teacher presentation, Ls2

> T: effect or influence (.) uh (.) what does effect mean? (7) is it completely the same as influence or (2) is there a slight difference (4) {S4 raises her hand and is selected}
>
> S4: you do something and there's er (.) an action?
>
> T: yes (.) that's true (.) **positive or negative**
>
> S4: er it can be both
>
> T: yeah: **but rather?**
>
> S4: er bad
>
> T: yah. rather negative yeah (.) so (.) effect uh very often means influenced in a bad way

In Extract 20, the teacher wants the student to attribute a positive or negative connotation to the word *effect* and thereby assign class membership. This classification was used as a way of characterising the lexical item in question and can therefore be considered a micro-CDF. However, CATEGORISE was also found to be a macro-function, as can be seen in the following extract where the teacher wants to show the syntactical differences between *although* and *though*.

Extract 21 Description within CATEGORISE, teacher presentation, Ls2

> T: **what (.) is the difference between although and though?** just as (.) regards sentence (.) structure or word (.) o- kind of word positioning? in (.) a (.) sentence? (3) where is although normally placed? where would you place though.
>
> S9: although (.) would be typically placed at the beginning= <22> and </22>
>
> T: <22>=mhm=</22>
>
> S9: =though at the end of a <21> sentence </21>
>
> T: <21> yeah </21> <fast> but though can also sometimes be at the beginning so we can have though at the beginning or at the end? </fast> (.) and although just at the beginning (3) and even though means the same thing as although

For the purpose of juxtaposing the two vocabulary items, the teacher breaks down his original question into two separate questions that focus on the structural behaviour of the connectors within a sentence, thereby giving a kind of linguistic structural description. As it stands, DESCRIBE was only used within the language centred part of Ls2 (WT 2.2 and teacher presentation) where it was always focused on elaborating on the semantics of lexical items or their syntactical use in the context of a sentence.

The last CDF that occurred during the teacher's presentation is EXPLAIN. Its instances correlate with the use of questions for reasons outlined in section 6.1.2.2., where the teacher sought to justify his presentation by explaining how the language of analysis and evaluation might be useful in a context of energy consumption, as was shown in Extract 7 (p.54). The other example for EXPLAIN occurred when the teacher prompted the students to recognise a zero-conditional clause by asking them why *when* and *if* can be used interchangeably in certain contexts (Extract 8, p.55). As opposed to the samples of EXPLAIN during the first part of the lesson, which all focused on the students' reasoning processes and were thus referential, the initiations of EXPLAIN during the teacher's presentation were all elicited by display questions.

To sum up, the CDF types in Ls2 were not distributed evenly across the two parts. Instead it was found that only three of the six identified types occurred in both lesson parts. These included CATEGORISE, which was especially prominent during the comparison of WT 2.1, DEFINE, which was almost exclusively used during the teacher's presentation, and EXPLAIN, which had a similar distribution as CATEGORISE. Their relative distributions can be obtained from Figure 5. In contrast, EXPLORE and REPORT were only found in the first part of the lesson, while all instances of DESCRIBE occurred in the second part.

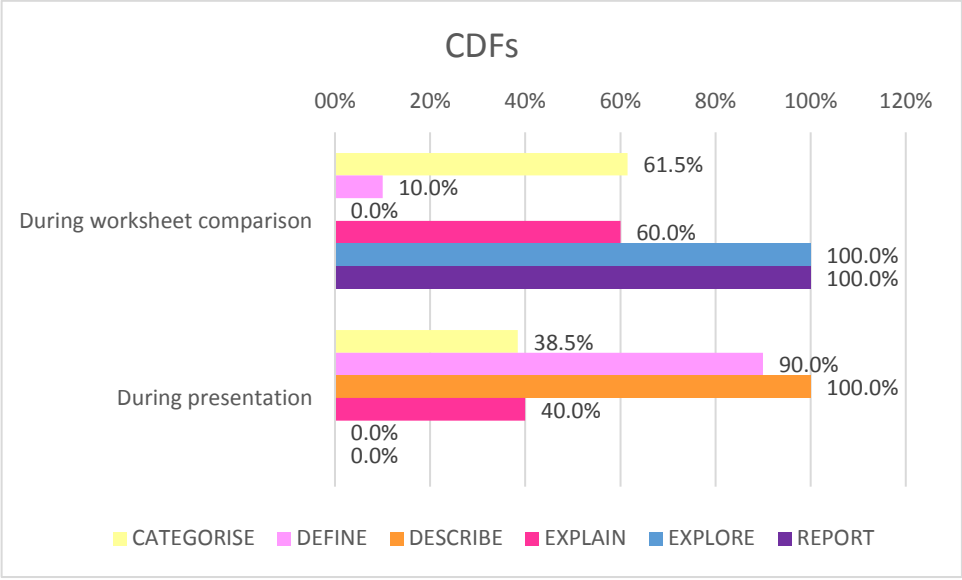

Figure 5 Relative distribution of the CDFs between the two parts of Ls2

It was also argued that the distribution of CDFs is most likely based on the purpose of the classroom activity. While WT 2.1 concentrated on the collection of students' ideas, which prompted a lot of instances of CATEGORISE, WT 2.2 was focused on the elicitation of student's language examples that they presented to the shared knowledge space. On the other hand, the teacher's presentation was mainly concerned with providing students with appropriate

words and phrases and in order to ensure their understanding, the teacher had to use definitions which often entailed other CDFs on a micro-level. Because Ls2 had such a diverse set of activities, it provided more space for different discourse functions than Ls1. The only CDF that was missing in both contexts was EVALUATE, which was only found in student responses during the panel discussion of Ls3.

6.2.2.3. CDFs in Ls3

Like Ls2, the panel discussion also yielded six different CDF types. In contrast to the previous lessons, however, categorisations could not be identified in the data set for Ls3. Instead, the open discussion prompted students to evaluate not only the factual information presented but also the quality of the reasoning processes behind their classmates' arguments. In addition to EVALUATE, this lesson also encouraged students to speculate (EXPLORE) about energy consumption and which measures might be taken to make energy production more efficient. These two CDFs (EVALUATE and EXPLORE) were the most prominent in Ls3 but did not receive much, if any, discourse time in the previous recorded lessons. The distribution of all the identified CDF types in Ls3 is presented in the following table.

Table 17 CDF types in Ls3

CDF types	Absolute occurrence	Proportion within Ls3
DEFINE	5	11.4%
DESCRIBE	3	6.8%
EVALUATE	15	34.1%
EXPLAIN	2	4.5%
EXPLORE	13	29.5%
REPORT	6	13.6%
	44	100.0%

Table 17 accentuates the prevalence of EVALUATE and EXPLORE as they together accounted for 63.6% of the CDFs that occurred in Ls3. During the discussion, evaluations took many different forms. Firstly, students had to present an energy source and give reasons why this source is the most sustainable within the Austrian context. Secondly, this stance-taking was then critiqued by other students in order to enforce their own energy source which then prompted the addressed students to reflect on their arguments. The following extract shows such a chain of evaluative processes. Note that the teacher's input played a minimal role during the students' exchange.

Extract 22 Students' evaluations of each other's arguments, Ls3

T: […] my question to (2) the whole group actually is (1) **whether (.) the energy source you've introduced to us (.) uhm can be effectively used in austria**. (7) okay?

[…]

S7: yes uhm <3> i think </3>

T: <3> [S7] </3>

S7: that water energy is (2) just advantageous because (.) we have a lot of lakes in austria and as we have mentioned before (.) in the whole process where we uhm produce the energy the water isn't used up (2) so (.) it's renewable (.) as you might know (.) and i think it's the (.) probably biggest uhm benefit of water energy.

S3: i've got a question (.) to the group (.) uhm because (3) isn't it true that uhm (3) when we build up these (2) what (.) do you call them (2) the (.) water

S7: the mo- {holds up picture} this?=

S3: =yah exactly=

T: =dams yeah

S3: that (2) in (.) in a way life is destroyed for (.) the animals who live in these lakes and these rivers (2) and therefore i don't think that's their only benefit other- but (.) that there are only benefits (2) when (2) uhm (3) building up these (5)

T: power plants or er dams.=

S3: =dams

S8: we do not agree because you <4> uhm </4>

SS: <4> <soft> @@@ </soft> </4>

S8: can build (.) uhm around uhm little (.) uhm of these lakes or ocean- or not oceans but lakes or (.) if you use uhm (.) use water of the canalisation? yah? (.) and you can surround the (2) magazines? (2) <L1de> Speicher? {reservoirs} </L1de>

T: yeah

S8: yeah (.) erm:: and (.) build (1) uhm (4) uhm magazines for the (2) uhm (3) <5> <@>animals </@></5>

SS: <5> @@@@ </5>

T: <6> do you mean like nature- nature reserves? </6>

S8: <6> next to the </6> nature reserves <7> yes </7>

SS & T: <7> yeah </7>

S7: i don't think it would be a big problem (2)

S3**:** in theory is that (.) we COULD build these (3) erm magazines? (.)

SS: yeah=

S3: =but in practice (.) it's not always <8> so easy </8>

Although the teacher does participate in the discourse, his primary function here is to provide the speakers with necessary vocabulary and clarify concepts. He does not partake in the discussion but instead allows the students to react to each other. This deviation from the

traditional IRF pattern observed in the previous lessons gives students the space to evaluate each other's contributions and to engage in higher order critical thinking. Whether this observation is restricted to this specific lesson or can be generalised to open discussions in general is to be determined by further empirical research that includes a comparative investigation of traditional teacher-fronted classroom discourse and student-centred discussions. What can be said, however, is that the students' active participation minimised the teacher's use of questions as the students themselves often raised issues. Instead of functioning as an interlocutor, the teacher took on the role of a moderator.

Apart from EVALUATE, the other prevalent CDF that could be identified was EXPLORE. Its high frequency in this lesson can be related to the purpose of the underlying task which was to determine a potential national energy source. Interestingly, these explorations seemed to occur toward the end of the lesson whereas the beginning was more concerned with establishing a factual basis by explaining and describing the processes involved in energy production. A prototypical example for EXPLORE in Ls3 is given below.

Extract 23 EXPLORE, Ls3

> T: yeah. exactly. talking about the future (.) maybe uhm ONE round uh through the panel again uh:m **what is (.) the future potential? and what might be technological advance for the future your energy source to become even MORE effective**. (3) maybe starting again (.) with uh solar panels.
>
> S5: uhm <43> <un> x </un> </43>
>
> T: <43> IS there a way (2) of becoming more effective. </43>
>
> S5: yeah there's always a way t- there's always a way to become MORE effective but it would be (.) the- it would be very good i think for the er not so well-developed countries in africa (.) to: build erm solar panels? because they have erm many (.) erm deserts and so (.) have t- they have (2) the sha- er the chance to (.) get enough (.) uhm energy.
>
> T: mhm=
>
> S5: =and o- they can also (.) uhm (2) sell their energy to other (.) countries=
>
> T: =mhm (.) right (.) and it would m- maybe also be a chance (.) for developed countries (.) to: invest (.) in (.) uhm developing countries (2) and uhm again (.) we would be able to see the effects of globalisation there. […]

After the students' speculations about the future potential of their energy sources, the teacher then asked the students to give a closing statement for each group. As these statements were essentially summaries of all the positive and negative aspects noted by the students, they were all instances of REPORT. Other occurrences of REPORT included the presentation of statistics on energy use and the explanation of technological requirements for building power plants.

The five instances of DEFINE were all concerned with reformulating and condensing the students' statements by the teacher. Interestingly, all of these reformulations occurred in the form of closed questions, as can be seen in the following examples.

(1) T: **do you mean like nature- nature reserves?**
S8: <6> next to the </6> nature reserves <7> yes </7>

(2) T: **you mean it's like an endless source**, actually
S6: yeah=

(3) T: **so it uses up resources**
S3: yeah yah

(4) T: **you mean if you need to get (.) water from one place <23> to another** </23>
S5: <23> yes </23>

(5) T: okay right <35> **so you say (that it is not a factor) </35> how advanced the factory is**
S3: <35> yeah no </35> no

As such, the actual act of defining was not performed by the students but by the teacher. Nevertheless, they were counted towards the total occurrences of DEFINE as the students had to follow the teacher's reformulation and compare it with their own understanding of the described concept.

The last two CDF types that were identified in students' responses in Ls3 were DESCRIBE and EXPLAIN. In this lesson, as opposed to Ls1 and Ls2, all of the descriptions were physical in nature, with the first two instances focusing on a description of a statistical graph and the last one focused on describing the Austrian agricultural landscape.

Extract 24 Physical description, Ls3

> S3: anyway so (.) i-i think the potential is there (.) to use uhm biomass here (.) and also if you look at (.) uhm austria and its uhm (.) uhm and its
>
> T: **geography? you** <45> **mean or?** </45>
>
> S3: <45> geography </45> yes uhm <u>we can see that there are a lot of (.) uhm uhm (7) yah fields</u>
>
> T: yeah right
>
> S3: so yah <u>everywhere around villages (.) there are fields</u>. and out of these fields we could (.) use a lot of biomass. (2) yeah

While the description of a physically present graph allows the teacher to verify the student's rendering of the underlying message, the description in Extract 24 was more challenging with regard to identification of the described concept. As the teacher started to notice that S3 was trying to convey something for which he could not recall the correct term, he offered him a lexical item, which the student picked up. However, as the student perhaps sensed that the

word *geography* did not exactly suit his underlying idea, he continued to describe what he meant and eventually remembered a word that functioned as a signifier for his concept.

In this lesson, there were several instances where EXPLAIN was used by the students. However, only two were elicited by the teacher's questions while the others occurred either during the description of the individual power sources or during the students' critical interaction. The teacher-initiated explanations where all prompted by questions for reasons and were open in nature.

To sum up, Ls3 opened the floor for students' critical comments and thus resulted in a different CDF profile than the previous lessons. While the high number of evaluations are partially based on the general nature of having an open discussion as a classroom activity where students are generally allowed more room to interact with each other and are encouraged to critique each other, most of the evaluations and explorations can be attributed to the purpose of the panel forum, which was the recommendation of an energy conservation plan for future implementation in Austria.

6.3. Correlation of CDFs and question functions

After having analysed the occurrences of teacher question functions and CDFs separately across the three recorded lessons, the following sections will investigate how these question functions might be linked to certain CDF types altogether. Additionally, it will also be examined whether there might be a correlation between the question types and the referential/display distinction as well as the open/closed categorisation and whether certain question words can be linked to Dalton-Puffer's question functions. Where appropriate, remarks will be made regarding a possible influence of question functions and CDFs on the complexity of student responses. However, these are to be taken as interesting observations rather than official findings since no formal scheme of analysis was established for investigating complexity in students' utterances.

6.3.1. Findings on questions for facts

The first question function that will be investigated in detail is questions for facts. As expected, they were the most frequent in the data set. In the preliminary correlation of question types and CDFs (Table 3, p.35) it was proposed that questions for facts would be most likely to elicit student responses that contain CATEGORISE, DEFINE, DESCRIBE and REPORT. As the following figure shows, this assumption was mostly confirmed by the results of the quantitative analysis.

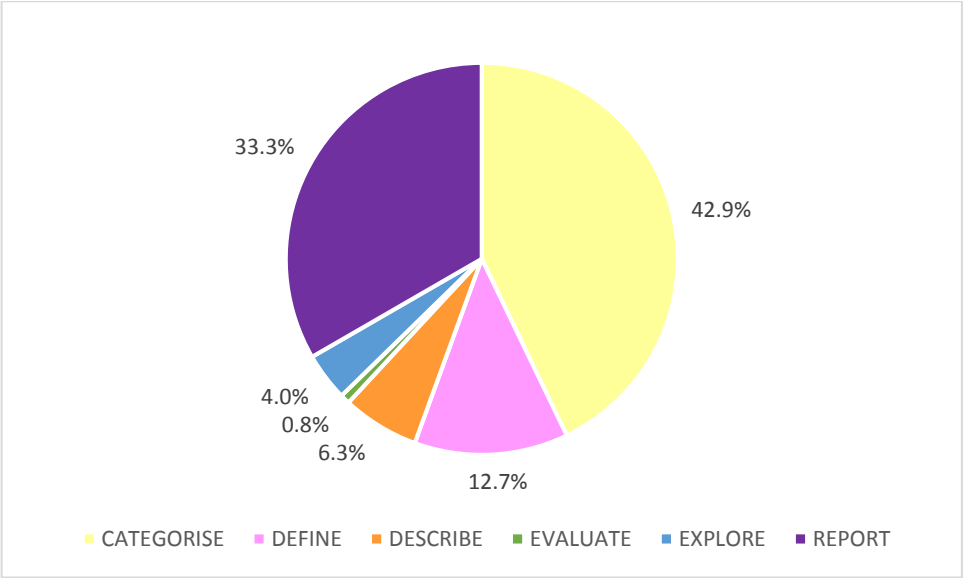

Figure 6 CDFs elicited by questions for facts

The most prevalent CDF that was elicited by questions for facts was CATEGORISE. As assumed, categorisations were always limited to naming class members and thus produced responses of low linguistic complexity. Questions for categorisations were largely referential (81.5%) as the activities in which these categorisations occurred were overall referential in nature (Example 6, Ls1). Display questions for categorisations were only observed during the teacher's presentation where he quizzed students about words and phrases (Example 7, Ls2). The majority of categorisations questions were also open (81.5%) and when question words were used, which was not necessarily the case as the teacher often abbreviated the questions to keywords (Example 8, Ls1), they were always introduced by *what*, as can be seen by Example 6 and 7.

(6) T: let's compare this together. first category is waking up. **what is typically used and what (thing) can be used instead**. [S1].
S1: u:m typically used is an alarm clock?
(7) T: =yeah so **this is what kind of conditional.**
(8) T: […] <reading> **heating? cooling?** </reading> (6)[S20]?
S20: today we can use uh:m (.) air conditioning or a heater?

The second most frequent CDF type that occurred in students' responses to questions for facts was REPORT. Even though factual initiations of REPORT could be found in all recorded lessons, they were especially prominent during Ls2, as was already indicated in the previous sub-chapters. In contrast to CATEGORISE, reporting answers varied in their length and complexity. While some answers were limited to a few words, other responses spanned across several sentences. An example for the latter was taken from the discussion in Ls3.

Extract 25 REPORT, Ls3

> T: […] uhm the question now is (.) **how (2) spread (3) and (4) how much (.) these energy sources are in use already. and (2) uh whether (.) they need to be further developed to become more effective (.) or if there ARE (.) downsides to the sources that you've presented to us.** (7)
>
> S3: yeah uhm (5) biomass is (.) has also developed as an unlimited source (.) for: uhm (3) source- use for uh many hou- home owners?
>
> T: okay
>
> S3: erm uh it helped also to reduce (2) uhm (.) uhm their deepend- depen- dependency on fossil fuels. and it's already (.) widespread in austria.

The reason for this variation in students' answers is most likely based on the purpose of the task as there was no observable correlation between the openness of the question, different question words or the reference of the knowledge questioned. Extended student answers were given to both open and closed questions as well as to display and referential questions. Factual questions that elicited reports were to a large part referential (66.7%). Regarding the openness of the questions, the distribution was relatively even with 57.1% open and 42.9% closed. As with factual questions for categorisations, open questions were not always introduced by question words but when they were, the teacher used *what*, *how* and *who*. In total, only 5 out of 12 open questions were initiated by a question word.

After these especially prominent CDF types, other CDFs were also found to be elicited by questions for facts. The first of these is DEFINE which occurred in 12.7% of the student answers. Instances of DEFINE that were prompted by questions for facts could only be found in Ls2 during the language-focused task of the worksheet (WT 2.2) and the teacher's presentation. Interestingly, these questions for definitions were always introduced the question word *what*. Similar observations were already made by Dalton-Puffer (2007: 113) and Lackner (2012: 59-60). Factual definitions were exclusively elicited by open, display questions. As far as the length and complexity of students' answers is concerned, these ranged from simple translations to whole sentences in the target language. While Dalton-Puffer (2007: 114) found that definitions were "mostly circumvented by translations in the CLIL classroom", these observations did not apply to the data investigated here. In most cases, students did attempt to define the meaning behind a word and only gave translations when invited to do so. Whether this behaviour is due to the personal teaching style of the teacher or the proficiency level of the students would need to be determine by further empirical research that compares the definition behaviour in lower and upper secondary classes with different teachers.

The fourth CDF type that was identified in student responses to factual questions was DESCRIBE. Across all lessons, only four instances of DESCRIBE could be linked to this question function, three of which occurred in Ls2 and one in Ls3. Similar to DEFINE, the majority of questions were open (75%) and focused on testing the students' knowledge (75%). Out of the three open questions, each was introduced by a different question word.

(9) T: resemble? […] **WHEN is it also used. (.)** in (.) what (3) sort of (.) um (2) word (3) family (4) or what topic. […]
S4: you can (.) use it if you want to (.) describe that a person is similar to another person=

(10) T: […] **what do you do to dilute something** […]
S4: you (use other stuff)

(11) T: [...] **where is although normally placed? where would you place though**.
S9: although (.) would be typically placed at the beginning= <22> and </22>
T: <22>=mhm=</22>
S9: =though at the end of a […] sentence […]

In the first example (Ls2) the teacher uses *when* to elicit the context in which the lexical item in question might me most appropriate. The student's response can be regarded as a functional description as it describes the purpose of the vocabulary device. The student's description in (11) can also be considered functional as it focuses on the interrelation of the lexical items within the sentence structure (Ls2). It is initiated by the question word *where*. The description in (10), however, focuses on the process that is conveyed by the word *dilute* (Ls2). The teacher's formulation of the question with *What do you do to x something?* seems to be a promising formulation for eliciting process descriptions. As there are no other instances of this phrase in the data set, however, this assumption is purely speculative and needs to be verified by further empirical support. The students' responses to the teacher's description questions were similar in length and complexity to those for DEFINE in that they were usually realised in short sentences.

In addition to the CDF types above, which were expected to be found, EXPLORE was also identified within students' responses to questions for facts. However, they only occurred three times in the whole data set, twice in Ls2 and once in Ls3 where it was actually elicited by the same question that caused another student to EVALUATE. Factual questions that elicited explorations were mostly open (80%) and referential (60%). The only time EXPLORE was elicited by a display question was during WT 2.2, where the teacher wanted to know a sentence with *comparable* (Extract 17, p.68). The open questions, of which there were only two, were both initiated by question words, namely *what* (Extract 16, p.67) and *who* (Extract

17, p.68). The students' responses to factual explorative questions varied rather considerably in length. While the answer to the questions in Ls2 consisted of short clauses or sentences, the response to the factual question in Ls3 was comparatively extensive. However, it must be noted that the instance of EXPLORE in the latter was triggered by another student's critical remark and was not given immediately after the teacher's question.

Extract 26 EXPLORE elicited by student critique, Ls3

S10: yeah but i think there are a lot of fabrics in <un> xxx </un> austria that don't look nice as well (.) and so i don't think that (.) a wind power plant (.) would can make such a difference

S6: but they are so s::pread like (.) i- if there is ONE big thing okay but there is like everywhere (.) so (2)

S10: but we could build them (3) far away from each other.

SS: <soft> @@@ </soft>

S3: <soft> but that's a power plant- (how) people don't wanna do this </soft>

S10: i don't think that we (.) there are already producing enough energy, we don't have to (3) build thousands more (2)

S3: <20> <un> xxxx </un> </20>

S9: <20> and i think </20> we're getting used to them. (.) it's just because we uhm (.) we grew up with (.) uhm no wind power plants and now they are built (.) pretty fast (.) and so we just have to get used to them (2) and for our childs one day it's normal to grow up with wind power plants (4)

In this case, EXPLORE was used as a last step in an argument which links it to the CDF EVALUATE. The teacher had originally asked whether the group concerned with wind energy had any information to put against the critique that people would not like to see wind turbines disrupting the scenery of the landscape. The responsible group first tried to argue against the energy sources of the other students, eventually leading to S10's statement in Extract 26 that any power plant would destroy the landscape in some way. Apart from the teacher's initial question, he did not interfere with the students' discussion, which is why both EXPLORE and EVALUATE were attributed to the same question. This instance of EVALUATE was the only one that could be said to be elicited by a factual question.

Overall, the majority of questions for facts were open (69.8%) and referential (60.3%). Even though open questions theoretically require an introductive question word, many questions were shortened to keywords that referred to an overarching question. When question words were used, however, *what* was the most common, followed by *who*, which was used twice, and *when*, *where*, and *how*, which all occurred once within the recorded data for factual questions. Despite Dalton-Puffer's (2007: 113) and Llinares and Pascual Peña's (2015: 25) observation that students' responses to questions for facts only produce short, and

linguistically and conceptually simple answers, the analysis between different CDFs has shown that the complexity of the response might be associated to the cognitive function used in answering the question. While the elicitation of class members seems to be especially prone to generating responses consisting of single words, the occurrence of other CDF types appeared to produce utterances at the clause or sentence level. With regard to complexity, the answers dealing with REPORT, EXPLORE, and EVALUATE were found to be more evolved than those concerned with DEFINE and DESCRIBE. That being said, definite conclusions cannot be made due to the small sample size. These findings might, however, be used to inspire further research regarding the correlation of CDFs and students' cognitive involvement.

6.3.2. Findings on questions for explanations

Questions for explanations were the second most frequent question function within the data set for this study. Per definition, questions for explanations are used for making statements more explicit which allows for a relatively wide range of CDFs within responses. Therefore, it was proposed that these questions can elicit any type of CDF which is confirmed by the analysed data.

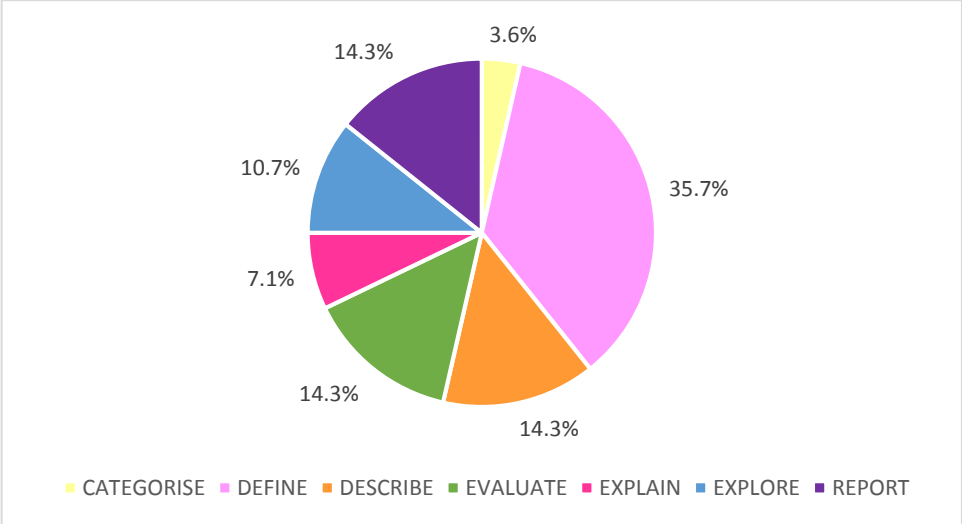

Figure 7 CDFs elicited by questions for explanations

As is illustrated in Figure 7, students used all of the seven CDF types at least once to answer questions for explanations. The most prominent CDF that was realised, however, was DEFINE, which occurred in all analysed lessons. In contrast to definitions that were elicited by questions for facts, questions for explanations concerned with DEFINE were primarily closed (90%) and referential (90%). The only time a question for definition was open, it was introduced by *what* and focused on clarification. Questions for definitions that focused on elaborating on a student's previous statement were mainly realised in two forms: the teacher

asked for a repetition or he reformulated a student's answer to which the student then agreed. If they did not agree, they actually went on to justify or argue their view, which is part of EVALUATE. Unsurprisingly, the student's agreement mostly took the form of one-word answers, such as *yeah*, *yah* or *yes*.

(12) T: <6> **do you mean like nature- nature reserves?** </6>
S8: <6> next to the </6> nature reserves […] yes […]

(13) T: **you mean it's like an endless source**, actually
S6: yeah

It could be argued that these definitions were technically not performed by the students and should thus not be counted towards the overall distribution of CDFs to questions for explanations. However, since the students still had to validate the teacher's definition, they were checking whether this reformulation actually fitted their cognitive concept which means they were engaged in the definition process. Even though the second type of explanation question for definition was realised through repetition requests, there was one case where the student also elaborated on his answer.

Extract 27 DEFINE as response to repetition request, Ls1

S2: feet?

T: **once again?**

S2: feet (.) you cou- just you could start walking?

This, however, could only be observed once in the recorded data and is by no means indicative of explanation behaviour in general. Most of the responses containing DEFINE to questions for explanations were extremely short due to the closed format of the questions.

The next frequent CDF types elicited by questions for explanations were DESCRIBE, EVALUATE and REPORT. While EVALUATE and REPORT only occurred in Ls3, instances of DESCRIBE were spread across all of the recorded lessons. Similar to DEFINE, the majority of explanatory questions for DESCRIBE were closed (75%) and referential (75%). The only time an open question occurred was when the teacher asked one of the groups during the panel discussion to explain the meaning behind a graph.

Extract 28 Open question for DESCRIBE, Ls3

T: yeah. (3) maybe **you can tell us again what (.) uh is the main message behind this graph**.

S2: so the more developed (.) uhm countries use more energy than the uhm (.) poorer countries (.) like here in africa. (3)

Like in questions for DEFINE, the teacher uses *what* to introduce his question. As the student's response focuses on the characteristics of a tangible graph, it can be interpreted as a physical description. Another instance of a physical description was found in the same lesson when a student described how Austria's agricultural landscape might benefit biomass energy production (Extract 24, p.75). The other two responses to questions for explanations related to DESCRIBE focused on the function of a river for personal hygiene (Extract 14, p.64) and the process behind the word *effect* (Extract 9, p.55). In contrast to the closed questions for DEFINE, closed explanatory questions for DESCRIBE produced responses at the sentence level.

Instances of EVALUATE and REPORT in students' explanations could only be found in Ls3. In both cases, all of the questions were referential. With EVALUATE, half of the questions were open whereas reporting questions tended to be open more frequently (75%). Invitations to evaluate were uttered for two different purposes: the teacher either used the question to steer the discourse into a certain topical direction or he invited students to actively challenge each other's arguments or information.

Extract 29 Stance taking (EVALUATE), Ls3

> T: […] and **wind energy?** (2)
>
> S9: yeah as we already said wind is the: cheapest renewable source (.) besides biomass and solar plants- panels uh:m (2) yeah the price is decreasing (2) so uhm as we (.) can see here and [S5] has already said uh::m (.) the cost of solar panels went down quite (2) uhm […] much yeah […] uhm but (.) w- the costs of winds are decreasing too (.) a:nd yeah solar panels are the most expensive ones and winds are the cheapest ones so yeah.

Extract 30 Invitation to critique (EVALUATE), Ls3

> T: […] before I ask any questions **are there any questions amongst yourselves** {S6 raises her hand} yes.
>
> S6: erm for the wind […] erm (2) you said in austria (3) there is a lot. (3) but (.) in the other countries there is not so (.) could this- could wind (.) erm can (4)
>
> T: provide?
>
> S6: provide the whole world? (3)

Extract 31 Invitation to evaluate, Ls3

> T: okay so **then you accept this answer?** @@
>
> S3: no i i just let it=

In the first extract, the teacher wants the students to elaborate on the type of investment that would be needed to implement a particular energy source as the primary power resource in Austria. Even though this question is more targeted towards the CDF EXPLORE, S9 responded to it by justifying the feasibility of wind energy. In this case, the teacher's group nomination was interpreted as a question for explanation rather than reason because its primary purpose

was to prompt the students to elaborate on the potential of their energy source rather than expressing a cause/effect relationship between costs and financial sustainability. In Extract 30 the teacher invites students to ask questions, thereby encouraging them to elaborate on each other's arguments. This opportunity is taken up by S6, who evaluates the information given by another group and formulates an explorative question. The teacher question in Extract 31 is asked after a long discussion on hydropower in which S3 has expressed his critical stance towards whether hydropower is actually a renewable source of energy or whether increasing water consumption renders it an obsolete form of energy production. After several turns, S3 gives up on arguing his point which leads to the teacher's question in Extract 31 in which he wants S3 to make his standpoint explicit, which he does. Apart from this rather short answer, the other instances of EVALUATE in students' responses to explanatory questions were always expressed in sentences of moderate linguistic and conceptual complexity.

With regard to REPORT, teacher questions were asked in two different contexts. Firstly, reporting questions for explanations were asked to expound the technology required for implementing an energy source on a large scale (Extract 32). Secondly, REPORT was most prominent during the closing statements towards the end of the lesson (Extract 33).

Extract 32 REPORT as isolated CDF, Ls3

> T: okay right **what about the technology that uh stands behind uh: solar panels**. i mean that's (3) no simple technology i would assume? uhm (.) how much financial n-investment would be needed then (2)
>
> S5: uhm (3) yeah the prices are (.) very lou- low today (.) a:nd it is also a fact that for example austria (.) ge- uh we have (.) uhm (.) uhm <L1de> was heißt uhm dass du eine förderung bekommst {how do you say that you get a subsidy} </L1de>
>
> T: er subsidy. yeah you get subsidies.
>
> S5: yeah you get subsidies if you: are interested (.) in buying (.) solar panels so that (.) it is more used

Extract 33 REPORT as overarching language function, Ls3

> T: okay **so more renewable sources will be needed?** and we've got a round of representatives of (.) renewable energy sources and we'll start with uhm our closing statements (.) wi:th (.) solar panels. (3)
>
> S5: uhm yeah (.) i think (2) the- the (.) the coasts o:f (.) uh:m solar panels will (2) still (.) uhm: get lower in the next years (.) and (.) you will see it so that (.) one day it is a minimum (.) so i think more and more people (.) ca:n buy solar panels. and (.) yeah it will stop the (.) pollution and also cut down the electrician- electricity bill. (6)
>
> T: okay?
>
> S3: uhm yes uhm (.) as we said the benefit (.) of BIOMASS is that (.) er (2) it contains waste which is <un> x </un> not harmful for the environment (.) and uh turn it into something useful (3) so that's the main point (.) of biomass. and the uhm (.) the (2) emissions which are (.) produced aren't harmful (.) and if there IS produced for example carbon dioxide (.) it's uhm (2) captured and used

for <un> xx </un> growth. <un> xx x xx </un> energy growth. uhm <un> xx </un> (2) and uhm (.) as we said (.) uhm (.) we are all surrounded (.) around (.) uhm (.) with (.) biomass and therefore (3) uhm we think (.) biomass is the (.) ideal (.) source for energy for (.) this country. (4)

T: okay thank you very much (**hydropower**)

S7: uhm as we already mentioned (.) at the beginning it might be expensive to build these magazines but uhm (2) when you uhm build them or (.) when they already exist (2) the costs are very low and i think that's (.) probably the most important thing […]

T: yah? okay alright? (.) **wind power**.

S10: uhm (.) so: we said that we provide enough energy (.) and we- we'll also (.) uhm provide enough energy in the future because as long as the sun shine (.) there will be enough wind (.) […] and uhm as we said the price are decreasing so it's very cheap. and there's no pollution at all so (.) think about changing to wind energy (2)

In Extract 32, the teacher wants the students to explain how the technological advancement of solar power cells might impact financial investment. Even though he follows up his first explanatory question with a question that is targeted towards explore, the student only responds with presenting factual information without explicitly speculating about the potential of solar energy. Apart from this instance of REPORT, the students also summarised their main arguments in the closing statements of the discussion, as is shown in Extract 33. Interestingly, not all of the students responded to the teacher's question in the same way. While the majority of students' answers contained REPORT, S5's response was different as it focused on the future potential of solar energy, thereby expressing the CDF EXPLORE. Overall, it was found that reporting answers to questions for explanations were rather linguistically complex, employing different types of conjunctions and subordinate clauses, such as conditionals and relative clauses. As far as frequency of question words is concerned, there was only one open question that was introduced by an interrogative pronoun and that was the question in Extract 33, which started with *what*. Other open questions were categorised based on their open function, even though they were limited to keywords, as in previous instances.

The next CDF type that could be identified in students' responses to questions for explanations was EXPLORE. As already indicated, invitations for explorations were not always taken up by students or given when other students reacted differently to the same question. However, there were also instances where the teacher succeeded in eliciting EXPLORE through questions for explanations. These questions were always referential and open and occurred three times in the investigated data set, all of them during the panel discussion in Ls3. The two questions that were introduced by a question word are exemplified in Extract 34, while the last question is shown in Extract 35.

Extract 34 Open questions with interrogative pronouns, EXPLORE, Ls3

T: right. so **what ki- what kind of investment would be needed actually. is it (.) uh just (2) uh is it a lot of money that you would need for buying (.) uh or for actually building up (.) such (.) power plants biomass power plants or:: uhm is it only a small investment**. <34> <un> xx </un> </34>

S6: <34> only a small </34> because you don't really need much. or we may- maybe want the fabric to (.) reuse this for uhm other things the (.) side products but not really (.) erm (.) this:

S3: yeah=

S6: =biomass for energy.=

T: =**how advanced is the technology that you need for that?**

S3: i don't think that very advanced technology is needed because (.) the only (.) uhm really uhm (3) difficult point is to (2) burn it? which isn't (.) that uhm difficult

T: mhm=

S3: =and then to: turn it into steam. (2) there is not a- a lot of (.) courses used for this and therefore (.) uhm just a few fabrics can be built up (.) and i don't uhm think that is difficult to collect (.) the: (2) manure of animals or (.) the waste that is produced in agriculture=

T: =mhm

Extract 35 Open question without interrogative pronoun, EXPLORE, Ls3

T: so actually biomass is all around us? a:nd we could use even more than we are using now. **hydropower?** (2)

S8: uhm we think that the (outlook) will look very good for hydropower? erm because hydropower is an domestic energy source which kind of means that every country can produce their (.) own energy sources? (.) and so there will not be any fight between uhm states or (2) some (3)

In Extract 34, the teacher uses both *what* and *how* as interrogative pronouns. Even though he reformulates his first question by adding a number of polar questions, the students do not restrict their answers to simply choosing one of the options outlined by the teacher, but they go on to justify their standpoint by describing potential resources used in biomass energy production. Both responses to the first and second question in Extract 34 feature the causal conjunction *because*. In Extract 35, the teacher does not formulate a full question but rather resorts to using the name of the group to initiate their turn. This extract was taken from a segment that focused on the future potential of the various renewable energy sources. Even though the original question was classified as a question for opinion as students needed to take a stance towards a topic, the question in Extract 35 was considered to be explanatory because it emphasised that the students needed to make the capacity of their energy source explicit. This difference in categorisation suggests that, similar to CDFs, question functions might operate on different levels. While the larger episode is concerned with eliciting opinions, other question types and CDFs might appear in order to achieve the purpose of the overall communicative intention.

The sixth category that was found in responses to questions for explanations was EXPLAIN. In this case, only two examples were found, both of them occurring in Ls2. The first one was already shown in Extract 1 (p.47), where the teacher asks the student to explain *how do you charge your smartphone* in a way that saves energy. The second question focused on checking whether the teacher's understanding of a student's answer was what the student actually wanted to say by asking *is that what you meant?* in Extract 15 (p.66). This example was described in further detail in section 6.2.2.2. (p.64) where the occurrence of CDFs in Ls2 was discussed. While the first question is open and uses the interrogative pronoun *how*, the second one is closed. Both, however, are referential. Interestingly, the response to the open question was shorter and less linguistically complex than the answer to the closed question, which stretched over several turns and incorporated subordinate clauses. Due to the few instances, however, these observations should not be projected on CLIL classrooms in general.

The CDF that occurred least often in responses to questions for explanations was CATEGORISE. In fact, it was only used once, during Ls2. In the following extract the teacher asks the student to contrast showering and bathing, which she had already done in her previous statement. Unsure of what her opinion was, the teacher asked her to reiterate her original position.

Extract 36 CATEGORISE as response to question for explanation, Ls2

S8: but it's better taking a shower than taking a bath

T: yeah right (.) good (.) so an alternative to (.) uh (2) taking (.) a bath is taking a shower (.) or the other way around. (1) **what did you say was better?** (2)

S8: <whispering> shower.= </whispering>

T: =showering <nods> (4) right.

Even though this question might be interpreted as a question for opinion, its primary focus lies on re-stating rather than on taking a personal stance, which is signified by the use of the past tense. Therefore, it was categorised as a question for explanation. Although the question in Extract 36 is open in form, using the pronoun *what*, it is limited in its range of responses and was thus seen as functionally closed. As the teacher does not know the student's answer, the question is also referential in nature. Similar to the categorising answers to questions for facts, the student's response consisted of only one word, making it one of the shortest to be elicited by questions for explanations.

Interestingly, with a percentage of 57.1% the majority of questions for explanations were closed in either function or form, which stands in stark contrast to the results for questions for facts, which were found to be predominantly open. However, this closed format did not

inhibit the complexity of student responses as most of the CDFs were realised on the sentence level and even spanned across longer stretches of speech. Similar to their occurrences in responses to question for facts, DEFINE, DESCRIBE, and CATEGORISE were found to generate linguistically less complex answers than REPORT, EXPLORE, EVALUATE and EXPLAIN. This could be an indicator that complexity of student responses might not solely be dependent on the question function, as proposed by Dalton-Puffer (2007), but also be influenced by the CDF type that is elicited. However, this assumption needs to be confirmed by further empirical research. As far as knowledge distribution is concerned, all but two questions for explanations were found to be referential, amounting to 92.9%. Both of these display questions were asked during the teacher's presentation in Ls2 and were analysed in detail in earlier sections of this paper.

6.3.3. Findings on questions for reasons

The third most frequent question function in the data set for this paper was concerned with eliciting reasons. Despite the assumption that questions for reasons would be directly linked to EXPLAIN, EVALUATE and EXPLORE were also found in students' responses to this question type.

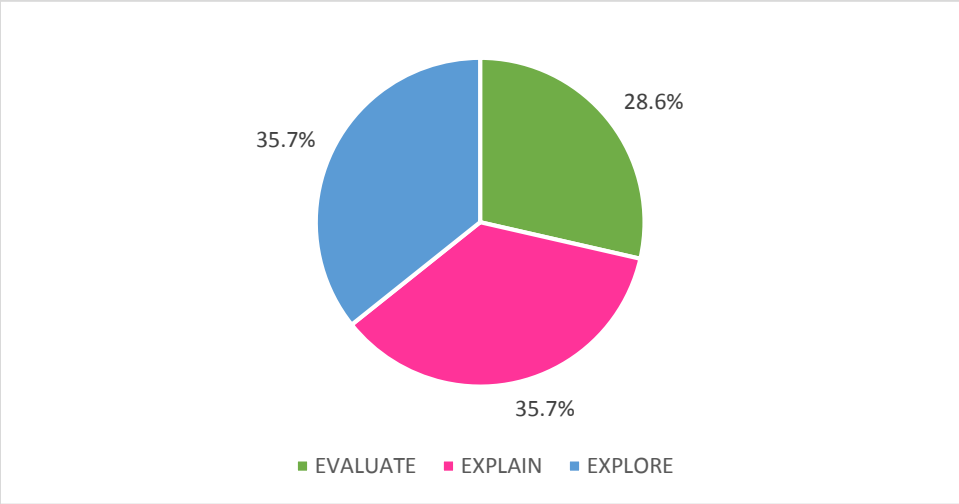

Figure 8 CDFs elicited by questions for reasons

As Figure 8 shows, EXPLAIN was indeed very prominent in students' responses to questions for reasons. However, it shared its predominant status with EXPLORE. Instances of EXPLAIN could be observed in Ls2 and Ls3 whereas EXPLORE was only found in students' responses in the panel discussion. As the explanations of Ls2 were already discussed in section 6.2.2.2. (p.64), the following examples were taken from Ls3.

Extract 37 EXPLAIN, long response, Ls3

> T: […] any(.)thing else (7) because my question to (2) the whole group actually is (1) **whether (.) the energy source you've introduced to us (.) uhm can be effectively used in austria.** (7) okay?
>
> S11: <u>because</u> er everything else in the whole world (.) er for example <u>solar panels we have in the whole world</u> (.) solar energy (.) only (.) every (.) er state has (.) er can see the sun and so (.) the (.) the (.) is (.) not (.) <u>everybody knows that the (.) sun (.) will er live many (.) years left</u> and so (3)

Even though the teacher's question in Extract 37 could also be interpreted as a question for opinion, it was categorised as a question for reason because its primary focus lies on explicating students' reasoning processes. In the subsequent response the student tries to imply that solar energy production is not limited by a country's resources thereby expressing a cause/effect relationship between sunshine and unrestricted energy production. Interestingly, there seems to be a discrepancy between the original intent of the teacher's question, which is more targeted towards eliciting an evaluation, and the student's response which focuses on explanation.

Extract 38 EXPLAIN, short response, Ls3

> T: uhm **why do you think has the price gone down**. (2)
>
> S9: <u>because it's easier to produce them</u> (.) and (.) they: there might be uhm (.) so we might need uhm money for (.) maybe keeping and saving the energy we produce so uhm it's not (2) well-developed yet?
>
> T: mhm=
>
> S9: =so we can keep them for just weeks or months but not for years maybe that's a challenge for the future but not for now.

In Extract 38, the teacher wants to know possible reasons for the reduction of costs regarding wind energy. The question is asked within a larger episode of discussing possible investments needed for implementing individual energy sources, which primarily targets EXPLORE. However, the teacher used various other types of questions, such as the one in Extract 38, for prompting students' formation of arguments. Therefore, only the first part of S9's answer is directly linked to the question for reason whereas the rest of her response refers back to the original overarching question. In addition to the question word *why*, questions for reasons that triggered EXPLAIN also featured *what* as interrogative pronouns. To a large part, questions concerned with EXPLAIN were open (80%) and referential (60%). As far as the complexity of students' answers is concerned, there were considerable variations in length. While some the responses in Ls2 were generally short and rarely exceeded incomplete clauses, the replies during the panel discussion could range from short clauses like in Extract 38 to whole stretches of more complex sentences as those in Extract 37. In three out of five responses, students used the linking word *because* to express a causal relationship.

In addition to EXPLAIN, EXPLORE was also found in students' responses to questions for reasons. Questions that elicited EXPLORE were always referential and open in their format. A prototypical example of a question that focuses on explicating a cause/effect relationship is shown in the following example.

Extract 39 Question for EXPLORE, Ls3

> T: right any other scepticism or criticism (.) of (2) the other energy sources (10) **what about uhm hydropower in areas where you do not have any rivers lakes** or (.) uhm (.) anything connected to that (3) **is there a solution to THIS problem**
>
> S7: yes i think so because you could build uhm (3) i don't know it in english so <L1de> rohre oder so </L1de>
>
> T: tubes? <21> or pipes </21> <22> mhm </22>
>
> S7: <21> yes </21><22> tubes </22> to transport the water to areas where there is no lake or no ocean (3) yes. so i don't think it is (.) totally un- unpossible (.) impossible (.) uhm to produce electricity from water in areas where there is no water

In Extract 39, the teacher wants the group on hydropower to argue how their energy source might be used in regions that do not have access to large bodies of water. Even though this question appears to be a question for explanation, it is used in the context of giving reasons on why a particular energy source should be used for global power production. The student responds to the question by giving a hypothetical solution to the issue raised by the teacher. Extract 39 was taken from a larger section of the lesson that was primarily targeted at eliciting EVALUATE, showing again that CDFs operate on various levels. However, there were also cases where EXPLORE formed the overarching function.

Extract 40 EXPLORE on a macro-level, Ls3

> T: =yeah **what about the costs of (.) uhm (2) uh (.) instating. uh the: energy source as the primary energy source in Austria. what (.) would- what kind of investment would be needed** (.) to (.) make (.) the energy source you're all representing uh (.) the primary energy source in Austria. so **what kind of uh financial investments (.) uhm would be needed? investments in terms of resources? (3) or what can you say about that.** (5)
>
> S5: first of all i think uh the price of solar panels went down the last years and (.) nowadays a solar panel (.) so solar panels aren't (.) that expensive they were in the last five years (.) and we have (.) this effect that (.) erm solar panels cut down your electricity bill. so if you buy erm ener- erm solar panels (.) and put them (.) uhm on your house you have the next (.) er months and years (.) enough energy and so the electricity bill goes down on a very (.) low (comment).
>
> T: mhm (2) okay (.) **biomass?**
>
> S3: uhm yes uhm: *we think it is a clean use for biomass (.) uhm (.) erm this energy (.) is used in commercial businesses for example (.) airlines(.) and it get taxes from the state (.) and uhm these taxes can also be used to- <L1de> also </L1de> it's (.) quite good that (.) you get taxes* which we could also invest again in biomass (.) there's no problem concerning that. and yes
>
> S6: and also that it would be cheaper to (.) erm to use THIS biomass for energy instead of you have to burn it because it's (.) just waste (2) and that would be
>
> S3: <mumbling> yeah uhm </mumbling>

S6: yeah (.) wouldn't cost a lot of money. (2)

As already indicated in the analysis of Extract 38, a large section of the panel discussion was targeted towards speculating about different types of investments needed for the implementation of the different energy sources. The teacher's questions in Extract 40 mark the introduction to this part of the lesson. Even though their main objective was to elicit EXPLORE, the students also used EVALUATE in the ongoing discourse, as is evidenced by S3's stance taking in Extract 40, which is highlighted through italics. Before speculating about the costs for solar panels in the future, S5 gives a short report on the financial implications of solar panels in the past. However, as it does not answer the teacher's question but rather gives relevant background information, it was not counted as a valid response to a question for reason.

EVALUATE was also targeted as an overarching function, even though it appeared in various student responses that were not triggered by teacher questions. The following extract signifies the starting point of a section focused on evaluations.

Extract 41 EVALUATE as a macro-function, Ls3

T […] **how effective is the energy source that (.) you are representing. so can we actually (.) uh cover the whole (.) need for energy that Austria has with (.) uh these renewable energies that you've uh just introduced to us** (3)

S11: of course with the: solar panels you can (.) give the whole world enough energy because uhm (.) the earth receives around 120,000 terawatts (.) of solar radiation (.) which is 20 uh thousand times MORE power than we need to supply the whole world.

Similar to the question in Extract 39, the teacher's questions in this example can be regarded as a question for reason because its main focus lies on establishing why a particular energy source should be used globally. In contrast to the question in Extract 39, however, these questions foreground the student's stance taking rather than expressing a causal relationship, even though it is used in S11's argument. The student's response is a nearly perfect example of how EVALUATE should be realised according to Dalton-Puffer (2016) as it features not only an opinion but also substantial evidence to back it up. Questions for reasons that elicited the CDF EVALUATE were always referential and predominantly open (75%). Both questions targeted at EVALUATE and EXPLORE were found to be introduced by the question words *what* and *how*. As can be seen by the above extracts, the students' responses were rather linguistically complex, using several different types of sentence structures, such as conditional or relative clauses.

All in all, the majority of questions for reasons were open (85.7%) and referential (85.7%). With the exception of two questions, all instances were taken from the panel discussion, indicating that Ls3 allowed for more evaluative and speculative use of language which is supported by the rather complex student responses. Even the answers to closed questions, such as the one in Extract 37 (p.89), were comparatively extensive which seems to confirm Dalton-Puffer's (2007) conclusion that questions for reasons can be ranked higher on a complexity scale than the previous two question functions. As indicated earlier, Llinares and Pascual Peña (2015: 25) had also found that questions for reasons (and meta-cognitive questions) were very promising in "engag[ing] students linguistically and cognitively at higher levels […] when constructing knowledge in the L2". They explained this heightened quality and quantity of student responses by referring to the higher cognitive engagement that is necessary when students are "required to explain and take a stance" (Llinares & Pascual Peña 2015: 26). Regarding the use of interrogative pronouns, open questions for reasons where most often introduced by *what*, followed by *why*, and *how.*

6.3.4. Findings on questions for opinions

The least frequent question function was concerned with eliciting opinions. As already mentioned, this type of question was exclusively used during the panel discussion. Despite the assumption that EVALUATE would be the only CDF in responses to questions for opinions, the following figure shows that EXPLORE was also identified in student utterances.

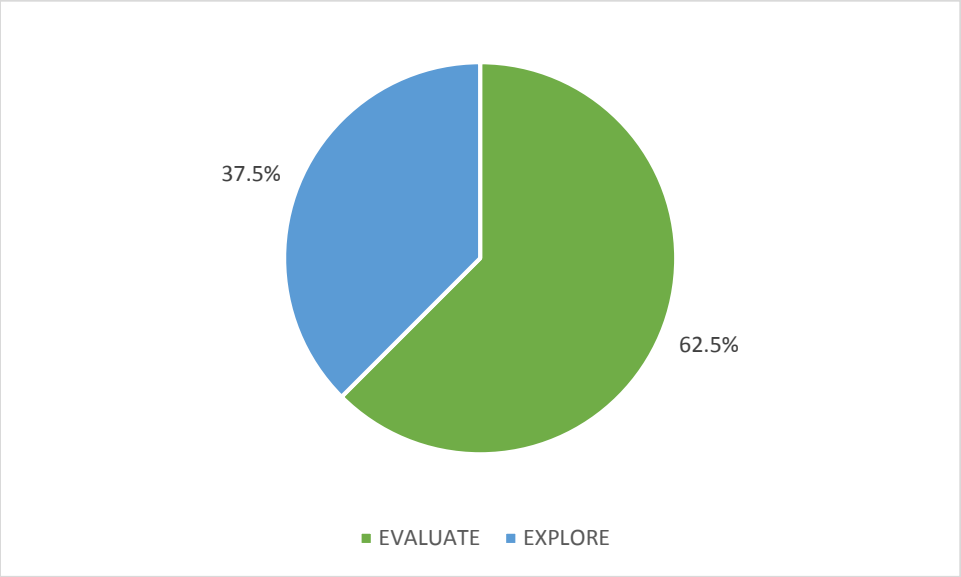

Figure 9 CDFs elicited by questions for opinions

With 62.5%, EVALUATE formed the majority of the CDFs in responses to questions for opinions. Questions that invited students to take a personal stance towards a topic were

predominantly closed (80%) and always referential. The only open question is shown in the following extract.

Extract 42 EVALUATE, open, Ls3

T: […] it is used up by us (.) and (.) in (.) in the future? and nobody knows whe- when this would be (.) uh there might not be (.) water left for (.) the production of (.) uhm (2) energy or for the conversion of energy (3) **question is when will that be and (2) is that of any concern to us now.** (6) because you know we can also (.) uh filter water (.) and purify water.

S3: yes

T: question is <32> maybe if </32>

S6: <32> that costs a lot of money </32>

T: <32> you SEE that criticism </32> if you say that this criticism is actually a benefit (3) or if there are (.) other ways (2) of

S7: well i think it's uhm (5) how should i explain it? YOU (.) criticised US @

SS: @@@

S3: yes <33> (we'll more argue honestly) </33>

S7: <33> but i think </33> it's very (.) advantageous because (3) hm how should i explain that (2) if: uhm the energy consumption isn't that high you can reduce the water (.) uhm so there- the water isn't wasted. it's not that the water (.) uhm is streaming down all the time? so it'll (.) yes you don't need so much energy you can (.) reduce the water(.)flow. (3) so water isn't really wasted (6)

As most of the opinion questions for EVALUATE were closed, the open question in Extract 42 is the only one that uses an interrogative pronoun. However, it has to be noted that it was not necessarily the teacher's question that prompted S7 to defend her position but rather the ongoing debate among the students that happened before Extract 42 and was concluded by S7's statement that reduced energy consumption would lead to a decreasing need for hydropower and to less water shortage. In addition to the open question above, there were also questions for opinions that were closed in both form and function, as is exemplified in the extract below.

Extract 43 EVALUATE, closed, Ls3

T: okay so (2) **also the seasons in austria are no problem at all**

S11: yeah.

T: winter (2) weather (2) sunlight (2) not being less

S11: no because solar panels could (.) er (2) give whole austria enough energy.

The contrast in length between the student's response in Extract 42 and 43 is rather striking. While the open question in the first excerpt elicits an answer that spans over multiple sentences, the closed question in the second triggers only a short response. As was noted in the previous sections, closed questions were not necessarily found to limit the length of

student responses which is most likely caused by a discrepancy between form and function. Questions that are closed in form, but open in function are probably more inclined to elicit extended student answers than questions that are closed both in form and function, such as the one in Extract 43. Whether this assumption is warranted needs to be confirmed by empirical research specifically targeting open discussions that deviate from the traditional IRF pattern (cf. Dalton-Puffer 2007: 113).

The second CDF type that was elicited by questions for opinions was EXPLORE. Similar to the opinion-seeking questions for EVALUATE, the majority of questions for EXPLORE were closed (66.7%). However, this percentage should not be generalised as only three questions for EXPLORE could be identified and is therefore not necessarily representative. While Extract 44 shows one of the closed questions, Extract 45 includes both the only open question and the other closed question that were uttered with regard to EXPLORE.

Extract 44 EXPLORE, closed, Ls3

> T: […] (if you don't know) hydropower is used in austria (3) very (.) widespread actually (.) uh:m **are there any (.) AREAS (2) or (2) yeah a- e- areas in austria that (.) we could invest more in hydropower? where there is more potential?** than we actually use now?
>
> S7: yes i think uhm (3) the east side of austria as we {holds up picture} <40> as we </40>
>
> T: <40> yes </40>
>
> S7: showed you (4) because uh:m hydropower isn't used that much? (2) i don't think i- i don't know why but uhm (3) yes there is of course potential to (2) build power plants in the east as in the west.

Extract 45 EXPLORE, open and closed, Ls3

> T: yeah. exactly. talking about the future (.) maybe uhm ONE round uh through the panel again uh:m **what is (.) the future potential?** and **what might be technological advance for the future your energy source to become even MORE effective**. (3) maybe starting again (.) with uh solar panels.
>
> S5: uhm <43> <un> x </un> </43>
>
> T: <43> **IS there a way (2) of becoming more effective**. </43>
>
> S5: yeah there's always a way t- there's always a way to become MORE effective but it would be (.) the- it would be very good i think for the er not so well-developed countries in africa (.) to: build erm solar panels? because they have erm many (.) erm deserts and so (.) have t- they have (2) the sha- er the chance to (.) get enough (.) uhm energy.
>
> T: mhm=
>
> S5: =and o- they can also (.) uhm (2) sell their energy to other (.) countries=
>
> T: =mhm (.) right (.) and it would m- maybe also be a chance (.) for developed countries (.) to: invest (.) in (.) uhm developing countries (2) and uhm again (.) we would be able to see the effects of globalisation there.

In both extracts the teacher invites students to take a stance on the future potential of energy resources. Even though the question in Extract 44 is formally closed, it is not restricted in the

information it seeks. Therefore, S7's response is relatively long compared to the answer in Extract 43, supporting the assumption that the function of the question is a more reliable predictor towards the complexity of the student answer. Extract 45 contains the remaining instances of questions for opinions targeted at EXPLORE. Through a series of open and closed questions, the teacher prompts the students to speculate on whether it is possible to make an energy source more effective so that it can provide the whole world with electricity. While the first part of S5's response answers the teacher's closed question, the rest of his turn is dedicated to elaborating on the potential of solar energy as prompted by the teacher's open question. The open question thus takes precedence over the closed question which yields a rather long response from the student whose argument is taken up and explored further by the teacher, which validates the student's response.

Overall, questions for opinions were exclusively referential. As far as the openness of questions is concerned, it was found that half of the questions were closed, and half were open. However, a distinction was made between questions that were both closed in form and function, which usually yielded shorter student responses, and those which were only formally closed but effectively open because they allowed an array of answers. Replies to the latter questions as well as to purely open ones were found to be generally more extensive, spanning over several sentences. In the case of open questions, only two used interrogative pronouns, namely *when* and *what*.

7. Discussion

As the analysis of the video recordings has shown, there is indeed a correlation between question functions and certain CDF types. Apart from meta-cognitive questions, which focus on prompting students to think about their cognitive processes and learning strategies, all of the question functions proposed by Dalton-Puffer (2007) were found in the data. The following list presents a revised overview of the correlation between question functions and CDFs found in student responses.

Table 18 Revised correlation of question functions and CDF types

Question functions	Elicited CDFs
Questions for facts	CATEGORISE, DEFINE, DESCRIBE, (EVALUATE), EXPLORE, REPORT
Questions for explanations	all CDFs
Questions for reasons	EVALUATE, EXPLAIN, EXPLORE
Questions for opinions	EVALUATE, EXPLORE
Meta-cognitive questions	no data

While questions for facts were originally expected to only elicit answers that do not involve a lot of cognitive involvement, the analysis of the data has shown that in addition to CATEGORISE, DEFINE, DESCRIBE and REPORT, these questions are also used in the context of EXPLORE and EVALUATE which are notorious for engaging higher thinking skills. As there was, however, only one instance of EVALUATE in this regard, its correlation to questions for facts needs to be further investigated by more empirical research. The expectations concerning questions for explanations, on the other hand, were fulfilled as it was proposed that their function of requiring elaboration on statements or arguments can involve all of the CDF types. Surprisingly, questions for reasons, which were expected to be directly linked to EXPLAIN due to their purpose of disclosing causal relationships, also elicited EVALUATE and EXPLORE in student responses. It was shown that questions for reasons can also target the connection of hypothetical causes and effects as well as the evaluation of measures that are already in place and have certain outcomes. EVALUATE was also strongly represented in questions for opinions, as was expected. However, students' opinions could also include hypothetical measures that should be taken. The revised list in Table 18 can, despite its limitations due to data size, serve as a starting point for further research on this topic. Especially with regard to meta-cognitive questions, but also concerning the other question functions, more analysis needs to be carried out to confirm the correlation proposed in this study.

The only research question (RQ 3.3.) that has not been addressed so far is: Which questions need to be asked in order to elicit the different CDF types? Based on the current evidence the following pattern of question functions and CDFs can be discerned.

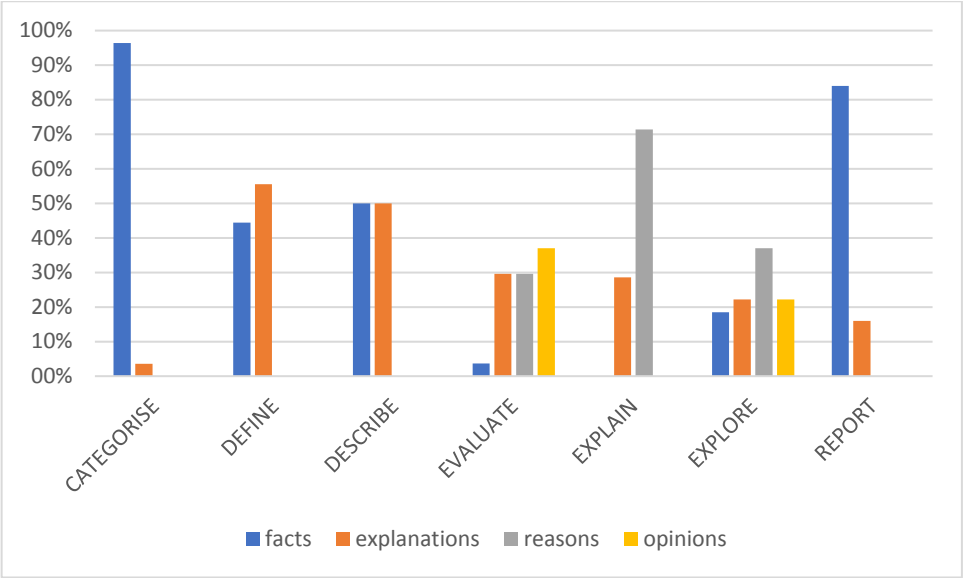

Figure 10 Distribution of question functions across the seven CDF types

Based on the available data, it seems that the individual CDF types have a tendency to be elicited by different question functions. In order to target categorisations, teachers should therefore primarily ask questions for facts. Questions for explanations are also possible. However, they only made up 3.6% of the questions regarding CATEGORISE. For definitions, teachers can ask both questions for facts and explanations. With 55.6%, the latter, however, showed a higher tendency to elicit DEFINE than questions for facts. DESCRIBE, on the other hand, is equally likely to be prompted by questions for facts as well as questions for explanations. With regard to EVALUATE, theoretically all question types can be asked. With a percentage of 37%, questions for opinions were found to have the strongest link to this CDF, followed by questions for reasons (29.6%) and explanations (29.6%). Questions for facts, on the other hand, only had a chance of 3.7% to elicit EVALUATE. As expected, EXPLAIN is most likely to be elicited by questions for reasons (71.4%). Additionally, questions for explanations were also found to trigger EXPLAIN in students' responses. Similar to EVALUATE, EXPLORE can theoretically also be brought forth by all four question functions. The most promising, however, seem to be questions for reasons as they elicited explorations with a chance of 37%. With 22.2% each, questions for opinions and explanations were both equally likely to prompt EXPLORE in student responses. Questions for facts can also be used for triggering speculative thought processes, but only with a chance of 18.5%. Lastly, REPORT strongly resembles CATEGORISE in its distribution of questions functions. Questions that elicited reports were mostly questions for facts (84%), but questions for explanations were also found. These presented guidelines could serve as a helpful tool for targeting the different CDFs in student

responses. Further research that focuses on the deliberate integration of these question functions by teachers could not only reveal possible strategies for eliciting CDFs but also help in establishing a potential toolkit similar to that of the CLIL matrix offered online.

Another interesting aspect that should be addressed is the influence of question functions on the complexity of student responses. In her analysis Dalton-Puffer (2007: 118) proposed that question functions could be ranked on a complexity scale. Furthermore, she also noted that questions only yield extended student responses when they are both referential and open (Dalton-Puffer 2007: 124) and concluded that the openness of a question "is a better predictor for the extent of student responses" than the distinction between display and referential (Dalton-Puffer 2007: 124). Although a formal analysis of complexity was not conducted in the current paper, similar observations to those of Dalton-Puffer (2007) were made. However, there were also some indications that the complexity of student answers is not so much dependent on the question function but rather on the CDF that is targeted by this question. Based on the – albeit limited – evidence, some CDFs seem to produce more complex answers than others. Therefore, a preliminary ranking of CDFs can be deduced.

CATEGORISE	DEFINE	DESCRIBE	EXPLAIN	REPORT	EVALUATE	EXPLORE
less complex						more complex

Figure 11 Complexity ranking of CDFs

The CDF that generated the shortest student responses was CATEGORISE. Irrespective of the question function and referentiality, students' categorisations were usually realised in a few words up to very short sentences. Whether this low complexity is based on the fact that categorisation only ever dealt with eliciting class members and never with full classifications needs to be investigated further. It also has to be noted that questions for CATEGORISE were always closed in function, even if they were formally open and referential, which seems to confirm Dalton-Puffer's (2007) conclusion that closed questions elicit shorter answers than open ones.

Similar observations were made with regard to DEFINE. Answers to questions for definitions were normally very short, either consisting of a few words or a short sentence. Interestingly, questions for explanations, which usually came in the form of confirmation requests, only yielded one-word answers. Questions for facts, on the other hand, often produced short sentences, even if they were given in response to functionally closed, but formally open

display questions. Here, the openness seemed to overrule the complexity of the question function and its referentiality.

Answers that featured DESCRIBE could range in their length from single words to multiple sentences. There was no discernible difference between responses to question for facts and questions for explanations since both produced relatively similar complex language outputs. Whether a question was open or closed did not really influence the length of the response and neither did the referentiality. From the evidence it can thus be concluded that descriptions are generally rather resistant to influence by question form, function or purpose. There are certain elements that need to be included in descriptions and the length or complexity of student responses is probably most likely dependent on the language proficiency of the student and how well he/she is able to express him/herself. This assumption, however, needs to be investigated by a comparative analysis between students of different ages and levels of proficiency.

The same stability was observed with EXPLAIN. Whether they were elicited by questions for explanations or reasons did not really impact the complexity and length of the student output which usually came in the form of short sentences that often featured the connector *because*. In the analysed data, responses varied from short phrases and incomplete sentences to several sentences explaining the reasons behind a process and giving examples to substantiate that reasoning. Neither the openness nor the referentiality showed any constant pattern that would have warranted a hypothesis regarding question function and form, and complexity of student output.

With regard to REPORT, there seems to be quite a range of possible answers. While reports that were elicited by questions for facts were usually formulated in either single words or sentences, questions for explanations tended to produce longer presentations, consisting of multiple consecutive sentences. With questions for facts, the length of student responses was usually determined by whether the question was open or not. Closed questions tended to elicit either single words or short sentences whereas open questions frequently generated several sentences in a row. Whether a question was referential or not did not really influence the complexity of the student output. In the case of reports in response to questions for explanations it was found that these types of questions usually produce answers that range from multiple sentences to whole paragraphs of presenting information. Therefore, it seems that with REPORT the complexity of the question function is a more reliable predictor for the

degree of elaboration of student responses than the distinction between open/closed questions, even though there is some influence within the question level, or display/referential questions.

Such observations could not be made for EVALUATE. In the data, students' evaluations are usually expressed through multiple sentences, using several different means of connecting or contrasting, such as *and*, *but*, *so* and *because*. Question functions did not have an observable influence on EVALUATE. The only instance when evaluations were formulated in a short sentence was when the eliciting question was both closed in form and function. However, most of the questions were either formally or functionally open, which led to the production of several consecutive sentences. As all the questions for evaluations were referential, it was not possible to investigate the influence of display questions on EVALUATE. However, it is likely that display questions are rare when inviting students to argue their standpoint.

As with EVALUATE, responses that included EXPLORE were comparatively extensive and complex. Students' speculations and hypotheses were usually formulated across several sentences that used a variety of sentence connectors, such as *because*, *but* and *so*, but also more lexico-grammatical structures that would be associated with hypothesis-building like *if*-clauses. In contrast to EVALUATE, there was one instance of a display question that could be linked to EXPLORE. The response to that question was considerably shorter than those to the referential questions, which made up the rest of the questions for explorations. The openness of the questions for explorations did not really have an influence on the complexity of the answer, and neither did the question function. The reason why EXPLORE is ranked higher than EVALUATE on the complexity scale in Figure 11 is that hypotheses were sometimes collaboratively constructed and were often the focus of whole sections of classroom discourse. As there was, however, some overlap between EVALUATE and EXPLORE regarding their mutual use in formulating opinions or verbalising reasoning processes, the ranking of these two CDFs might be reversed.

To sum up, while there were some instances where question functions had an influence on the linguistic complexity of student responses, the different CDF types seemed to be a more consistent predictor for gauging the length of student output. Based on the observational evidence analysed for this paper, it appears that focusing on more 'advanced' CDFs could potentially foster the quality and quantity of students' language production. That being said, the proposed ranking does not suggest that some CDFs are better than others, but simply that

some types have shown a tendency to elicit longer and more complex student responses than others. Due to the informal nature of these observations, further empirical support is needed to create a definitive order on the suggested complexity scale (if such a ranking of CDFs is possible at all).

What also needs to be considered is that different disciplines may emphasise different discourse functions by default and an incorporation of evaluations or explorations may not always be possible. This has also been noted by Morton (2020) who points out that achieving literacy, which is a key element in CLIL education, in different school subjects means mastering "their own specific types of communication, most often seen in the text types (or genres) which are typically used" (Morton 2020: 9). He further argues that CDFs could play an integral role in helping formulate specific language goals in order to accomplish said literacy. An additional contributor to the irregular distribution of CDFs is the time pressure of fitting prespecified content into a lesson which may not leave enough room to engage students in hypothetical thinking (Dalton-Puffer 2007: 126). Perhaps the fact that the observed lessons were recorded in an elective subject that was designed by two teachers and not determined by a national syllabus was one of the reasons why non-factual questions were much more frequent than in Dalton-Puffer's (2007) data set (and slightly more frequent than in Pascual Peña's (2010) and Llinares and Pascual Peña's (2015) studies). This suggests that teachers should be awarded more flexibility in what to teach and how to teach it. What has to be noted as well is that because this subject is offered as an elective, students are probably more invested in the content to begin with, which could positively influence their output quality and quantity. A lack of interest in compulsory subjects could be one of the reasons why student responses to teacher questions tend to be limited to minimal answers (Dalton-Puffer 2007). On the other hand, it is the teacher's responsibility to make lessons engaging and cognitively demanding and, as discussed earlier, higher cognitive involvement means more effective learning. Therefore, a shift towards higher ranking CDFs could possibly benefit the students' retention of knowledge.

On a side note, it has to be mentioned that the tendency to simplify questions could not be observed in the data. While there were some instances where the teacher followed up a general question with more precise questions in order to specify what he meant, these questions were rarely less complex than the original question. Moreover, there was no clear correlation between question words and complexity of student responses. Even though *what*

was especially prominent in questions for facts, which corresponds with Dalton-Puffer's (2007: 113) observation, it was also used with other question functions and elicited a range of student answers. As expected, the interrogative *why* was used exclusively in questions for reasons that targeted the CDF EXPLAIN. However, responses to questions with *why* were usually rather short and not explicitly more complex than questions with *what*, especially considering that *what* can be used for versatile functions. At the current research stage, there seems to be no easy solution as to how individual question functions can be formulated purely based on question words. Such a notion would be rather restrictive considering that questions can come in all sorts of forms and can employ a variety of different language structures. How effective a question is in eliciting student responses is not only dependent on the question itself but also on the teaching style of the instructor and how much the students are encouraged to share their knowledge, observations and opinions. Therefore, it can be summarised that, even though question functions do play an important role in shaping the classroom discourse, they are by no means the only factor in encouraging student participation and language output.

8. Conclusion

The purpose of this study was to investigate in how far teacher questions influence the cognitive processes behind students' linguistic output. It tried to establish a correlation between Dalton-Puffer's (2007) construct of question functions and her model of cognitive discourse functions (2013). After an extensive overview of the necessity and implications of CLIL on students' language as well as learning competences, it was proposed that certain question functions can be connected to CDFs due to their underlying communicative purposes.

The analysis of three recorded CLIL lessons showed that such a correlation was indeed possible. Even though questions for facts were initially expected to be rather restrictive in their targeting of student responses, it was shown that a wide variety of CDFs can be elicited by questions for facts. The most common CDFs that could be associated to this type of question were CATEGORISE, REPORT, DEFINE and DESCRIBE, but EXPLORE and EVALUATE were also possible. Questions for explanations were found to be largely linked to DEFINE, even though other CDFs were also observed. As far as questions for reasons are concerned, the analysis has shown that reasoning processes are strongly linked to EXPLAIN, EXPLORE and EVALUATE. The last two were also observed in student responses to questions for opinions.

The only question function that could not be identified in the data set was meta-cognitive questions, which is not surprising considering that other researchers (Mehan 1979a; Dalton-Puffer 2007, Pascual Peña 2010, Llinares & Pascual Peña 2015) did not find many instances of meta-cognitive processing either.

In addition to the overall correlation between question functions and CDFs, the individual lessons were also analysed in detail in order to provide a basis for further research in this regard. It was found that the lesson activities had a considerable influence on the distribution of question functions as well as cognitive discourse functions. While Ls1 and Ls2 followed the IRF pattern and were predominantly concerned with eliciting facts, the panel discussion in Ls3 opened up the floor to the students and focused much more on encouraging them to formulate their opinions and critique each other's arguments, which meant a shift towards 'more complex' question functions. As a result, student output was generally more extensive in Ls3 than in the other two observed classrooms. Whether this is due to moving away from triadic dialogue or to the shift in lesson objectives needs to be determined by further comparative analyses between 'traditional' CLIL classroom discourse and open discussion forums.

Furthermore, this thesis investigated whether the complexity of student responses is more influenced by question functions, as proposed by Dalton-Puffer (2007), or by CDFs. A cursory qualitative analysis has shown that, while in some cases question functions do affect student output, CDFs were generally found to be a more reliable predictor for linguistic complexity. Based on the observations, a complexity ranking of CDFs was devised in order to provide teachers with an approximate guideline for enhancing students' conceptual and linguistic learning. However, this proposal needs further support from empirical research.

On this note a word of warning must be issued. As the data for this paper investigated lessons by one teacher only, caution must be taken in generalising the results and interpretations for CLIL teachers overall. The fact that the teacher came from a language-specific background could have influenced his use of question functions as Dalton-Puffer has pointed out that "the teacher's overall language competence is likely to be an important factor in determining how far and how much a teacher is […] inclined to create […] open spaces during CLIL lessons" (Dalton-Puffer 2007: 123). Therefore, the teacher's proficiency in the target language might have shifted the distribution of question functions towards the non-factual end. Whether the frequency of the different question functions is due to the individual teaching style of this

teacher, the flexibility of the subject syllabus or the structure of the lessons cannot be determined at this point of the research and would need further analysis of a more varied set of data.

Despite its limitations, this thesis has produced some interesting implications concerning lesson design in CLIL. From the analysed data it seems that open discussion forums invite a more diverse use of question functions as well as cognitive discourse functions. Furthermore, the use of CDFs that involve more higher order thinking as well as higher-ranking question functions appears to encourage the production of more complex student answers. Hypothetically, this difference in both question and CDF distribution could serve as an incentive for adapting the lesson structure from a restricted, factual-based teacher-fronted interaction to a discussion setting where students can freely exchange knowledge and debate different standpoints, facts and arguments. Of course, the teaching of facts is still necessary but how students acquire those facts can be influenced by the teacher's choice of lesson organisation and their use of question functions. Using more complex question functions as well as focusing on eliciting CDFs that require more cognitive processing could contribute to a more effective and organic retention of knowledge than simply presenting facts and testing students on what they can remember. This shift in teaching style could ultimately change students' whole relationship to learning and education in general.

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10. Appendix

10.1. Abstract

Content and Language Integrated Learning (CLIL) has gained increasing importance for teaching English as a Foreign Language due to its dual focus on language and subject-specific content as well as its holistic approach to learning. One of its underlying principles is its emphasis on students' cognitive involvement in the co-construction of knowledge. Dalton-Puffer's construct of Cognitive Discourse Functions (CDFs) has contributed to the incorporation of various cognitive processes in CLIL classroom discourse. As these processes are often elicited by teacher questions, the current paper sought to devise a correlation between different question functions and CDFs in student responses. For this purpose, three recorded CLIL lessons were transcribed and analysed. Apart from question functions and CDFs, the complexity of student answers was also taken into consideration. It was found that the different questions types can indeed be correlated with certain CDFs. Furthermore, this study also suggests a ranking of CDF types based on the complexity of student answers which could help teachers maximise student output and encourage a deeper understanding of subject-specific content and the target language.

Keywords: CLIL, question functions, Cognitive Discourse Functions, complexity of student responses

10.2. Zusammenfassung

Das Unterrichtsprinzip CLIL hat aufgrund seines dualen Fokus auf Sprache und facheinschlägigem Inhalt als auch wegen seiner holistischen Herangehensweise an das Lernen an sich an Wichtigkeit für das Lehren von Englisch als Fremdsprache gewonnen. Eines seiner zugrundeliegenden Prinzipien ist die kognitive Beteiligung der SchülerInnen in der Ko-konstruktion von Wissen. Dalton-Puffers Konstrukt der Kognitive Diskursfunktionen (KDFs) hat maßgeblich zu dem Einbeziehen verschiedener kognitiver Prozesse in CLIL-Stunden beigetragen. Da diese Prozesse oftmals von Lehrerfragen hervorgerufen werden, lag der Fokus dieser Arbeit auf dem Erstellen einer korrelativen Verbindung zwischen Fragefunktionen und KDFs in den Antworten der SchülerInnen. Zu diesem Zweck wurden drei gefilmte CLIL-Stunden transkribiert und analysiert. Abgesehen von Fragefunktionen und KDFs wurde auch die Komplexität der SchülerInnenantworten in Betracht gezogen. Die Resultate zeigten, dass es tatsächlich eine Korrelation zwischen verschiedenen Fragetypen und bestimmten KDFs gibt.

Des Weiteren wurde, basierend auf der Komplexität der Antworten, außerdem eine Einstufung der KDFs vorgeschlagen, welche LehrerInnen dabei helfen soll, die Äußerungen seitens der SchülerInnen zu maximieren und ein tieferes Verständnis von sowohl fachspezifischem Inhalt als auch der Fremdsprache zu fördern.

Schlagwörter: CLIL, Fragefunktionen, Kognitive Diskursfunktionen, Komplexität von SchülerInnenantworten