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Module 1
The Language Model

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Content

Given that EUCIM-TE aims at inclusive academic discourse, what is an appropriate model of language for this aim?

The EUCIM-TE project aims to help teachers to support the inclusive development of academic discourse, and to help learners to be able to produce and understand academic discourse (or the language of schooling) in order to reach their educational goals. EUCIM-TE aims to support teachers whose classrooms contain migrant students, language minority students and other students who may not be achieving their educational potential for reasons related to the development of academic discourse. It is convenient to have one term to refer to all of these three culturally and socially diverse groups of students, so we will call them 'diverse' students or learners.

The importance of this aim has been made clearer by recent research in Europe and North America on the education of immigrant or language minority students, which has revealed significant educational underachievement (e.g. in reading and mathematics) of these students and the need for educators to take steps to overcome it through language support. Thus the project responds to implications of the results of PISA 2003, and other studies revealing educational underachievement and the need for education systems, particularly in Europe, to deal more effectively with increasing socio-economic and cultural diversity in their student populations.

Increasingly, teachers who teach diverse learners are expected to teach both their subject area and the academic language that learners require to learn their subject area. Similar developments are occurring for teachers who teach native speakers (see Hinde et al. 2007)[i]. Traditionally it has often been taken for granted that learners will simply develop the ability to use this academic discourse successfully, but that assumption has been found to be highly questionable. Consequently teachers need to become more aware of the academic language they require, how they can better support students to develop it, and how they can convey to students the importance of academic language for their academic achievement. It is important to select a model of language which is appropriate to this purpose.

A recent review of research on teaching second language learners in the content areas in the U.S., Canada and Australia (Janzen, 2008) found that children of immigrants who must learn through their second language are at a high risk of academic failure: large majority of English language learners in the U.S. scored below the basic level in reading, writing, history, science, and mathematics, at 4th, 8th, and 12th grades (National Center for Education Statistics, 2005). A critical issue is teachers who are not trained to work with non-native speakers. A US national survey found that as many as 41% of teachers have English language learners in their classes, but only 12.5% of those teachers had had 8 or more hours of training in the previous 3 years on how to assist them (National Center for Education Statistics, 2002).

Janzen's review revealed that the most frequent claim in the research was the centrality of language in content teaching. “The language of academic texts, both the ones students read and the ones they produce, has distinctive features and meanings that may present a contrast to the language used in informal spoken interaction; academic language can also differ from one discipline to another. The academic uses of language as well as the meaning of individual words need to be explicitly taught for students to fulfil the genre or discourse requirements privileged in academic settings and to understand the material they encounter in, for example, history textbooks or mathematical word problems ... Finally, as a prerequisite for instruction, teachers must thoroughly understand how the language of their disciplines construes meaning and must use academic language in clear and consistent ways in the classroom” (Janzen 2008: 1029-30). Janzen found that “the studies based on SFL [Systemic Functional Linguistics] represent the most compelling perspective on content-area instruction, doubtless because they start from an extensively developed stance on the nature of language in general ... Systemic functional linguists view content as being construed and understood through language; language instruction is therefore not a separate or additional strand in the classroom, it is content instruction” (p. 1015).

SFL presents 'the most compelling perspective' on academic discourse. Thus if content teachers are to teach how the academic discourse of their disciplines constructs meaning, it is important that they are supported to take advantage of the tools that SFL can offer.

Models of language can be divided broadly into formal models, which describe the language system only, and functional models which describe both the language system and how it is used in context by people to communicate and operate in their social world. One needs to work with a functional model if the aim is to describe how academic language is used in teaching and learning. A formal model is not adequate for this purpose. This paper will describe the Systemic Functional Model (SFL) model of language and its value for understanding the role of language in education in general and the role of academic language in particular.

Approaches to the development of language and thought.

SFL sees language as a means of learning; learners are not only learning language but are using it for academic purposes, as a resource for thinking and reasoning about disciplinary knowledge. To provide a background for this perspective we will contrast two different approaches to the development of language and thought.

The American linguist Noam Chomsky takes a bio-psychological approach to language and thought. For Chomsky, human languages all follow the same universal principles (Universal Grammar, an abstract representation of syntactic structures). Children are innately programmed to develop language; they do not have to be taught, for language develops biologically, like learning to walk. The environment contributes little. A minimal exposure to language is sufficient to trigger development and for a child to develop the mature form of a specific language. Universal grammar guides a language acquisition device (LAD) which leads the child to make the right hypotheses about language. All children learn their mother tongue, even in situations of “poverty of stimulus”, because,

Chomsky thinks, they do not simply copy the language of their environment, but deduce rules from it and use them to produce new sentences, thanks to their inborn LAD. Language is an innate faculty, understood as an autonomous component of the mind, and separate from other aspects of cognitive development. Thus the development of language and the development of thinking are seen as unrelated. Holding that language is innate and unrelated to thinking, this approach does not lead us to explore questions of the role of language as a means of learning in education.

The Russian psychologist Lev Vygotsky took a social interactionist approach to the development of language and thought, which is based on very different assumptions. For Vygotsky, language is acquired as a communicative tool in the process of socialisation of the child. He insists that the central characteristic of human intellectual development is based on interaction and interpersonal involvement. Studying children in social settings learning to communicate and learning to think, Vygotsky held that language and thought develop primarily from social interaction. Vygotsky was particularly concerned with the development of higher mental functions such as voluntary attention, memory, abstraction and the like. In Vygotsky's view, higher mental functions appear twice in development: first as inter-mental functions, mediated by speech during interactions with others; later as intra-mental functions, mediated by internalised signs[ii]. This view implies that language is central in two ways: firstly, language as interpersonal dialogue enables inter-mental functions in social interaction; secondly, language as reflection is a centrally important mediational means of higher intra-mental functioning, and cognitive processing.

Noting the conversations that adults have with children, Vygotsky argued that children could learn more than they were independently capable of if they were in a supportive interactive environment. The notions of the 'Zone of Proximal Development' and scaffolding interaction have been widely taken up in research on learning and teaching language[iii].

The psycholinguistic approach of Vygotsky (1896-1934) to the development of language and thinking can be compared with that of Piaget (1896-1980) and Bruner (1915-). While Piaget and Vygotsky were contemporaries – the latter ignored in the western countries for a long time -, Bruner's work was fundamentally inspired by both.. All three adopt a constructivist attitude maintaining that., on an innate biological basis, the child interacts with his environment and progressively attains new qualitative levels of thinking: through "assimilation", "accommodation" and finally "equilibration majorante " (Piaget) or with adult help, applying a "spiral curriculum" (Bruner) or following the adult's "directive and supportive scaffolds in the zone of proximal development" (Vygotsky). While Piaget's functional perspective is limited to the child observing and acting on the world, Vygotsky's and Bruner's functionalism includes social interactions as decisive elements for further development.. For them, passing from one level of "representation" (i.e. enactive-based on actions, iconic – based on visual and auditory images, symbolic mode – based on words, numbers..) or cycle of development to the next is not possible without interpersonal communication or specific language and active intervention of the adult who provides structure, direction, guidance and support (Bruner – transactional, ritualised scenar-

ios or LASS: Language Acquisition Support System, Vygotsky – scaffolding language education).

Piaget, Vygotsky and Bruner differ on the importance given to language as a dynamic element in this process. For Piaget, language is a necessary but not sufficient condition for cognitive development. Language provides the means to encode cognitive categories and so takes an important part in enhancing the progression from one qualitative level of thinking to the next one, but during the process merely reflects and describes the underlying cognitive structures. Central to his view is the image of the child as the lone scientist, who creates his or her own sense of the world. Consequently, teaching is not Piaget's first preoccupation, but the concentration on the child's individual process of learning and promotion of the autonomous development of the child.

For Bruner and Vygotsky however, communicative and inner language will allow access to new levels of thinking or representations. Hence the scaffolding or support structures offered by the adult will be of central importance. (Bruner recommends 5 scaffolding strategies to support the verbal exchange: simplifying task, motivating child, highlighting critical features, providing model for imitation. Vygotsky's direct and support scaffolds are comparable). But these scaffolds must be presented in a social significant context and with regard to the actual level of development or the social or cognitive function pursued by the child. Bruner noticed that the ritualised scenarios of routine social practices in early childhood fulfill these conditions: having a bath, getting dressed, … Here the adult adjusts intuitively the level of language complexity required to the actual competence of the child and encourages its development through verbal interaction. More recently, such circumscribed situations are labelled as "event sequences" or more generally as "social practices" which initiate, structure and develop the innate "gifts" of communication in exchange with an "expert"-environment.

The ideas of Vygotsky and Bruner have encouraged a more perceptive view of the role of language as a means of learning in education. Inspired by Vygotsky, social constructionist researchers hold that learning is a social activity which requires interaction and engagement. Some have enquired into student discussion in the classroom, and found it lacking. For example, in an extensive investigation, Nystrand (1996) found that the typical classroom teacher spends under three minutes an hour allowing students to talk about ideas with one another and the teacher. They emphasise the need to increase the use of student discussion. Other researchers (e,g Gibbons 2006) have enquired into teacher-student and student-student scaffolding in classroom interactions and uncovered a rich variety of forms of supportive interaction. Still other researchers (e.g. Nelson 1996) have drawn attention to the role of event sequences and social practices in early learning, which has led to a greater awareness of the role of social practices in early education in the first or second language.

Conceptions of the social aspect of interaction and the role of language in developing the mind have been enriched by ethnographic studies in various cultures of learning through interaction, including parent-child talk, which have shown how these interpersonal interactions reflect and communicate the values of their wider cultures. Ochs (1990), who

notes the connection with Vygotskyan theory, uses the concept of language socialisation – socialisation in language and through language:

A basic tenet of language socialisation is that language must be studied not only as a symbolic system that encodes local social and cultural structures, but also as a tool for establishing (i.e. maintaining, creating) social and psychological realities. (Ochs 1990: 287-8)

Given a social interactionist approach to the development of language and thought, what theory or model of language would be relevant to analysing the role of language and social interaction in developing the mind, of academic discourse as a means of learning? In a discussion of approaches to the development of language and thought, Painter (1999) outlines a number of criteria:

> "...a relevant theory of language must have certain emphases which are quite different from those of the Chomskyan tradition. In particular, language must be construed in some terms which enable linguistic forms to be interpreted as meaningful. Moreover, linguistic meaning must encompass both the interpersonal dialogical role of an utterance (such as requesting) and its representational function (such as classifying an object). Linguistic meaning must also be relatable to the situational context and the broader sociocultural context. Finally, in the modelling of language, there must be no irreconcilable dichotomy made between language as an internally coherent system and the use of the system as forms of meaningful social practice" (Painter 1999:36).

The SFL model of language.

The SFL model of language analyses language as a resource for meaning, and describes how people make meaning in the texts and social contexts of their everyday lives. It thus provides teachers and researchers with tools to describe how students and teachers make meaning in educational texts and contexts, and to guide student development appropriately.

The SFL model relates several levels of language-in-context: context of culture, context of situation, discourse, and grammar and vocabulary (see Fig. 1). For example, one can look at a classroom lesson in its context of culture (the culture of school and society), in its context of situation (the situation of teacher and learners talking about a topic), as a discourse process (such as a class discussion) and as grammar and vocabulary. SFL aims to describe how the levels of context of culture, context of situation, discourse and grammar and vocabulary form a meaningful whole. To put it more technically, SFL describes how context of culture and context of situation are realised (encoded or expressed) as texts which are realised as grammar and vocabulary. (A formal model of language, describing the language system only, would only include grammar and vocabulary).

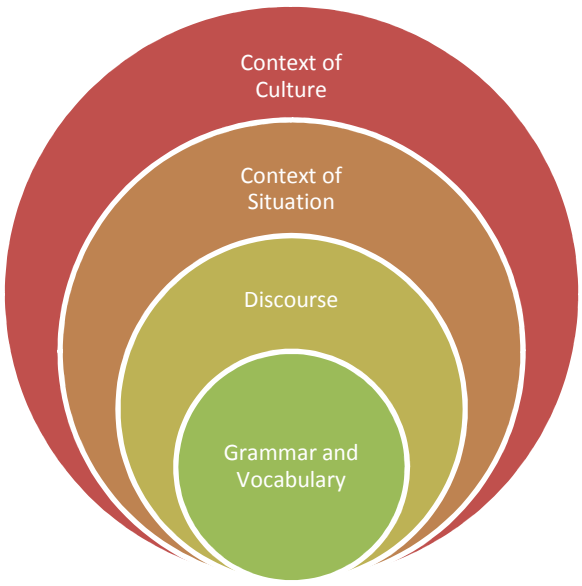

Figure 1: Relation of Language to Social Context (see Martin & Rose 2007:5, Martin & Rose 2008:10)

By contrast, dominant traditions of research in second language learning have not aimed to relate language, discourse and context as a meaningful whole. They have been strongly influenced by structuralist models of language which did not deal with meaning, considering it to be unscientific, and which saw language as a system of rules (or rather habits) of the grammatical patterns and vocabulary of sentences. The effect of this view was to regard written or spoken discourse simply as a display of grammar patterns and vocabulary. The view only deals with meaning incidentally and not systematically, and does not address the question of how the 'wording' of the text (the grammar and vocabulary) constructs the meaning of the text, or relate the text to its social context. Much of current second language assessment still fails to address this question adequately and evaluate language development (and academic language development) appropriately.

Failing to describe meaning in text means failing to describe how 'wording' plays a part in how learners and teachers make meaning in classrooms, which means failing to describe how knowledge of content is built up, or how social roles and relationships are established, for instance. Because the SFL model analyses language as a resource for meaning in discourse and social context, it is able to describe how learners and teachers make meanings in social studies, science, mathematics and all the other disciplines and subject areas and to provide insights into student progress.

In addition, the fact that the EUCIM-TE project aims to address issues of social and cultural diversity in classrooms means that a language model that ignores social and cultural context is inadequate to the purposes of EUCIM-TE.

The SFL model of language offers two central concepts – genre and register - which can be used to view how academic discourse operates across the curriculum and to guide processes of learning and teaching academic discourse.

One of these concepts is 'genre', which refers to specific types of text or discourse. Martin & Rose 2007 see genre as “a staged, goal-oriented, social process. Social because we participate in genres with other people; goal oriented because we use genres to get things done; staged because it usually takes a few steps to reach our goals.” (Martin & Rose 2007: 8). Some of the prototypical genres of schooling are Recount, Narrative, Procedure, Report, Account, Explanation, and Exposition (see Schleppegrell, 2004: 85. This book is entitled 'The Language of Schooling', which is a useful paraphrase of 'academic discourse'). These prototypical genres take more specialised shapes within subject areas: a Science Explanation, which explains why scientific phenomena occur, is different from a Historical Explanation, which explains the causes and consequences of historical events. Students need to understand the subject area genres they are expected to read in their textbooks and be able to construct those they are expected to write, and participate in the oral genres of the classroom. SFL work on the genres of schooling has great value for content teachers who wish to understand the language demands made by the genres of schooling on their students. It must be strongly stressed that genres are not rigid, regimented patterns, but are are flexible and variable.

As types of text or discourse, genres link to social context and to grammar, as in figure 1. A genre is intimately related to the social contexts in which it is appropriate. As Martin & Rose explain:

> 'Members of cultural groupings gain control over a broad common set of genres as we mature – we learn to distinguish between types of everyday contexts, and to manage our interactions, apply our experiences, and organise our discourse effectively within each context.' (Martin & Rose 2007: 18).

A genre is also intimately related to the grammar and vocabulary that realise it. A Recount, for example, which retells a sequence of events, will typically use verbs of doing and happening in the past tense, talks about specific people and things and manages sequence in time with time conjunctions (then, next etc.). By contrast, a Science Explanation will often use nominalisations for events (e.g. 'evaporation'), employ the ‘timeless’ present tense, talk about generic things and express cause-effect relations in a variety of ways e.g. using verbs like 'cause'.

Content teachers need to be knowledgeable about the grammar and vocabulary that are required by the genres of their subject area in order to gain insight into student language difficulties. A genre like Recount may be relatively undemanding in its requirements, but a genre like Science Explanation often makes demands that are difficult for second language learners because they call for features of language that are not fully controlled until the later stages of second language development.

The other of these concepts is Register. Register is defined by Halliday as “a set of meanings that is appropriate to a particular function of language, together with the words and structures that express these meanings. We can refer to a 'mathematics register' in the sense of the meanings that belong to the language of mathematics … and that a language must express if it is being used for mathematical purposes.” (Halliday 1978: 195). A deeper understanding of the register of their discipline or subject area can be invaluable to con-

tent teachers who wish to understand the role of academic language in the processes of teaching and learning in their own classrooms.

Registers and genres in different curriculum subjects and activities

It is commonly understood that in different areas of the school curriculum there are different ways of using linguistic and other semiotic resources (such as actions, gestures, graphics, sounds and images) to make meaning. These different ways adopted by writers and teachers indicate that the use of spoken and written language in different curriculum areas and activities is strongly influenced by subject content and established subject-related genres.

Subject content is itself a reflection of how expert practitioners of a particular field of study have come to construe and practise their specialist knowledge and understanding. For example, the content of the subject Science at any one time is a particular selection and representation of some elements of scientific knowledge and activities that science educators have found to be important for students to learn as novice scientists. The selection and representation of scientific knowledge and activities are primarily built upon discipline-based ways of knowing about the world, established procedures for investigating phenomena, and valued opinions. In the school curriculum this practice of science is experienced by students through the concepts that they are taught and the learning activities that they participate in. In other words, they are being introduced into the practice of science in school. Much of this practice is mediated by language and other semiotic means.

The language of any subject curriculum – names and labels of things and concepts on different topics, ways of describing ideas, phenomena and processes in teacher talk, in textbooks and in teacher-made materials, ways of talking about learning activities such as science experiments etc – is therefore particular to the established views of knowing and ways of doing things in a specific context and time. These are in effect disciplined-based curriculum practices and they vary in different educational and cultural environments. Seen in this light, learning academic language, or more precisely the different varieties of academic language, is much more than learning to use words and grammar correctly in a content- and context-free way. Words and grammar have to be used in ways that are appropriate to the different practices in different curriculum areas. The concept of register, as in the register of mathematics, or the register of history, is helpful in foregrounding this aspect of language use in the different areas of the curriculum.

The concept of genre is particularly useful in capturing how texts are typically organised (said and done) in different areas of the school curriculum and subject activities, particularly in the textbooks and other reading texts, and more formal uses of spoken language (e.g. when a teacher is doing whole-class explanations or when a student is writing a class assignment). The genre of instructions for conducting an experiment in Science and the genre for describing the events leading to the First World War in History are likely to display some considerable differences. These generic differences reflect the fact that these texts serve different purposes.

The concepts of register and genre have particular salience for teachers working with additional/second language students. As indicated, the concept of register suggests that curriculum content and activities can be seen in terms of discipline-based practice. As such this kind of practice comprises established disciplinary ideas and concepts, accepted views of exploring and investigating phenomena, and culturally sanctioned ways of using language. Professional experience has shown that most students are not necessarily familiar with the different disciplinary practices in school, particularly in secondary schools.

Additional/second language students, particularly those who have recently joined school from a different educational background through the medium of another language, may find all aspects of the newly-encountered curriculum practices (including the ways in which registers and genres shape content organisations and language expressions) difficult to understand and use. Much of the curriculum content may be unfamiliar (particularly in subjects where the content is more likely to be culturally specific, e.g. History), and more importantly, a good deal of the language used in classroom activities and written materials may appear to demand specific know-how in using the vocabulary and grammar knowledge that they may already have.

Students from minority ethnic and language backgrounds may be aware of some (aspects of) school curriculum registers and genres, but teachers have found that these students tend to benefit from explicit teaching and guidance.

Register: Field, tenor and mode

Registers vary with the context of situation which Halliday describes in terms of three 'contextual variables' of field (what the language is being used to talk about), tenor (the role relationships between the interactants) and mode (the role language is playing in the interaction).

SFL contends that all languages operate three main functions of language in social contexts:

- to represent experience ('ideational' function);
- to enact relationships between people ('interpersonal function');
- to organise discourse as coherent text in context ('textual function').

These three functions can be found in any text and operate simultaneously. They can be identified by the different patterns of meaning they realise. And they are central to teaching and learning.

Halliday claims that the field of a text can be associated with the realisation of ideational meanings, the tenor of a text can be associated with the realisation of interpersonal meanings, and the mode of a text can be associated with the realisation of textual meanings.

We will now describe the three language functions of the SFL model as they apply to education in order to show the importance of these functions in academic discourse. We will give detailed examples in order to:

(a) give a sense of the scope and flexibility of the SFL approach and how it opens up new ways of looking at academic discourse in teaching and learning;

(b) show how teaching the register of a content area is central to teaching the content-area;

(c) indicate how SFL analysis can raise awareness of content teacher expertise in teaching the functional language of their subject and highlight examples of good practice.

1. Ideational meaning: Representing experience and creating meaning

The SFL model sees language not just as a system for expressing meaning but also as a system for creating meaning. "Language does not just passively reflect a pre-existing social reality. It is an active agent in constructing that reality; and in language education we often have to exploit that vast potential." (Halliday 1999:16). A well-recognised example of one aspect of this is the power of fictional narrative to create imagined worlds. Much less recognised, but absolutely central to the purposes of EUCIM-TE, is the power of learning and teaching in the academic disciplines to create worlds of discipline-based knowledge as ways of representing our experience that go beyond our everyday, commonsense understanding:

> 'In all language education, the learner has to build up a resource. It is a resource of a particular kind: a resource for creating meaning. I call it a "meaning potential". Whether someone is learning the mother tongue, learning to read and write, learning a second or foreign language, learning the language of science or mathematics, or learning the styles of written composition – all these are forms of meaning potential. What the learner has to do is to construe (that is, construct in the mind) a linguistic system. That is what is meant by "language as system"; it is language as stored up energy. It is a language, or some specific aspect of a language, like the language of science, in the form of a potential, a resource that you draw on in reading and writing and speaking and listening – and a resource that you use for learning with. How do you construe this potential and how do you use it when you've got it? You build it up and you act it out, in the form of text. "Text" refers to all instances of language that you listen to and read, and that you produce yourself in speaking and reading' (Halliday 1999:7).

It is important to note that Halliday is using 'language education' not in the limited sense of what is aimed at in the mother-tongue or foreign language classroom, but in the sense of the role of language in learning and teaching. Elsewhere he sums up the scope of language education under the three headings of "Learning Language, Learning Through Language, and Learning About Language" (ibid. pg. 21), with the second heading covering 'language across the curriculum', which includes science, mathematics and all other areas of education. All of these areas of discipline-based knowledge construct and maintain registers which are linguistic systems and have a meaning potential. Thus Halliday is offering a view of academic language across education which can provide a shared vision for educators across the curriculum who wish to coordinate their work in language as a means of learning.

Learning the language of history, science or mathematics is learning a way of representing and indeed creating experience. One can trace this learning in teacher and student discourse by identifying the patterns of 'ideational' meaning which are used.

One such pattern of ideational meaning occurs when learners classify kinds of things into taxonomies, building up their linguistic systems and their ability to make meaning. Taxonomic classification places a thing into a class based on the properties of the thing. As the young child builds knowledge of the everyday world, she or he constructs taxonomies of things, developing vocabulary and typically using the verb 'to be' (a 'being' process in ideational meaning) to classify things, as in X is a Y (e.g 'a platypus is an animal'). Here is an example where a young learner raises the question of the place of a kind of thing (a platypus) in a taxonomy (animals).

S aged 3 years 8 months, is looking at animal jigsaw puzzle pieces with his mother.

S: *There isn't a fox* [i.e. on this animal jigsaw]*; and there isn't – Is a platypus an animal?* (Painter 1999:102).

The child is relating "platypus" and "animal" in a lexical taxonomy of animals, and using 'is' to classify. The next example shows the same child discussing the properties or characteristics of animals: snakes and worms do not 'have the property' of having legs, but lizards do.

S. *Snakes and worms don't have legs*.

M. *Ah, no.*

S. *But lizards do.* (Painter 1999:105)

In this example he is using the verb 'to have' (a 'having' process in ideational meaning) to describe the properties of kinds of things in the animal taxonomy, as in X has Y. Being processes are also used to identify the properties or characteristics of an object or concept, as in X is Y (e.g. a platypus is aquatic). Processes of doing and happening can also be used to identify properties (e.g. lizards run on the ground).Note that the child is referring generically to classes of things ('Snakes and worms', 'lizards') rather than to an individual snake or worm, just as he was referring generically to 'a platypus'.

In school, taxonomies become much more elaborate and kinds of things are defined more formally. A language of classification develops which may include verbs such as *classify* and nouns such as *characteristics*, *properties*, *kind*, *type, definition*. In the following Grade 9 science example, the students are building up the scientific classification of matter. The students had read material on the classification of matter in their textbooks, including taxonomic statements such as: matter *is* anything that has mass and volume; any *kind* of matter can be *classified* as a mixture or a pure substance; there *are* two *types* of mixtures: heterogeneous and homogeneous. They have also read statements of the properties or characteristics of mixtures such as: mixtures contain more than one substance; the substances in a mixture have not reacted chemically with each other so that they have changed properties; mixtures can be separated by physical means. The statements of properties use both being and having processes and doing and happening processes.

The students drew on this material when the teacher asked them to describe some characteristics of a mixture:

Ms. Armstrong: Okay. *Definition* of a mixture. All right. Give me some *characteristics* of a mixture then. Okay. A mixture *is* not joined together. Okay. It's not–

Sam: Not change properties.

Ms. Armstrong: Not change properties.

Vicki: By physical means.

Ms. Armstrong: It tends to be separated by physical means. Good. What else?

Vicki: No chemical change occurs. (Slater & Mohan 2010:95).

The teacher uses the language of classification (definition, characteristics) to pose her question to the class..The class respond with statements of properties/characteristics in a way that shows they understand this language and are clear that she is implicitly asking for those properties of a mixture that distinguish it from a substance. Their understanding suggests that they have developed some ability to talk about of how they are building up taxonomies during their experiences of schooling.

As learners build knowledge of the world, they build taxonomies of things, and they draw upon ideational resources of language to do so. When the young child says " Is a platypus an animal?" or "Snakes and worms don't have legs", she or he is using being and having processes and simple lexical taxonomies. School learners construct much more elaborate taxonomies from their reading and in the classroom, use a wider range of processes, more extended taxonomies of lexical items, and a more developed language to talk about classifications and properties. Exploring how these meanings are created through the use of ideational resources provides a window on these aspects of the development of knowledge of the world.

2. Interpersonal meaning: Interacting and enacting relationships

The SFL model sees learning (including the learning of language) as a social, interactive meaning-making process, a collaboration between individuals, holding that 'meaning is something actualised between two minds in the process of dialogue' (Painter 2000: 66). SFL's analysis of learning as a social interaction draws attention to the considerable significance for learning of describing how teachers and learners actively collaborate and interrelate, and leads towards a more nuanced and complex view of teacher and learner roles. Tracking learning interactions over time, one can follow the evidence of interpersonal meaning for indications of growth in teaching and learning processes.

This interactional perspective strongly contrasts with Chomsky's view that the child possesses a language faculty which is innate, and also with Piaget's view that the child learns as an independent individual by her/his own actions on the environment. It interconnects with ideas of Vygotsky on the role of social interaction and semiotic mediation in the development of higher mental functions and with neo-Vygotskian work exploring such concepts as scaffolding.

Early learning provides striking examples of the role of interaction in learning. When the young child learns through interaction with its mother and family, the 'learning of and through language takes place through conversation whose overt goal is simply to get on with the business of everyday life. Children learn language and become socialised into the culture at home by others who may have minimal conscious knowledge about either language or the social system. The effectiveness of everyday talk as a means of initial apprenticeship into the culture lies in the very implicitness of what is taught and learned...' (Painter 1999:63).

During interaction, interpersonal meaning choices such as speech functions (e.g. statements, questions, commands and offers) maintain and construct social roles and relations.

Here mother and child are accomplishing a task together and are interacting verbally .as they do so. Mother is playing with nesting barrels with child S who is 2 years 7 months old. In her first three utterances, Mother guides the child in the immediate situation with a question, a statement and a command, moving from less direct to more direct guidance:.

M: Oh what about the green one? That comes first.

S: Mm.

M: Get that one first.

S: That goes like that. Then it goes like – there? Then you put it on here.
(Painter 1999: 142)

A much more complex example of guidance and interaction comes from a junior secondary geography classroom. It involved a unit of work on World Heritage consisting of seventeen lessons taught over six weeks. In the first lesson, the teacher introduced the unit.

> T: (Writes on the whiteboard 'World Heritage') Ah, it's about a six week unit more or less. Um, with a broad title of World Heritage. It's a fairly big title, but we will come back to that in a moment. Um, we really need to get into these key geographic ideas and the two things I want you to do is to remember the three that we are using: location, distribution and a fairly big one, a fairly new one we call spatial interaction. … Um, and the second thing I want you to be able to do as you go through is to use these words um, frequently, accurately, correctly ... I'll go through each of those. OK, first thing we'll look at is simply the location of different heritage sites. (F. Christie 2000: 195).

The teacher guides the students interpersonally by using the 1st person 'we' and 2nd person 'you' to guide the students to the tasks to be completed, as in 'we really need to get into these key geographical ideas', 'the two things I want you to do'. He controls interaction by using declarative mood, to make statements establishing essential information for the students, whose role is to listen.

At a broader level, the teacher is providing guidance well beyond the immediate situation. He is previewing how the plan for the unit, a large pattern of classroom interaction, will unfold over the six weeks. The students are being asked to understand the 'shape' of the unit and keep it in mind throughout, so that they are to be able to participate in the interactions adequately, link the lessons together and engage with their tasks appropriately. Satisfying this requirement may place appreciable demands on their language abilities.

There are large differences between learning in the home and learning in school and SFL work has noted the contrast between the more fragmented and specific 'commonsense' knowledge developed in the casual interaction patterns of the home and the more systematic and universal 'educational' knowledge provided by the more formalised interaction patterns in the school. This SFL work connects with studies on cultural discontinuities between home and school, such as research on working class children by the British sociologist, Basil Bernstein.

When the child in the home learns language and learns through language, language is both the means of learning and the evidence of learning. The same is true for learning

language and learning through language in school, and more generally. Halliday points out: 'Since language is not only the primary means by which a person learns but also the primary evidence we have for judging what a person has learnt, it is helpful to conceive of learning in linguistic terms.' (Halliday 1998:1)

Learning is often discussed in terms of cognitive processes 'inside the head', so to speak, but Halliday offers a linguistic theory of learning in terms of the linguistic processes of learning interactions which can be heard or read, recorded and analysed.

3. Textual meaning: Organising discourse as coherent text in social context

SFL describes how people use language in different social contexts, holding that a text is understood in relation to its context. While there are many ways in which context is important in learning and teaching, we will choose only one. It has often been noted that young learners' talk is more dependent on the immediate context of speaking, while the talk of older learners is less so, and that a similar development occurs with beginning versus more advanced second language learners. Here is an example of how movement between more dependence on the immediate context of speaking and less dependence occurs in a classroom episode, why it is important in teaching and learning, and how the movement can be traced through textual meaning.

Mr. Peterson is doing a small demonstration with a Grade 9 secondary science class to show that why things sink or float in water is dependent on density.

Mr. Peterson: Here's—here's a rubber stopper in water. (Drops it in and it sinks.)

Students: Whoa!

Mr. Peterson: Rubber's more dense than water. Here's a cork in water. (Takes out the rubber stopper and drops the cork in, which floats.)

Todd: Less...

Mr. Peterson: It floats quite high. Right?

In this example, 'Here's a rubber stopper', 'Here's a cork', 'It floats quite high' all serve to draw the students' attention to the events of the demonstration. They all refer to the immediate non-verbal context of the demonstration. 'Here', 'Here' and 'it' are examples of 'exophoric reference' in the 'textual' function.

Notice that, by contrast, 'Rubber's more dense than water' is a general statement about rubber and water and is not dependent on the immediate context of the demonstration for its meaning. Here 'rubber' and 'water' are examples of 'generic' reference. The statement serves to draw the students' attention to the scientific principle at issue, that floating or sinking is dependent on the density of substances such as rubber and water. This is part of the context of shared knowledge of science that the class is developing.

Mr. Peterson is helping students to link theory and practice by moving between statements of theory and cases of practice. Movement between theory and practice, concept and example in this way is an important strategy in education.. Tracing the movement between exophoric reference and generic reference in the textual function provides a

means to explore how the meaning is being built up through the use of textual resources. The example of Mr. Peterson shows how SFL analysis can describe the expertise of content teachers in teaching the academic discourse of their discipline, and highlight examples of good practice.

Three conceptual/terminological issues

EUCIM-TE focusses on diverse learners: migrant learners, 'language minority' learners, and other learners who may not be achieving their educational potential for reasons related to the development of academic discourse. Three related conceptual/terminological issues that deserve further discussion are: educational potential, minority students and academic discourse.

The question of educational potential relates to the issues of school success and equality of educational opportunity which are inextricably bound up with the issue of educational aims and policies and it is no surprise therefore that we find many contrasting opinions on the subject. However, few would disagree that what is learned and how learning takes place is both influenced and evidenced for the large part by the language used by the students and by the teacher in the classroom, that is, by academic discourse or the language of schooling. The focus on student/teacher engagement highlights the effect of participation[iv] in a learning activity in the classroom.

With respect to language 'minority' students, it can be argued that the term 'minority' should be replaced by a term related to linguistic diversity. Studies by Broeder & Extra (1999) and subsequent Multilingual City Projects aim to trace language (minority) group members through a large number of parameters, such as country-of-origin, ethnic origin, language choice, self-identification, language vitality, etc. However, the distinction between language majority and language minority learners is widely used and is of major importance in bilingual education research, which has found that language minority learners, by comparison with language majority learners, have a particularly critical need to develop academic discourse (see Genessee 2004, Goldenberg 2008)[v]. It is vital that EUCIM-TE keeps this result in view, however one labels the majority/minority distinction.

How can 'academic discourse' be defined and described? Academic discourse is a broad term widely used by language researchers, a number of whom contrast it with conversational language. A related term is the language of schooling. Defining and describing academic discourse more precisely requires the use of linguistic description. We will use an SFL approach to the description of academic discourse (or the language of schooling) in terms of register features.[vi]

Academic discourse is a crucial aim for language development in schooling. It is often demanding for learners and difficult for them to understand, However, it is important to keep in mind that it does not follow that here-and-now informal interaction is always undemanding and easy to understand in classroom discussion about school subjects (see Leung, C. 2010).[vii]

Conclusion

This brief introduction to the SFL model illustrates its value for understanding the development of academic discourse and language as a means of learning. But this introduction is necessarily limited and by no means covers the full range. SFL analysis can explore academic discourse in social contexts in a number of productive ways. For instance, SFL analysis has been used in Multimodal Discourse Analysis (MDA) and Critical Discourse Analysis (CDA). MDA extends the analysis of discourse to provide functional semiotic analyses of images and describe how meanings are realised visually. It thus expands consideration of modes of communication beyond the verbal and moves beyond linguistics into social semiotics (see Kress & Van Leeuwen 2001). As communication by personal computer and the internet become an increasingly important part of learners' lives, understanding the potentials and the affordances of multimodal communication becomes increasingly urgent. CDA analyses discourse to highlight how language conventions and language practices are invested with power relations and ideological processes which people are often unaware of' (see Chouliaraki, & Fairclough 1999). It helps learners to be more critically aware of ideologies in the discourses they hear and read.

To conclude, if diverse learners are to achieve their educational potential, and if content teachers are to understand more deeply how the academic discourse of their disciplines constructs meaning, and use this understanding to enhance teaching and learning, it is essential that they are supported to take advantage of the resources that the SFL model of language can offer. As a functional model of language that relates grammar and lexis to discourse and to social context, and elaborates this relation through register and genre, SFL offers tools of great scope and flexibility which can be expanded in a variety of ways.

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[i] In addition to aiming at improving academic discourse for immigrant students, EUCIM aims at academic discourse for students who are native speakers of the language of instruction.
There is recent evidence from American research that there are important benefits for students who are native speakers if content teachers work on aspects of academic discourse. The context of this research is unusual and needs to be described.
Since the passage of No Child Left Behind (NCLB—No Child Left Behind Act of 2001) with its testing mandates, elementary schools in the U.S. have focused their time on improving reading and math scores. School districts have reduced the time given to other subjects in K-8 (primary and junior secondary schools)] so as to intensify the teaching of reading and math, which alone are tested under the provisions of NCLB. The time for History, civics, geography, and the social studies in general has been notably reduced. Some social studies educators have responded by integrating reading skills into the teaching of social studies at the elementary level. This response resonates with literacy researchers who have asserted that reading comprehen-

sion can be enhanced through language-conscious instruction in the content areas. It is consistent with EUCIM's emphasis on inclusive academic discourse.

Hinde et al. (2007) present the first interstate quasi-experimental assessment of the power of content integration in building reading skills. The authors studied the effects on reading comprehension of GeoLiteracy — a K-8 package of 85 lessons that teaches geography in the context of practicing reading and writing skills. Ninety-six third through eighth grade teachers in Arizona and Michigan divided up into intervention and comparison groups. Intervention teachers taught GeoLiteracy lessons during their language arts or social studies times, and their comparison teacher counterparts taught the curriculum as usual—without GeoLiteracy. Statistical analyses of reading comprehension assessments of the 2,539 students involved reveal statistically significant improvement in reading comprehension scores for students in Grades 5 through 8 who were taught using the GeoLiteracy curriculum.

The reading skills that were targeted for this study included cause/effect, sequencing, main idea, summarizing, drawing conclusions/inferences, following directions, and reading/interpreting graphic displays. In the SFL model of language, these would be covered by the ideational component, and so would be part of the approach to inclusive academic literacy that EUCIM-TE recommends to content-teachers.

The Geoliteracy approach guides teachers to build literacy skills and geography knowledge in an integrated way. It underlines the potential of a deeper understanding of the role of language in disciplinary subject-areas by content teachers. For a research study which provides valuable insights into the role of academic discourse in geography courses, see Coetzee-Lachmann (2009).

[ii] Vygotsky speaks about four stages in child speech development, and the third and fourth stages show the development of intra-mental functioning:

"*With the gradual accumulation of naive psychological experience, the child enters a third stage, distinguished by external signs, external operations that are used as aids in the solution of internal problems. That is the stage when the child counts on his fingers, resorts to mnemonic aids, and so on. In speech development it is characterized by egocentric speech.*

The fourth stage we call the "in growth" stage. The external operation turns inward and undergoes a profound change in the process. The child begins to count in his head, to use "logical memory," that is, to operate with inherent relationships and inner signs. In speech development this is the final stage of inner, soundless speech. **"**

[iii] A scaffold is a structure that braces another structure being built. Adopted in the learning environment of the classroom this means that the teacher provides gradual interactional support. The zone of concerns the partially developed skills that can only be displayed with support. In the classroom, this means that the teacher can activate the student's potential for new learning through the appropriate scaffolds.

[iv] The following effects can be distinguished: outcome effect (as a direct learning effect), process effect (as an effect on likelihood of future participation), and (self) identification effect (in-group/out-group efficiency). More specifically, the learning task-related effect involves: participation (be there and be active), collaboration (be co-operative in peer interaction), and explaining (be instructional in peer interaction).

[v] The research literature on bilingual education (e.g. Genesee 2004) standardly makes a very strong distinction between bilingual education for *majority* students (programs for students who come to school speaking a majority language, such as English in Canada or German in Germany) and bilingual education for *minority* students (programs for students who come to school speaking a minority language, such as Spanish in the U.S., or Turkish in Germany). Bilingual education for *majority* students is often referred to as "immersion" after the Canadian French immersion programs, which are for majority students who speak English in Canada. (It would appear that the bulk of programs which have been labelled as CLIL (Language and Content Integrated Learning) in Europe are in fact bilingual education for *majority* students, not *minority* students, though this is seldom stated prominently). Bilingual education for *minority* students would include EUCIM, since EUCIM aims at migrant students. In the bilingual education research literature it is widely recognised that these two kinds of programs and students raise very different issues, and that research results from one kind of program cannot be generalised to the other kind. Indeed some researchers have pointed out that bilingual education programs for minority students runs the danger of being 'submersion' programs. Researchers have suggested that academic discourse may be unproblematic for language majority students in certain respects. A review of the education of language majority students in North America (Genesee

2004:554) refers to the consistent finding that immersion students attain the same level of achievement in academic subjects (such as mathematics) as students receiving instruction in these subjects through their native language. Consistent with this finding, research on programs for language majority students has concentrated on questions of second language learning and teaching for language learners who aim at a knowledge of the grammar and vocabulary of the second language. It has not concentrated on questions of academic discourse as a means of learning content or subject matter.

By contrast, a recent review of the education of language minority students in the U.S. (Goldenberg 2008:13) identifies academic discourse for learning as a crucial need and points out:"English Language Learners' language needs are complex, and while they benefit from ELD [English language development] instruction per se, they also need instruction in the use of English in the content areas (math, history, science, etc.). Teaching both content and language is a challenge for teachers; this is currently also an area of active research. But whether we isolate and teach explicitly the language and vocabulary of academic subject areas in ELD instruction or integrate the teaching of language within content lessons, we should recognize that doing either or both requires very careful planning and effective instructional practices in order to achieve the desired language and content objectives."

Thus it is very important to keep in mind the distinction between language majority and language minority learners, however this is labelled. Academic discourse and the coordinated learning of language and educational subject matter is most certainly problematic for language minority students and their teachers. Projects which serve the needs of language minority students are not about second language teaching in any simple sense, but address questions of language as a means of learning, the integration of language and content learning, and the development of academic discourse.

With regard to alternative terms for 'minority', in each report for a city that participated in the Language City Project, a terminology list is available that is useful for the EUCIM-project. Another useful European-based and recent source is the terminology issue in the VALEUR project: how to deal with labelling the "additional" languages of Europe. The final report that was eventually published (McPake 2007) is polished and less politically sensitive than some of the original information that was available for it. The remaining unpolished but official information is still available for the 21 European countries that were represented in the VALEUR project (www.valeur.org)

[vi] SFL characterises academic discourse (or the language of schooling) in the following way.

Two very different sites of language socialisation are the home and the school; Halliday notes how they tend to present different forms of language and different kinds of knowledge.

"Commonsense knowledge is typically transmitted in the home; it tends to be spoken, non-technical, informal, without boundaries, and with room for discretion on the part of the child learner, who can take it or leave it. Educational knowledge usually comes packaged by the school, and it differs in these five ways: it is written, technical, formal, with strong boundaries and with much less discretion on the part of the learner...So there is a difference in the typical forms in which these two kinds of knowledge are presented to us." (Halliday 1988:11).

In parallel with this contrast between home and school, Schleppegrell (2004: Chapter 3) uses the linguistic description of register to describe the differences between the registers of informal interaction and the registers of schooling and show how the language of schooling is organised in different ways from the language of everyday life. She finds that 'language used in interaction has features that help create a context of everyday meanings, familiarity, and negotiation, which language used for the tasks of schooling typically realises contexts of information display, authoritativeness and high degrees of structure... From the ideational component of the grammar, school-based texts typically select complex nominal syntax that draws on technical and abstract lexis and processes though which logical meanings are instantiated... Selections from the interpersonal component of the grammar typically realise the "expert", authoritative role of the student in the choice of declarative mood and use of modality and attitudinal resources instead of intonation to convey speaker/writer stance toward what is said. Selections from the textual component of the grammar realise the high degree of structure expected in school-based tasks, constructed through internal conjunction and other cohesive resources and clause-combining strategies of condensation and embedding along with effective

exploitation of thematic position in the clause to highlight the organisational structure of the text through expanded noun phrases, nominalization, and other uses of grammatical metaphor ' (ibid. 74-5).

[vii] It is often assumed that the here-and-now informal language used in classroom talk, especially when teachers and students are engaged in small group work or one-to-one discussions, is easy to understand. However, the here-and-now language associated with hands-on student learning activities can be intellectually challenging. In the following example, a 14-year old second language student (Sairah, pseudonym) and a teacher are engaged in a 2-minute one-to-one mathematics task:

Data

Mean, median, and Mode

S = Sairah
S1= another pupil
(.) a very short untimed pause
(2) pause of more than one second
= latching
[overlapping onset
] overlap termination
? rising intonation
(word)unclear word/s
[ ] noise/comments related to utterance
(( )) Researcher's comments

001 S: miss?
002 miss you know for the median when I you know
003 compare them together I've got 7 and 7 in the middle
004 T: 7 and 7 in the so you've got two numbers in the
005 middle
006 S yeah [and they are the same
007 T [because you've got an even number of numbers isn't
008 it?=
009 S =yeah=
010 T =so that's 1 2 3 4 5 6 7=
011 S =yeah there are 20 (.) 26
012 T right so what you do is you add them up (.) the 7and the 7
013 and divide them by 2
014 S oh okay
015 T right? you get if it is 7 then you'll get 7 isn't it?=
016 S =yeah?=
017 T =because 7 and 7 is 14 di[vided by (unclear)]
018 S [yeah (.) yeah]
019 S 7
020 T if it was different numbers if it was 7 and 8 then you
021 would have to=
022 S =7.5
023 ((Background classroom talk, teacher moving away?))
024 ((Teacher returns, after approx 6 seconds))
025 T what if you had if you had median (.) I'm sorry mode what
026 then
027 S mode?
028 ((Classroom background noise))
029 T if you have two 7s and two 8s (2) then what would your
030 mode be?
031 S 7.5=
032 T =no if all the rest of the numbers were appearing only

033 [once=
034 S1 [miss?
035 S =yeah=
036 T =and 7 and 8 was appearing twice
037 S hmmmn
038 T then you can have two modes (.) 7 and 8 because it is the
039 most frequent number
040 S would you have 7.5?
041 T =no that, that (unclear) if it [was the mean]
042 S [so if that was] yeah
043 T =right? if it is a mode then you can have two modes
044 S (unclear)
045 T so what numbers (.) right you've got 8 more here isn't it?=
046 S =yeah=
047 T =and if I gave you a set of numbers and I said no pencil
048 [T responding to another pupil] if I gave you a set of
049 numbers there 1 2 3 3 4 8 9 8 8 7 6 5 7 7 (.) so what's the
050 mode there? (.) you've got 1 2 3 8s and 1 2 3 7s isn't
051 it?=
052 S =yeah=
053 T =so the mode will be 8 (7)=
054 S =8 and 7?
055 T =8 and 7=
056 S =okay=
057 T =so you have two modes (.) okay?=
058 S =okay yeah

As we can see from this classroom example the exchange between the student and the teacher can be described as 'here-and-now' talk – the use of 'I' and 'you' in their utterances signals direct engagement with a task at hand, some of the meaning in the dialogue was potentially recoverable from the immediate context (e.g. lines 47-50 when teacher reading numbers from a page of a book). Sairah apparently didn't 'get it' (how to find 'mode'), despite her ability to engage in talk (e.g. she answered questions but gave incorrect answers). Sairah's difficulty appears to have started around line 25 when the teacher changed tack from 'median' to 'mode'. Here the teacher posed a question about mode, a topic covered in previous lessons. There might have been a number of possible reasons why Sairah didn't seem to be able to follow the teacher's elaboration. It might be that Sairah didn't grasp the concept of mode in the first place. It might also be possible that the way in which the change in topic was expressed (line 25 'what if you had if you had median (.) I'm sorry mode what if'). The slip of the tongue on the part of the teacher might have distracted Sairah. From the point of view of language use oen important observation here is that in this stretch of talk the language is informal, interactional and directly on-task. The only subject-specific terms used were 'median' and 'mode'. And yet for Sairah it was not easy (e.g. line 31 an incorrect answer; line 54 a quizzical expression). (See Leung 2010 for a fuller discussion.)

In earlier sections we have emphasised the importance of acknowledging the idea of a subject register (e.g. a mathematics register comprising subject-based meanings and the language used to express the subject-based meanings). The exchange between the teacher and Sairah in the example shows that in the classroom subject-based meanings can be expressed in everyday here-and-now talk with some use of subject-based terms. This kind of talk can appear to be deceptively easy from a teacher's point of view. But students' capacity to make use of this kind of seemingly informal language should not be taken for granted. Teachers have to explore how far content meaning and language expressions are understandable from students' perspectives, and help students to access content meanings by making language meanings explicit.

In linguistically diverse classrooms, many additional/second language students would benefit from explicit and focused teacher assistance to get at content meanings through the complex and fluid uses of different genre, register and modes of language in different classroom activities. Additional/second language students'

academic learning should be supported by highly focused and language-explicit teaching across the curriculum where appropriate.