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# TOWARDS AN INITIAL OPERATIONALISATION OF DISCIPLINARY LITERACIES

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## SETTING THE SCENE: WHAT IS MEANT BY DISCIPLINARY LITERACY?

The term disciplinary literacy refers to the interdependence between content matter and the ways in which this content is constructed and communicated, thereby enabling students to create and convey academic knowledge effectively. Disciplinary literacy is growing in popularity among educators as greater emphasis is being placed on the value of specialised ways of thinking and communicating that are essential to each academic discipline, rather than solely focusing on more general literacy skills. Disciplinary literacy involves a departure from treating reading and writing as technical skills towards seeing them as skills needed for producing, interpreting and evaluating texts, both in traditional and digital formats, in alignment with the social, cultural, and discursive norms and values and conventions of different school subjects. A task of education is to increase meta-awareness of these aspects of literacy and provide explicit guidance as disciplinary literacy skills do not develop automatically through exposure. Disciplinary literacy also extends beyond classrooms in that it places emphasis on providing learners with skills to participate in society and to critically navigate information, fostering skills they need to cope in the increasingly complex and rapidly changing world (European Commission, 2012). Disciplinary literacy is thus about supporting learners' agency, i.e., a sense of ownership of their own learning.

From disciplinary literacy perspective, the purpose of schooling is thus to support students in their development of disciplinary knowledge, skills, values and attitudes so they may navigate information and actively engage in future academic, professional, and social roles. Schooling provides a context, usually in the form of curricular subjects, for learners to enact "doing", "being" and "thinking" in ways that are relevant to the nature of knowledge and the typical practices that experts in different disciplines exercise and to socialise them into the mindsets of these identities (i.e., Historians for "History Lessons", Biologists for "Science Lessons", Mathematicians for "Maths Lessons") and into the culture of these disciplinary communities. Students are required to reproduce and recontextualise knowledge; to transform subject content into conceptual artefacts and knowledge objects, as evidence of knowledge building, which can be assessed and improved (Bereiter, 2002, pp. 480-482). This requires all manners of communicating knowledge, i.e., **disciplinary literacy** (see Airey, 2011; Fang & Coatoam, 2013), or disciplinary **literacies** in the plural to highlight the different discourse communities (Shanahan & Shanahan, 2008).

Disciplines are charged with values, traditions, theoretical frameworks and nomenclatures, which Westerholm and Räsänen (2015) refer to as 'disciplinary cultures'. The skills and strategies required for learning and communicating in a given subject matter will shape disciplinary literacy in that discipline and, eventually, in the subject drawing on that discipline. The relationship between disciplines and school subjects can thus be described as follows: Disciplinary literacies encompass discipline-specific textual-discourse and semiotics that have been normalised by experts of disciplinary communities of practice for the process of producing knowledge. Schooling serves as context for recontextualising knowledge, re-

presenting disciplinary-knowledge as pedagogic-subjects for the purpose of providing school-leavers with the level of disciplinary knowledge they will need to navigate information and actively participate as democratically informed citizens.

Shanahan and Shanahan (2008) suggest a model in which they see disciplinary literacy as a more advanced set of skills, knowledge (language), and strategies than basic or intermediate literacy. According to them, basic literacy skills consist of rudimentary skills such as decoding and the recognition of high-frequency words. Intermediate literacy skills entail basic fluency and general comprehension of text, including an understanding of commonly used vocabulary. Advanced literacy skills pertain to specific disciplines such as history, mathematics, geography, and other specialised fields. The acquisition of basic and intermediate literacies typically occurs during the primary years of schooling. As students' activities and school experiences become more specialised and focused within specific disciplines, such as mathematics, science, and English, a need for more discipline-specific skills, knowledge, and strategies arises.

There is thus a sense of hierarchy in Shanahan and Shanahan's (2008) view of literacy progression. However, also other views on this exist. For example, Spire et al. (2018) consider the idea of a hierarchical progression of disciplinary literacy to be problematic as literacy is neither a single nor a linear process (Rumelhart, 1994). Also the pluriliteracies approach (Coyle & Meyer, 2021) maintains that disciplinary literacy can be addressed at different educational levels from primary level onwards. That is, the development of discipline-specific literacy skills commences early in the educational trajectory, with early years' students in mathematics, for instance, requiring a basic lexicon to express fundamental mathematical concepts. It is important to consider the age and grade level of learners when examining features of discipline-specific literacies to be taught. For example, the anticipated level of disciplinary literacy in history-subject in the 3rd grade differs from that of the 5th grade. That cognitive and language demands are appropriate for learners' age and phase of learning is the key. This can be taken into account, for example, by controlling how context embedded or context independent the construction of knowledge is and what levels of abstraction can be used to convey meanings.

As mentioned above, existing definitions of disciplinary literacy draw attention to the close connection between, and even inseparability of, disciplinary content and ways of constructing and communicating it. According to Fang (2012: 20), for example, "[b]eing literate in a discipline means both deep knowledge of disciplinary content and keen understanding of disciplinary ways of making meaning" for academic, social, and professional purposes (Fang & Coatoam, 2013), which entails deeper transformative learning in specialised communities of practice. Moje's (2008: 99) argument that learning in subject areas is "a matter of learning the different knowledge and ways of knowing, doing, believing, and communicating that are privileged to those areas" adds the perspectives of learner agency and engagement.

The discussion above draws, in particular, on studies in the field of education where disciplinary literacy research has featured strongly (see also. Moje, 2015; Shanahan & Shanahan, 2012; 2019). Also in CLIL research the content-language interface, inherent for disciplinary literacies, has started to attract attention (e.g. Llinares et al., 2012; Nikula et al., 2016; Coyle & Meyer, 2021). CLIL contexts may be particularly fruitful for exploring disciplinary literacies as matters of language and content relationship easily become more visible in contexts where instruction happens through L2. However, far from being unique to CLIL, the importance of socialising learners into subject-specific ways of constructing and displaying knowledge and the intricacies of content and language relationship are relevant also when teaching in L1.

What we still lack are comprehensive conceptualisations of bi/multilingual disciplinary literacy that would unpack its inherently multifaceted and dynamic nature in ways that would help take both research and educational practice forward. This document sets the scene for such work, carried out in our current COST Action CLILNetLE, by discussing dimensions and aspects and characteristics deemed necessary for the initial operationalisation of bi/multilingual disciplinary literacy.

### **KEY DIMENSIONS AND ASPECTS FOR OPERATIONALISING DISCIPLINARY LITERACY**

The dimensions of disciplinary literacy discussed below are highly interconnected and overlapping. Furthermore, the order in which these dimensions are presented does not indicate a hierarchy of importance, as they are all essential components of effective communication within a discipline.

#### ***Disciplinary literacy has a multisemiotic dimension***

Language is not the only means through which we can communicate and build knowledge. It is therefore crucial to acknowledge disciplinary literacy as multisemiotic. Firstly, there are non-linguistic modes, such as, for example, diagrams, codes, signs, formulas, images, tables, graphs and timelines. Secondly, knowledge building also entails embodied and material aspects: meaning making happens, for example, through gestures, postures, positions and the use of various artefacts and spatial arrangements (e.g. Käätä 2021). These thus extend the notion of reading and writing beyond texts as exemplified by one CLIL teacher's comment: "in biology we read the environment or the surrounding nature" (Nikula & Käätä 2022).

In CLIL contexts, the multisemiotic dimension of meaning making also includes the multi- or plurilingual modes: knowledge and use of different linguistic systems/resources, and the interplay among these languages and resources (e.g., whether knowledge of one language (L1) aids learning content matter in another language (L2, L3).

#### ***Disciplinary literacy has a bi-, multi- and translingual dimension***

All school subjects, irrespective of the language of instruction or the language background of participants, involve learners being socialised and scaffolded into the language of the discipline. However, contexts such as CLIL, where instruction happens through an additional language, highlight the bi- and multilingual aspect of schooling as learners are expected to master the literacy conventions of subjects in multiple languages. How CLIL and the relationship between the languages involved impacts the development of disciplinary literacy in different languages is an ongoing research theme that we still know rather little of. Another area worth considering is going beyond bilingual to translingual disciplinary literacy. This orientation means steering away from languages-as-separate view to seeing them as forming a joint meaning-making resource. From this perspective, communicative competence in a specific subject means “the ability to merge different language resources in situated interactions for new meaning construction” and “the transformative capacity to mesh their resources for creative new forms and meanings” (Canagarajah 2013: 1-2). Such views would, obviously, have implications both for teaching and assessing disciplinary literacy in CLIL classrooms.

In addition to the translingual aspect it is possible to view disciplinary literacy in terms of interaction between different modes of literacies such as text, visual, and digital literacy. Apart from skills across different modes and media, transliteracy may also be expanded to fluid deployment of literacy skills across different communities. This is implicated by Moje’s (2015: 256) argument for “a view of disciplinary literacy that makes navigating across disciplinary communities as important as being skilled inside those communities”.

### ***Disciplinary literacy has a functional dimension***

Semiotic systems mediate the meaning of something to someone. The ability to select and use semiotic systems to communicate effectively and appropriately can be referred to as pragmatic literacy. The way in which students structure text and relay them depends on the nature of the message, whether it is experiential or logical— ideational, textual, or interpersonal. In Systemic Functional Linguistics (Halliday, 1978), it is important to pay attention to the communicative purpose of the message, the context (e.g., classroom interaction or exam situation), mode of interaction (oral or written), interlocutors (e.g., teacher-student / student-student), and cultures (e.g., disciplines are cultures). All of these have implications for register and style, i.e. for knowledge and use of linguistic and non-linguistic resources to communicate content in ways that are genre and situation appropriate.

### ***Disciplinary literacy has a critical dimension***

Critical literacy is also an important component of disciplinary literacy as it trains students to analyse and assess texts from multiple perspectives and through different lenses (social, cultural, and others). Students can eventually develop a deeper understanding of the

content matter, which reflects in their ability to probe existing assumptions with more confidence to uncover the underlying power and privilege that shape the texts they read (see Coyle & Meyer, 2021). An example of a critical literacy model relevant for bi- & multilingual students is that of Janks (2010). It focuses on four main ideas: (a) access (to help students see how different parts of a text come together to create meaning and learn to understand the big picture); (b) domination (to teach students to look for biases in texts so students can read more critically and think more deeply about what they are reading); (c) diversity (to recognise and value the different languages and cultures that students bring to the classroom); and (d) design (to encourage students to use their knowledge of language and communication to create new and innovative solutions to problems).

### ***Disciplinary literacy has a technological dimension***

An aspect of disciplinary literacy that is constantly growing in importance is the use of technology that allows us to make use of and navigate multimodal digital texts and create them. Digital literacy involves access to multimodal, multisemiotic disciplinary texts in digital formats, and the ability to sort through, navigate, critically evaluate, and make decisions about the multitude of texts that are ever more readily available via digital technologies, including artificial intelligence. The relationship between digital literacy and disciplinary literacy, however, goes beyond access, and evaluation of credibility or relevance. Digital literacy also entails novel ways of construction and communication of disciplinary knowledge (Manderino & Castek, 2016), which involve distribution and availability of data through digital methods, the use sophisticated digital tools for knowledge construction, the deployment of digital collaboration and productivity tools, and formation of digital scientific identity (Bello & Galindo-Rueda, 2020, p. 9). Coyle and Meyer (2021) situate digital literacies under subject-specific literacies and suggest that “digital literacies develop as learners apply subject-specific skills and strategies to critically decode or encode digital text or work through digital channels” (p. 122).

### **Realisations of disciplinary literacies in classroom practices and language use**

Shanahan and Shanahan (2008) point out the dilemma that even though - due to their high levels of abstraction, ambiguity and subtlety - it is not easy to learn disciplinary uses of literacy, they are rarely explicitly taught. This has been repeatedly attested in other studies as well. However, it is possible to identify features of language use in classrooms that serve as ways of “flagging” disciplinary literacies. These include, for example:

*Subject-specific vocabulary:* Perhaps the most obvious, and readily recognised, example of subjects building their knowledge in different ways is subject-specific terminology. For example, ‘DNA replication’ can easily be connected to Biology and ‘velocity’ to Physics.

*Genres:* Another typical way in which disciplinary literacies are realised is through the genres and conventionalised registers that characterise different disciplines. The

requirements for a lab report in Chemistry, for example, are different from those for a narrative account in History.

*Cognitive Discourse Functions:* The perspective of language is on its own insufficient for depicting disciplinary literacies. One key question instead is for what kind of *functions* language is used and how these may differ across subjects. The construct of cognitive discourse functions (Dalton-Puffer, 2013; 2016) is one attempt to bridge communicative intentions, cognitive processes, and their linguistic realisations. CDFs offer a tool for practitioners to start noticing how subject-specific information is verbalised. The construct of CDFs involves seven prototypical broad categories of communicative functions, i.e., report, explore, explain, evaluate, describe, define, classify, each of which subsumes different realisations. For example, the function ‘describe’ is not only expressed through the verb ‘describe’ but can be expressed with a range of other verbs such as label, identify, name or specify, all of which have the function of informing the listener/reader “about the observable features, qualities or externals and sometimes internal characteristics of something” (Dalton-Puffer, 2016: 38). While CDFs are an essential part of general academic literacy and hence apply across subjects, they can also capture subject-specificity as different school subjects may involve different constellations of CDFs and ways of realising them (see Morton, 2020).

Given that disciplinary literacy is connected with subject-specific knowledge building practices, any references (explicit or implicit) to how participants are expected to orient to knowledge serve as realisations of disciplinary literacies. While CDFs serve as one candidate for concretising the linkage between conceptual/cognitive processes and their linguistic/multisemiotic expression, more research on different contexts is needed in this area.

### ***Language teaching and disciplinary literacy***

It has been common to approach disciplinary literacy from the perspective of subject teaching. This raises the question about the nature of disciplinary literacy in language subjects that have a less straightforward disciplinary background than, for example, subjects such as History or Biology. Coyle & Meyer (2021), however, argue that language teaching has a key role in pluriliteracies and in developing learners’ skills beyond those relating to the mastery of language system and general communication, often perceived as the realm of language teaching. They call for approaches that involve critical analysis of texts and engage learners in uncovering and interpreting their different layers of meaning. This will increase learners’ general awareness of how meanings are constructed and of the non-neutrality of the texts they meet. Such awareness is useful both across school subjects and for enabling active and well-informed societal participation. By understanding how language and communication work, students can become more effective communicators and critical thinkers.

### ***Collaboration between language and content teachers and across subjects***

For a better understanding of disciplinary literacy in CLIL, collaborative work between language teachers and content teachers is a key. One area of collaboration, for example, could be assessment, working towards content and language integrated assessment criteria across different levels and disciplines (e.g. Bauer-Marschallinger, 2019). This can be accomplished by moving from *multidisciplinary work* (separate content and language disciplinary criteria), through *interdisciplinary work*, where criteria are shared (see Llinares & Nashaat-Sobhy, 2021; Morton, 2022; Morton & Nashaat-Sobhy, 2023) and then towards *transdisciplinary work*, where content and language teachers design joint activities once criteria are shared (Llinares, Morton & Whittaker, forthcoming 2024).

The transferability of disciplinary knowledge presents a complex issue when attempting to conceptualise literacies that are specific to a particular discipline (see Llinares & Nashaat-Sobhy, 2023). While certain features may be shared among different subject areas (interdisciplinary), others are unique and exclusive to a particular discipline. Consequently, any attempt to separate these discipline-specific literacies must be approached with great care and consideration.

### ***Related concepts***

Shanahan and Shanahan (2012) caution against the application of the term *content area literacy* in place of disciplinary literacy, as this may pose a significant challenge for educators who are focused on promoting disciplinary literacy. In contrast to content area literacy, which primarily prescribes study techniques and reading approaches aimed at enhancing text comprehension and retention, disciplinary literacy pertains to the description and analysis of the distinct uses and implications of literacy practices across various disciplines. To give a concrete example from a science lesson, content area literacy requires that students be equipped with the ability to effectively organise scientific vocabulary, employ mnemonic devices, and engage in repetitive exercises that facilitate the association of scientific words with their corresponding meanings; on the other hand, in disciplinary literacy, students are encouraged to adopt a critical approach toward the creation of scientific terminology, with a particular focus on the underlying processes and motivations that give rise to such lexicons. However, Spires et al. (2018) consider distinguishing between content area and disciplinary literacy practices as a 'false dichotomy', maintaining that they should be viewed as complementary practices.

The concept of disciplinary literacy can also be juxtaposed with that of *general academic literacy*. This refers to skills and dispositions that cut across different subjects and are connected to the overall functions of education. For example, transition from more concrete to more abstract, from informal to formal, and from personal to impersonal forms of expression and ways of constructing knowledge concern all subjects. Disciplinary literacy, as



has been discussed above, is more concerned with identifying the subject-specific features in constructing and communicating knowledge.

The term *pluriliteracies* is increasingly used in research literature. It also has explicit focus on disciplinary literacies, the term highlighting the multiplicity and complexity of connections between “languages, cultures, modes of communication and semiotic systems” (Coyle & Meyer, 2021: 41). In CLIL contexts, the pluri- prefix serves as a reminder of the aim to develop bilingual disciplinary literacy skills.

The dynamism and complexity of knowledge building and communication acknowledged in the work on disciplinary literacies also resonate with the broader notion of *multiliteracies* (e.g. Cope & Kalantzis 2009). Multiliteracies encompass the multiple means and modalities of communication and pay attention to cultural and linguistic diversity. A multiliterate person is thus one who employs various languages, different modalities and technological resources to participate in society. In a sense, then, disciplinary literacy is about acquisition of multiliteracy skills within the domain of school subjects.

## Conclusion

This paper presents key characteristics and an initial working definition of bi/multilingual disciplinary literacies to establish a shared operationalisation, based on existing research and contributions from members of WG1, within the scope of the current COST Action, CLILNetLE. It is intended to lay the groundwork for the Action-related activities to be carried out by the other WGs as well as to serve as a foundation for an evidence-based, refined, interdisciplinary, and thorough conceptualisation, which is to be developed through input from WG2-4.

We include below a condensed working conceptualisation –created during the Second General Meeting of CLILNetLE in Vienna on 3-4 March 2023 and slightly modified since – to serve as a summary, as it effectively captures the fundamental arguments and aspects presented in this paper:

We see disciplinary literacy both as a **goal** and a **dynamic process**. It involves a deep reciprocal relationship between disciplinary content and ways of constructing knowledge and communicating it. Disciplinary literacy starts from **knowledge building**; it is about **learning** the typical ways of **thinking, meaning-making and communicating** in different disciplinary areas inside and outside of school contexts. Disciplinary literacy is thus not only about language nor about the technical skills in reading and writing but about how these and other modes of communicating **are embedded in** the fabric of **the discipline**. This is why **content and language are inseparable**. The relationship between disciplines and disciplinary literacy in school is not straightforward nor is it a matter of turning learners into disciplinary experts.

Classrooms are rather spaces for learners to enact “doing”, “being” and “thinking” in ways that are relevant in different subjects, in **age-appropriate** ways.

Disciplinary literacy can be characterised as having the following key, interconnected dimensions:

- **multisemiotic dimension** (e.g., apart from the verbal mode, knowledge can also be built non-verbally by, for example, diagrams, codes, signs, formulas, images, tables, graphs and timelines. Knowledge building also entails embodied and material aspects such as gestures, postures, positions and the use of various artefacts and spatial arrangements).
- **bi-, multi- and translingual dimension** (This leads to repertoire-building over time. It builds on the learning of a broader range of language features associated with different disciplines, school subjects, and named languages, in contexts such as CLIL, and building knowledge by shifting between everyday and academic language to promote learning).
- **critical dimension** (This involves analysing texts from multiple perspectives, identifying underlying biases and power structures, valuing lingua-cultural variation, and utilising semiotic resources for problem-solving)
- **functional dimension** (i.e., use of linguistic and non-linguistic resources to communicate content in ways that are genre and situation appropriate)
- **technological dimension** (i.e., access to multimodal, multisemiotic disciplinary texts in digital formats, and the ability to sort through, navigate, critically evaluate, and make decisions about the multitude of texts that are ever more readily available via digital technologies as well as the ability to produce such texts)

As mentioned above, these dimensions are interrelated and overlapping, and learners gradually accumulate competences as regards these dimensions, commencing in early years of schooling. The interconnectedness and gradual mastery of these dimensions can be captured through a tree metaphor, as presented in Figure 1.

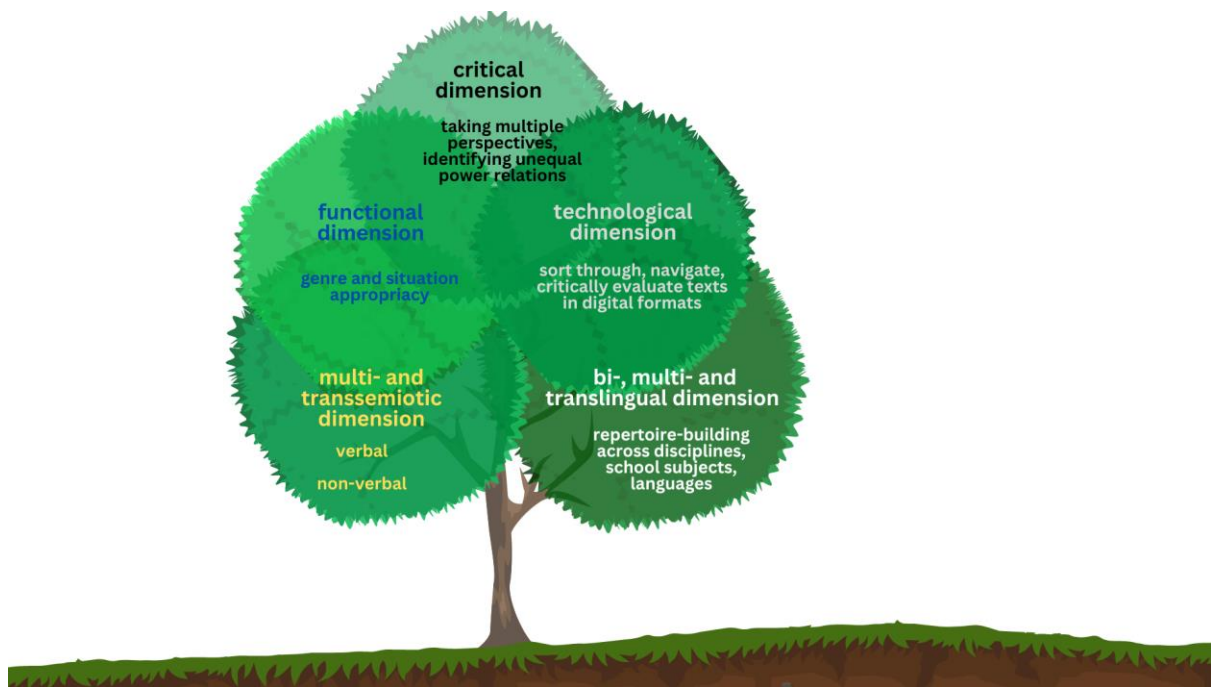


Figure 1. Key dimensions of bi/multilingual disciplinary literacy

To conclude, this working paper provides preliminary information and a shared starting point for the activities to be undertaken by WG2-5; it is thus an **initial conceptualisation** rather than an end product. There are many questions that have yet to be addressed regarding bi/multilingual disciplinary literacies. As part of the work within CLILNetLE, investigation into the development of bi/multilingual disciplinary literacies across school subjects (WG2) and across educational levels (WG3), the activities that contribute to this development (WG2-4), the impact of digital media on the learning and use of bi/multilingual disciplinary literacies in educational and non-educational contexts (WG4), and evidence-based, good practices (WG5) is expected to produce empirically based answers and thus lead way towards a more refined and comprehensive conceptualisation.

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