

Disciplinary language – A Question of Content, Voices and Structures in Content-area Texts¹

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The close interconnection between language and thinking is a classic philosophical proposition. In this article, the concept of *disciplinary language* is used in a broad sense to refer to the resources that disciplinary experts and content-area teachers use when expressing themselves in the content-area. Those studying a content-area are also expected to learn not only to understand that content-area's specific language and texts, but also to use disciplinary language when developing thoughts and demonstrating their knowledge of the area. Disciplinary language can be seen as a resource that gives students opportunities for deeper thinking within the content-area.² Knowledge development is therefore strongly related to language development in the area. One consequence of such reasoning is that matters related to disciplinary language are key issues in teaching and learning in school subjects and disciplines (cf. Moje 2008; Shanahan & Shanahan 2008; Fang & Coatoam 2013).

In other words, *disciplinary language* can be considered a collective concept for the language that qualified participants in a subject culture use when *making their voices heard in the content-area* to communicate *disciplinary content in language and resource structures relevant to the discipline*. The reasoning of these three aspects of disciplinary language will be discussed in more detail later in this article. Thus, disciplinary language is used in spoken and written content-area texts in the social community that constitutes content-area instruction. In some areas, such as music and physical education and health, disciplinary language is also a matter of being able to interpret and create meaning through the content-area's specific gestures and body language, such as being able to follow a choir director's conducting and connect it to the notes on the sheet music, and being able to understand and use "T" as gestured with the hands as a sign for "time out". Thus, disciplinary language comprises both verbal language (words) and other resources, such as symbols, images, sounds and gestures.

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² The content of the article in its entirety can be related to both school subjects and students in school, and to disciplinary fields and students in higher education. Going forward, the article will be written from a school perspective, and the reader must keep in mind that the content is relevant for instruction and teachers in both school and higher education.

According to Zhihui Fang (2012: 19), previous research³ states that “more than 70% of students in grades 4–12 are experiencing difficulties when reading and writing texts in academic content areas”. Thus, it is relevant for researchers focused on teaching and learning in school subjects to develop knowledge of disciplinary language in different content-areas. As seen from a sociocultural theory perspective, learning takes place through interplay in practice (Dysthe 2003: 31). The interplay is based on interaction and communication, with language considered the most important tool in learning (Dysthe 2003: 46). Learning in a content-area is thus based on involvement in a discourse community, with shared conventions for the use of language and with participants expected to both interpret and create spoken and written texts in the content-area (Säljö 2012; Shanahan & Shanahan 2008 & 2012). The interplay in the practice of a content-area takes place through utterances in speech and writing, i.e. in meaning-bearing text units that can be short or long (cf. Bakhtin 1986). Oral texts (speech and conversation) and written texts,⁴ coupled with various activities, can be said to form the basis of a content-area’s practice. With this understanding, it is reasonable to study both the practice and the texts in practice from a linguistic theory perspective.

The purpose of this study is to use linguistic theories to specify concepts and further develop models that can be used for the study of disciplinary language, content-area texts and content-area instruction. The concepts and models are intended to clarify which specific aspects of disciplinary language and the process of teaching need to be examined and which need to be managed in content-area instruction. Thus, the article is theoretically focused on key issues in teaching and learning in school subjects and disciplines. The study presents an overall perspective of disciplinary language, which differs from many studies in which disciplinary language is studied with a similar theoretical point of view, but where linguistic structures at the lexicogrammatical level and genre patterns are in focus (see e.g. Schleppegrell 2004; Fang & Schleppegrell 2010; Martin & Rose 2007). In the present study, the focus is on understanding how disciplinary language can be seen as content-area-specific and multimodal systems as a whole. This means that questions about grammatical choices are not investigated in any depth, even though the concrete text examples are also based on analyses at the lexicogrammatical level. Nor are questions about linguistic structures in different genres discussed in detail. It is hoped that the study will clarify perspectives on disciplinary language and its function in general when participants communicate within a content-area.

3 Fang makes reference to Biancarosa & Snow (2006) and Graham & Perin (2007).

4 Here, the concept of written texts refers to texts that can consist of verbal language (words) and/or other resources such as images, figures, symbols, etc. (Kress 2010).

The article first addresses the concept of disciplinary language based on dialogical theory (Bakhtin 1986; Ajagán-Lester et al. 2003; Evensen 2004) and a functional linguistic perspective (Halliday 1978 & 2014; Fang & Schleppegrell 2008; Thompson, 2013). This is followed by a discussion of disciplinary language in relation to the concept of disciplinary literacy (Fang & Schleppegrell 2010; Shanahan & Shanahan 2008). There is then a section where a discussion about the concepts is developed, and models for analysis of disciplinary language and instructional practices are presented. The article concludes with some implications for teaching and learning.

Disciplinary language – language in content-area texts

The intention is therefore to include all content-areas in this study, and thus look at language and text from a broader perspective. This article is based on the author's own previous research on writing instruction and student writing (Bergh Nestlog 2012; Bergh Nestlog, 2014). The aim at the time was to examine writing instruction and student texts in grades 4–6 of compulsory school to understand the students' meaning-making. Some of the same theories used in the present study were used there, and parts of the results of the previous research are used and further developed here.

In the article, the term *text* refers to both written and oral texts. Written texts can consist of different resources, such as words, symbols, images, figures and tables. Digital texts can also include audio files and moving images. In oral texts, i.e. conversations, speeches and other oral presentations, words and sounds are intertwined with gestures, facial expressions and other body language. Texts are thus multimodal through the interaction of different resources, and different resources have different affordances (possibilities and limitations) in meaning-making. Sometimes, for example, a figure can be a resource that clarifies and complements the verbal expressions in the text. In other cases, an image may be perceived as contradictory in relation to the words and may therefore even render meaning-making more difficult for the person interpreting the text. This means that the person who *creates* and *interprets* texts needs to have knowledge of and consider the affordances of different resources. The broadened concept of text also includes, for example, music texts, such as sheet music as written text that can be manifested acoustically in the room. Two- and three-dimensional artefacts of visual arts can also be considered texts in a broad sense of the word.

Going forward, the article will mainly focus on written verbal language, i.e. words in written texts. Hopefully, the reader can still bear in mind that the theories hold a multimodal perspective. The arguments may therefore be relevant even for content-areas where e.g. body language, images and sounds play a prominent role (see e.g. Kress 2010; Danielsson & Selander 2014).

Dialogism and meaning-making

In brief, meaning-making in a content-area can be said to occur through disciplinary language and dialogue. An understanding within dialogic theory formation (Bakhtin 1986) is that thinking takes shape in the world, which is significant for the view of learning and meaning-making. This means that thinking is not seen as an isolated activity within individuals, but rather as linked to social contexts. Although learning takes place within individuals, it always occurs together with persons or other resources (e.g. texts, computers, images) in the social context (Linell 2011: 437). Meaning-making takes place in social contexts both in and outside of school, and transfers – transactions – of ideas, linguistic and textual structures, bodily expressions and social behaviours take place constantly (cf. Säljö 2014). Thus, meaning-making takes place in dialogue with others and through internal dialogue with oneself (cf. Sfard 2008), especially through activities like reading, listening, speaking and writing. In such activities, verbal language is usually central. But symbols, images, gestures and the like can be included as meaning-making resources in the dialogue.

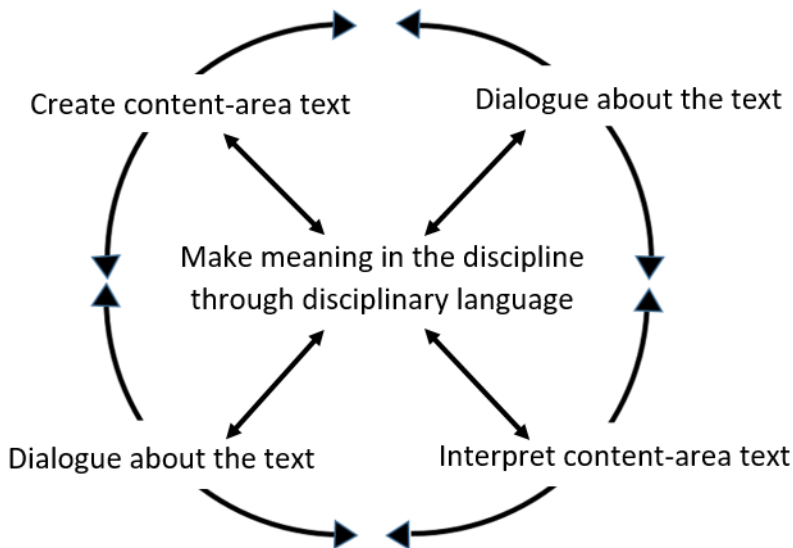


Figure 1. *The transaction circle.* (Cf. Bergh Nestlog 2012: 9)

Figure 1 is an attempt to visualise transaction processes in the content-area as an ongoing flow in which disciplinary language is used. The talk about the texts – the dialogue – is portrayed as central in meaning-making, when participants read or listen to content-area texts, which are interpreted, and when they create spoken and written content-area texts. The disciplinary language is constantly in focus during meaning-making. The transaction circle should be seen as embedded in a practice that involves meaning-makers

with their experience and knowledge. The practice and the content-area-specific context in which the meaning-making takes place has an impact on how the meaning-making develops. By alternately creating content-area texts, interpreting content-area texts, and discussing the meaning-making in progress, it is reasonable to imagine that the possibilities of using the disciplinary language in a functional way gradually deepen, thus benefiting the possibilities for knowledge development in the content-area. The transaction process takes place both through conversation with others and through parallel internal dialogues on the part of the participants (cf. Sfard 2008); speech and thoughts develop in interaction. The transaction circle is an attempt to show that disciplinary knowledge and disciplinary language can be seen as two sides of the same coin and that they develop in parallel during meaning-making.

In order to deepen understanding of meaning-making and learning in a content-area, the concept contained within the *double dialogue* concept can be applied (Ajagán-Lester et al. 2003; Evensen 1998). The concept means that in spoken and written texts a dialogue takes place in a double sense. The duality consists in all texts carrying expressions of relationships both between people and to other texts. In other words, the expression relates to *interaction* with others and *conventions* for what texts usually look like. Both interaction and conventions in texts depend on the social contexts they work within. The context affects the choice of expression and vice versa. The text can be considered an interface where the speaker or writer and the reader or listener meet, and an interface where conventions for language and text are followed or challenged. In the interface, meaning-making takes place both during the creation process and during the interpretation process.

Firstly, the double dialogue is therefore about the *interaction* between people, who in the interaction make linguistic choices based on the linguistic resources they have access to. When people interact linguistically within a content-area, they choose which disciplinary content they should focus on and how the content knowledge should be presented. Their choices depend, in part, on who they are in dialogue with – the intended listener or reader of what they are saying or writing, who may be more or less familiar with the content-area and disciplinary language.

Their choices can also relate to who they can and want to present themselves as. For example, if you want to show that you are knowledgeable in a content-area, you may choose content-area-specific terms instead of layman synonyms. Such a choice may be based on the belief that the other person understands these terms. But, the choice can also be based on wanting to demonstrate disciplinary literacy by choosing content-area-specific expressions that may impress the other person.

The linguistic choices in the interaction therefore relate to the desire for the dialogue to work in an expected way, and what is functional depends on the purpose of the interaction. You can see communication as starting from

an interaction axis that includes the language users involved in the interaction. The writer or speaker is on one end, while the reader or listener is on the other. And these two colour the text to a greater or lesser extent. The writer has the intended reader in mind during text creation, and during reading the reader influences the text in the sense that their experiences and knowledge affect interpretation.

Secondly, the double dialogue, as previously mentioned, is about relating to language *conventions*, i.e. how you usually express yourself in similar situations. Conventions evolve over time and are different in different social contexts. Language users within a content-area can choose to either adapt to the disciplinary convention or to challenge it and do things differently. The choices made on this *convention axis* thus depend on how the language users perceive the context of qualified language users in which the text is included. For a person interpreting and understanding a content-area text, it may be easier if the text follows the prevailing disciplinary conventions, if the person exposed to the text has knowledge about the conventions. In a school context, the content-areas are linked to different disciplinary conventions, which depend on different knowledge specialisations and ways of generating knowledge within the disciplinary field the content-area falls under. Knowledge in chemistry, for example, is largely based on experiments and a focus on understanding chemical processes (Shanahan & Shanahan 2012). Knowledge of chemistry is typically and conventionally portrayed in lab reports that are created following a specific text structure and presented through both verbal language and other representations, such as bullet lists, diagrams and figures. Presenting knowledge of chemical processes in the form of a poem written in hexameter would be challenging convention. The double dialogue is portrayed in Figure 2.

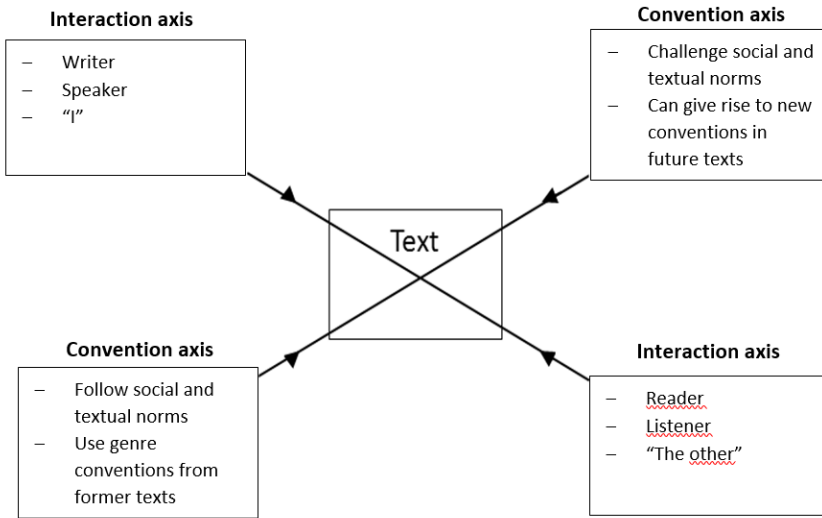


Figure 2. *The double dialogue.* (cf. Ajaǵán-Lester et al. 2003: 207)

Functional view of language in content-area texts

A central factor for texts used and created in different content-areas is that they need to work well for the purpose in the specific context. A functional view of language is therefore relevant in all teaching. The dialogical perspective presented above has strong links to a functional view of language (Halliday 1978; Ongstad 2005). With this type of view, we can conclude that 1) each text carries content that 2) is produced through language structures and other resources and that 3) the choice of language use is based on the interaction between the participants being able to function. Within systemic functional linguistics, the three aspects of texts are referred to as the texts three metafunctions, namely, the ideational, textual and interpersonal metafunctions. This means that a text can be considered from three perspectives that relate to three questions:

- What is the text about? (ideational metafunction that relates to the content)
- How is the content expressed? (textual metafunction that relates to language structures and text conventions) and
- Which persons are participating in the interaction with their voices? How does the interaction affect the text? (interpersonal metafunction that relates to how relationships are created in the text between the text creator and the text interpreter – the interaction).

The three metafunctions are always and simultaneously active (see Figure 3; cf. Halliday 1978).

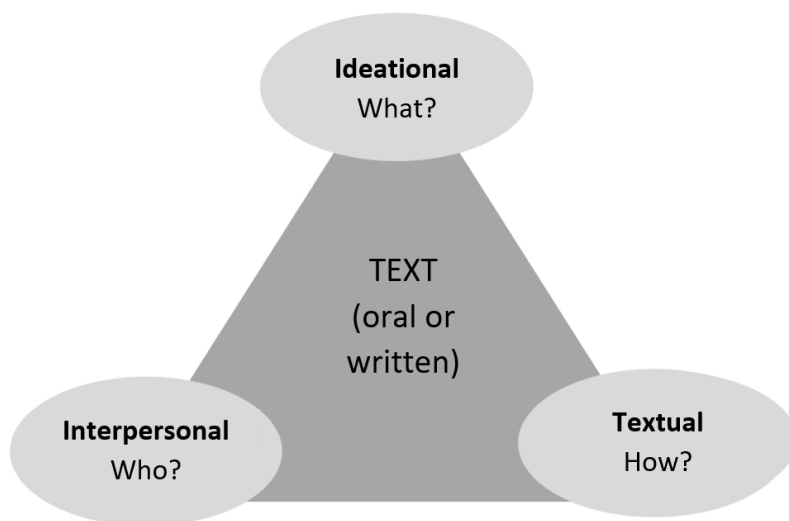


Figure 3. A functional view of language – three metafunctions in texts. (Cf. Halliday 2014: 31)

The following text is a translated excerpt from a history textbook from compulsory school grades 4–6. It is used as an example of how the three metafunctions work together in a text.

Little Viking village out by the sea. A visitor (bottom of the picture) is heading towards the village. He has just passed a woman washing clothes in the river. Some men are working down by the beach. He can hear them shouting to each other. The chieftain's family lives in the home at the large tree. What more can you discover in the picture? Discuss! (Körner 2005: 11; author's translation)

The *ideational* metafunction focuses on the content of the text, and we can sum things up by saying that the text is about life in village during the Viking Age.

Through the *textual* metafunction, we can see that the text acts as a kind of presentation of the picture that dominates the page of the book where the text is located. The text is one paragraph made up of eight graphic sentences. The first sentence is a fragment and not a syntactically complete sentence. The text is held together by referents related to the people in the village: “a visitor”, “he”, “a woman”, “some men”, and “chieftain's family”. Five of the sentences begin with one of these referents. The visitor is mentioned three times throughout the short text, and thereby becomes the clearest referent binding the text together. Another perspective of the textual metafunction is that, in the above example, text connections are created to the picture belonging to the verbal text, partly through the reader being able to see in the

picture the same thing that is being said verbally, and partly through a direct indication (“bottom of the picture”).

The textual metafunction also leads to the creation of intertextual relationships (Kristeva 1970), i.e. connections to other texts and to conventions that have developed in texts over time (cf. the convention action axis in the double dialogue). In this case, the text is made up of text sequences that are usually included in descriptive texts (Adam 1992; Ledin 2000): 1) an introduction in which the main theme, the Viking village, is presented through a phrase that acts as a kind of heading, 2) followed by descriptions of each subtheme (in this case, four subthemes: the visitor, the various actions of the women and men, and the chieftain family’s home) and 3) a conclusion in which the reader is invited to further develop the theme. A conventional way of concluding descriptive texts is to summarise the main theme. But here, the author has instead chosen to enter into a dialogue with the reader and ask for a continuation of the description.

In a text where the reader perceives that the text sequences form a thread running through the text, the function of the structure is to make the text coherent, which facilitates reading. This often relates to the reader being able to relate the text structure to previously read texts with similar text structure, i.e. convention related to a genre.

The *interpersonal* metafunction relates to meaning as an exchange. Relationships are created in the text through interaction between writer and reader (cf. the interaction axis in the double dialogue). In the above text excerpt, the writer is in dialogue with the reader through five statements, a question and a demand. Textbooks sometimes use the pronouns “we” and “you” as a means of addressing the reader and drawing them into the text, creating a sense of fellowship between the writer, the reader and others. In the above example, there is one “you” in a direct address to the reader in a question that is asked. The reader is then encouraged to provide more information, and thereby develop the theme. The question and the demand are speech functions that directly involve the reader in the interaction. In addition, a visitor is figured into the scheme. It is reasonable to assume that the function of this is to enable the reader to identify with a visitor travelling back in time to the Viking Age.

When analysing the text excerpt, the focus was on one metafunction at time. But, as a reader of a text, you do not look at the metafunctions individually. A reasonable conclusion is therefore that if the reader can create meaning in the text in a suitable manner, then the three metafunctions have worked well together. In other words, the writer’s interpersonal and textual choices have resulted in the content (the ideational metafunction) being presented in a functional way.

Disciplinary literacy

A concept closely linked to discussions about disciplinary language is *disciplinary literacy*. Literacy is about participating in linguistic social practices and using the language and texts that are part of the practice. Literacy is thus primarily something people do with language and texts, i.e. how people speak, read, write, listen and interact with text:

it is an activity, located in the space between thought and text. Literacy does not just reside in people's heads as a set of skills to be learned, and it does not just reside on paper, captured as texts to be analysed. Like all human activity, literacy is essentially social, and it is located between people. (Barton & Hamilton 1998: 3)

In the context of education, the power perspective is strongly linked to knowledge in the content-areas that are part of the education. Credibility in the content-area is created by those creating texts demonstrating the ability for content-area specific literacy: "the ability to engage in social, semiotic, and cognitive practices consistent with those of content experts" (Fang 2012: 19).

Since language and texts are linked to social communities, which differ from one another, language use and texts will also differ in different practices. It is not always obvious that teachers make it clear to students what language use looks like in the specific content-area, and that "[r]eading is not merely a way to learn new information but becomes a way to engage in new kinds of thinking" (Wineburg 1991: 515). Thus, the way one reads differs from one content-area to another since it is not just the content that differs, but also the mindset. For example, in history it is not possible to access historical events in any way other than through testimony or historical documents, all of which are based on some specific perspective. Historians understand this approach, and it affects their way of reading content-area texts. Samuel Wineburg (1991) concluded that this is not made clear in the school's history instruction or the presentations in history textbooks, and the students thus do not learn that they need apply a critical approach when reading texts in history (cf. Shanahan & Shanahan 2008).

History is not the only content-area where students need to develop critical literacy, which is particularly highlighted by researchers in the critical literacy field (see e.g. Gee 1990; Janks 2010; Luke 2012). Within this field of research, there is interest in how readers and writers are positioned in the texts, and questions about language and power are particularly relevant. This means that the double dialogue and the interpersonal metafunction are particularly in focus.

Timothy Shanahan and Cynthia Shanahan (2008; 2012) have emphasised the importance of focusing teaching on "disciplinary literacy", i.e. literacy in a specific content-area, in order to work with advanced knowledge

development in the content-area “to grasp deeper and more sophisticated ideas” (2012: 15):

A disciplinary literacy approach emphasizes the specialized knowledge and abilities possessed by those who create, communicate, and use knowledge within each of the disciplines. (Shanahan & Shanahan 2012: 7)

Thus, it is not enough for teachers to have knowledge about language and language skills in general. Such knowledge cannot be generally used across content-area boundaries in an successful way. Teachers must instead develop discipline-specific knowledge about each disciplinary language (see e.g. Moje 2008; Fang & Schleppegrell 2010; Shanahan & Shanahan 2012; Fang & Coatoam 2013).

Thus disciplinary literacy is a concept for the literacy tied to the specific practice of a content-area. Disciplinary literacy means being able to participate in a functional way in content-area practice, with its language and texts, and in a broad sense being able to interpret and make meaning and create texts where disciplinary language is used.

A content-area’s instructional practice and the texts included therein are thus closely related to each other and mutually influence each other. The norms and conventions found within the content-area’s culture are passed down into the content-area texts. The texts also affect the participants and the activities in the instructional practice. Texts in school and higher education can thus be seen as embedded in the instructional practice (cf. Fairclough 2001). There is a flow between the texts and the practice in which the texts are created and used. On one hand, what happens in the instructional practice is likely to affect how the students create and interpret texts, while on the other hand the instructional practice is likely to be affected by the students’ text creation and text interpretation in the sense that the teaching needs to be adapted according to how the students express themselves when creating and interpreting texts. Thus, in both texts and instructional practices, the double dialogue is at work in relation to interaction and conventions through transactions in the instructional practice.

In an instructional practice that promotes the development of disciplinary literacy, the participants work in a functional way with disciplinary language and content-area texts. New participants are gradually socialised in the content-area practice by being involved in content-area-specific activities and dialogues, both spoken and written.

Perspectives on teaching and learning

Earlier in this the article, I have stated that participation in the practice is considered fundamental to learning, and that spoken and written language are the most central tools in the interaction between participants. Through such a focus, this perspective differs from many other studies of teaching and learning.

Basic questions in educational contexts like *Who? Why? What? and How?* are discussed in many studies focusing on teaching and learning. In addition, the object of teaching and learning is often described based on the didactic triangle that problematises the relationship between *teacher, student* and *content knowledge* (Uljens 1997: 167), and focuses on *teaching processes* (Jank & Meyer 1997a: 54) or on *learning: Who should learn? Why should they learn? What should they learn? How should they learn?* and so on (Jank & Meyer 1997b: 17–18).

The educational perspective in this article differs from such studies by focusing mainly on 1) the participation and interaction in practice and 2) the disciplinary language and the content-area texts that are used in the practice and thereby promote the development of disciplinary literacy. The questions *Who? Why? What? and How?* are also central in this educational perspective, but they are used in questions related to interaction and language conventions in practice and texts, in other words disciplinary language. When participants in a content-area practice use spoken and written language, they, either consciously or subconsciously, apply the three metafunctions presented in Figure 3 and the double dialogue in Figure 2. This means, for example, that writers always apply the metafunctions and the double dialogue. With such an understanding, text creation can be promoted if the writer makes decisions about questions like those presented below before and during text creation as support in the linguistic choices they need to make:

- Who is my intended audience for this text?
- (Interpersonal metafunction)
- What should I write about?
- (Ideational metafunction)
- Why should I write about this particular content?
- (Interpersonal metafunction concerning choices related to interaction with the reader: Because I have a purpose for this writing that makes me want to communicate this particular content to this reader.)
- How should I structure the text and what wording should I use to show the coherence?
- (Textual metafunction)
- Why should I structure the text and word it this particular way?
- (Interpersonal metafunction concerning choices related to the textual metafunction, i.e. language conventions like genre traits and language norms: Because I have a purpose for my writing, and I think that if the reader is to create meaning in the text appropriately, then these are suitable language structures).

Although such an approach generally applies, it can be particularly applicable in educational contexts. In the next section, theories and key concepts related to disciplinary language and disciplinary literacy are further developed in

order to be applied in analyses of teaching and learning in different subject areas.

Disciplinary language and content-area practice

A central idea in this article is that disciplinary language serves as the building blocks for content-area texts, and that meaning in the content-area is created through spoken and written content-area texts. Through the disciplinary language, participants in the content-area practice can gain a view of the content-area itself. Both dialogism and the functional view of language and its triadic approach to text can help us gain a deeper understanding of the disciplinary language and thereby also the instructional practice in the content-area.

Aspects of disciplinary language

With the model presented in Figure 4, we can conclude that the disciplinary language is used in disciplinary texts (content-area texts) to communicate *disciplinary content* (subject content) through different *disciplinary voices* with *language and resource structures relevant to the discipline* (content-area). The three aspects can be said to characterise the content-area's texts and language. They are referred to here as *disciplinary aspects*.

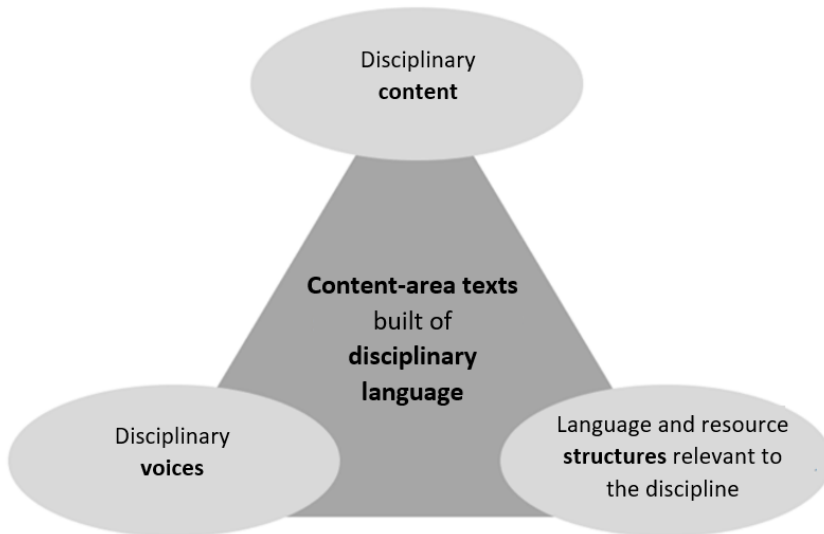


Figure 4. Disciplinary aspects – three aspects of content-area texts and disciplinary language. (Cf. Bergh Nestlog 2012)

First of all, disciplinary language concerns *language and resource structures relevant to the discipline*, such as verbal language, symbols, figures, images,

diagrams, two- and three-dimensional models, gestures, and body language. In digital texts, sounds and moving images can also be included as resources (right-hand corner of Figure 4). Secondly, the concept of disciplinary language is used for the different perspectives that a content-area can be considered from, based on the *disciplinary voices* that occur (left-hand corner of Figure 4). Disciplinary voices can be the voices of the teacher, the textbook and experts. Students' learning in the content-area means that their own disciplinary voices gradually become more qualified and adapted to a suitable disciplinary language. Thirdly, the *disciplinary content* is made explicit through the disciplinary language (upper corner of Figure 4). The three disciplinary aspects correspond to the three metafunctions in Figure 3.

It is important to underscore that the three disciplinary aspects may vary depending on the interaction and how conventions are used. The disciplinary voices vary, in part because the voices "talk" in different ways in different contexts and practices, and in part depending on how the writer interprets the interactional situation with the reader and what language and text conventions the writer is applying. It is therefore reasonable to conclude that disciplinary language and content-area texts cannot be carved in stone, but instead vary depending on which instructional practice they are presented in and are meant to work within. Thus, there is a flow between text and instructional practice, which is also related to a social practice outside of teaching (Fairclough 2001). For example, policy documents such as the curriculum affect teaching and ultimately also the texts written in the school.

A conclusion that can be drawn based on a functional view of language is that teaching in all content-areas needs to make the disciplinary language and the three disciplinary aspects specific (Figure 4) explicit for the students, and clarify the texts' relationship to the instructional practice and social practices outside of school.

Aspects of content-area practice

Just like content-area texts, the instructional practice can be considered from three aspects. Based on discourse theory's central idea that language and texts work together with the practices that they are part of, I would argue that *texts* in the content-area, with the three disciplinary aspects, constitute the content of the *instructional practice*. Content-area instruction thus needs to clearly and explicitly address all three disciplinary aspects, i.e. *disciplinary content*, *disciplinary voices* and *language and resource structures relevant to the discipline*. In other words, you can say that disciplinary literacy is promoted by the fact that the instructional practice focuses simultaneously on both language and voices, and knowledge within the content-area of the discipline (Fang 2012: 19).

In Figure 5, the *content knowledge* in the instructional practice is presented with the three disciplinary aspects (see Figure 4) as one aspect of the instructional practice. To round out this discussion, I will now move to the

other two aspects of the instructional practice. If we talk about three disciplinary aspects of content-area texts, we can talk about three *practical aspects* as aspects of teaching, namely, *content knowledge*, *voices*, and *structures in the instructional practice* (see Figure 5).

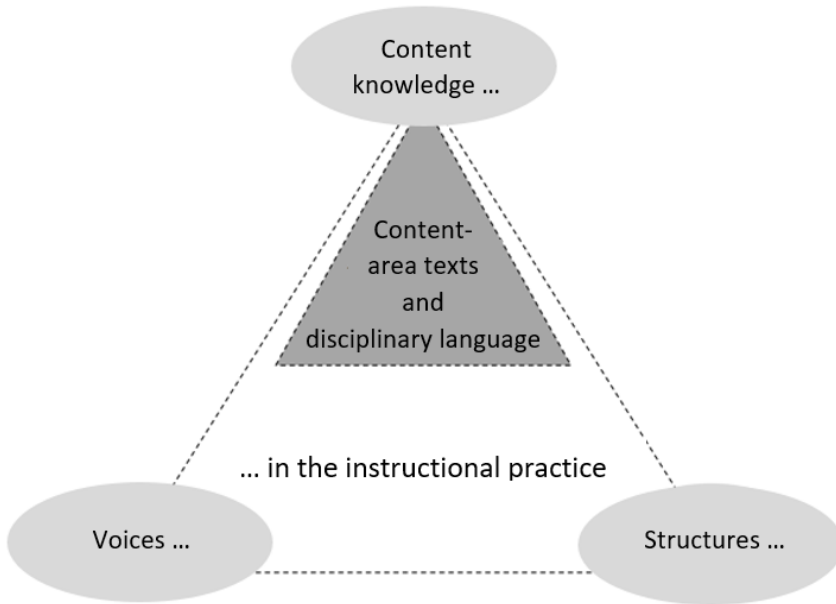


Figure 5. Practical aspects – three aspects of instructional practice.

In accordance with a dialogical theory, in the instructional practice it is relevant to take an interest in those participating in the instruction with their voices; the practical aspect *voices in the instructional practice* is about these participants. The concept of voice in this study can be attributed to the dialogical idea that all utterances and texts can be seen as links in a chain of voices (Bakhtin 1986: 146), that borrows ideas and structures from previous voices and colours the ideas and structures of forthcoming voices. In this way, the voices can be said to intertwine with each other and express one or more perspectives on the content knowledge. The difference between the concepts 1) *disciplinary voices* and 2) *voices in the instructional practice* is a construct that, by definition, relates to distinguishing between 1) the participants as engaging with their voices in the content-area, and 2) as engaging with their voices in situations that are not limited to the content-area, but also extend to social relationships and activities where the content-area is not in focus. The disciplinary voices are thus a subset of the voices in the instructional practice. In studies of content-area practice, it may be interesting to examine the voices from both of these perspectives.

As previously stated, meaning-making takes place in dialogue, and the transactions are thought to be ongoing and recursive (transaction circle in Figure 1). With this in mind, making sure that the students interact and develop their disciplinary voices during teaching is a key to learning. Hopefully, the students use their voices to communicate about the content-area, but their voices may sometimes be directed elsewhere, such as an upcoming school dance or a conflict that occurred during recess. Both students and teachers use their voices to create relationships with each other, both through dialogues in the content-area and directed towards issues outside of the content-area. The practical aspect *structures in the instructional practice* relates to work processes and the structure of the instruction. This aspect focuses on the form of the instruction, and is about how the teaching is built up so that it is cohesive and understandable for the students. The structures in the instructional practice can be compared to the textual metafunction, which relates to how texts are logically connected.

In conclusion, dialogism, functional linguistics' triadic approach to language and text, and discourse theories with the concepts and models about teaching and learning in subject areas presented above all work together. In the disciplinary didactic theory presented, content-area texts, disciplinary language and the instructional practice are thus considered central discourse dimensions of teaching and learning. Disciplinary aspects and practical aspects are also key concepts, which in turn are divided into three categories. The disciplinary aspects relate to 1) disciplinary content (ideas contained within the content-area), 2) disciplinary voices (voices that present the disciplinary content from one or more perspectives) and 3) language and resource structures relevant to the discipline (the way the content-area is presented). These three disciplinary aspects can be applied to all texts in the content-area, whether spoken or written. Naturally, the texts in the content-area play a central role in teaching, which in turn can be regarded as a kind of text for which the teacher is responsible, even if the students and teacher create it together. Like texts, there are three aspects to teaching in the content-area, i.e. practical aspect: content knowledge, voices and structures in the instructional practice.

Previous research on teaching and learning also highlighted the connection between the content of texts and their readers or writers, and also assumed that both students and the writing assignments and texts exist in a specific social context (Liberg et al. 2010: 8–10). This study has contributed more in-depth discussion of concepts about literacy teaching and learning in subject areas and further development of models based on theories from language and text research. It therefore clearly points to language perspectives from different points of view, in terms of both content-area texts and content-area instruction. In this way, the hope is that it will become clear that all disciplinary aspects (Figure 4) form the content of the instructional practice (Figure 5), and that in such teaching students are given opportunities to create

and interpret content-area texts. You could say that the teacher, for their part, needs to take control of the practical aspects, i.e. take responsibility for handling the practical aspects in their teaching so as to best promote the students' learning. In such teaching, it is reasonable to believe that the students are given the opportunity to take control of the disciplinary aspects, i.e. over the content-area texts and disciplinary language, so that they can participate in practice inside and outside of the school where the disciplinary language is relevant, thereby positioning themselves as qualified and credible participants. The next section focuses on implications for teaching and learning that may be relevant in matters related to disciplinary language and disciplinary literacy.

Implications for teaching and learning in the subject areas

In a teaching context, it is reasonable to think that students should be aware of how language and texts function in the various school subjects in order to take some form of control over texts and learning in the content-area. Implications for teaching and learning in the subject areas related to disciplinary language are discussed below based on the previous study (Bergh Nestlog 2012) mentioned in the introduction section.

In the study, the students obtained the *disciplinary content* from history and religion instruction when they were asked to write an argumentative and explanatory text. They used *disciplinary voices* that they obtained from the textbooks they read and coupled them with their own disciplinary voices, developed together with the teacher when doing the history and religion work, that they felt worked well based on the purpose of the writing and the intended readers of the texts. In the instruction, they were also made aware of *language structures relevant to the content-area* that could be applicable to the texts they were writing.

In the same instructional practice, the teacher exhibited an awareness about teaching and learning in the subject area that took the form of her talking about and dealing with all six disciplinary and practical aspects (see Figures 4 and 5). By being both theoretically and practically knowledgeable about matters of disciplinary literacy, she could make the disciplinary aspects explicit in the teaching. She talked to and wrote together with the students, for example, to make the language and text structures in the text they read and wrote clear. In this way, it also became clear how the disciplinary voices expressed themselves in relation to the disciplinary content. Both the students and the teacher were engaged in the content-area instruction, which can be expressed as the voices in the teaching actually being heard as disciplinary voices for the most part. The students demonstrated knowledge of the texts based on all three disciplinary aspects, for example when they discussed and critically reviewed both the disciplinary content and disciplinary voices and content-area-relevant language structures in their own texts. Matters related to disciplinary language and disciplinary voices seemed central to the

students' ability to develop knowledge in the content-area and be able to act as full participants in the practice of the content-area. In this instruction, the students also showed an interest in investing in work related to disciplinary literacy. One conclusion that can be drawn is that it may be because the students seemed to understand how each element of teaching relates to the whole, as the teacher structured the teaching in a manner that made the teaching process clear in its entirety. Each element was then perceived as functional. A structure that as a whole become understandable to the students thus seems to support the students' ability to become involved and to take responsibility for meaning-making in the content-area as a whole.

If the disciplinary language is made explicit in the instruction, the students have opportunities to develop depth and breadth in their knowledge of the content-area and eventually become full participants in the practice of the discipline with their language and voices. The meaning-making, which is ongoing in the transaction circle, is assumed to be deepened if the students can use all disciplinary aspects in their work with content-area texts. Students who can talk about texts based on one or more of the three disciplinary aspects demonstrate that they can navigate content-area texts, i.e. talk about the texts and thereby show signs of learning. The highest degree of text mobility is shown if one can easily talk about the content, voices and structures of the text as well as about associations that the reading awakens in their own experiences and the function and purpose of the text. (Bergh Nestlog 2012; cf. Langer 1995; Liberg 2003; Folkeryd, af Geijerstam et al. 2006; Halleson & Visén 2017).

In the above instructional practice (Bergh Nestlog 2012), some tools for teaching and learning related to disciplinary language and disciplinary literacy are also used. These tools are described in the following section, and are based on the dialogical understanding described earlier in the article.

Tools for teaching and learning in the subject area

A tool for teaching and learning in the subject area that the teacher above used relates to the *didactic function* of texts, namely, whether a text should primarily serve as support for own knowledge development or instead function in communication with others. The first didactic function relates to structuring the teaching so that the students are given opportunities to use the written and spoken language and a tool of thought in so-called *in-texts* (cf. Liberg 2009; Bergh Nestlog 2016; Bergh Nestlog et al. 2018).

In-texts are directed inwards towards the writer's thoughts and meaning-making. The didactic function of these texts in content-area instruction is to support the writers' meaning-making processes and knowledge development in terms of disciplinary content and disciplinary voices. In in-texts, the students are given the opportunity to formulate their meaning-making from disciplinary content. They are also given the opportunity to test their language use in the content-area with their own disciplinary voices and to reword the

disciplinary voices of others, such as those of the teacher or experts they have read or heard. Thus, disciplinary content and disciplinary voices are the focus of in-texts, not language and text structures or language norms (cf. Dysthe et al. 2011). In in-texts, the students can test their meaning-making in the content-area and use the disciplinary language their own way. The teacher can get an idea of the students' meaning-making in the content-area and thereby adjust his or her continued teaching in the content-area. Written in-texts can take various forms, such as mind maps, card writing, lists of ideas, and notes about how the writer perceived a content-area-specific concept or phenomenon. Spoken in-texts take the form of discussions in which the participants, for instance, work together to talk about a phenomenon or explain a process. Sometimes you talk to yourself, as when you need to solve a problem (cf. Sford 2008). The creation of in-texts, individually or together with others, is a way of promoting the students' meaning-making through the transactions that take place in the interaction, and is thus a way of staging the transaction circle presented in Figure 1.

Another didactic function of content-area texts focuses on being able to communicate with others in a well-functioning way. Such texts, *out-texts*, are directed outwards and are intended to be used in communication with others (cf. Liberg 2009; Bergh Nestlog 2016). It is therefore relevant, as a writer and teacher, not to limit the focus to knowledge content and disciplinary voices and their language use, but rather expand it to include language structures that get the text to appear as a logical whole. In other words, you need to work with all three disciplinary aspects. In out-texts, it is the interaction with the reader that is in focus. In the teaching, it is therefore relevant to update the content-area's conventions in terms of disciplinary language and text structures in the content-area texts. Examples of spoken out-texts include presentations or reports where there are listeners who are expected to be able to create meaning during the spoken delivery. In school, out-texts are linked to content-areas and genres. Since conventions differ from one content-area to another, for example, the analysis of "how historical knowledge is arranged" (Swedish National Agency for Education 2011, course syllabus in history; author's translation) is presented in a way that differs from the analysis of the "expressions in historical and contemporary art" (Swedish National Agency for Education 2011, course syllabus in visual arts; author's translation). Course and subject syllabuses specify a variety of speech functions that students are expected to demonstrate when communicating their knowledge. For example, in several content-areas they are expected to be able to argue, reason, explain, describe and discuss. In out-texts, writers apply the double dialogue (Figure 2). They both position themselves (as writer) and the intended reader on the interaction axis and position themselves on the convention axis by using or challenging genre patterns found in the subject culture. By using the teaching to clarify and talk to students about texts through the three disciplinary aspects (Figure 4) and thereby support the

transactions about text (Figure 1), there are great opportunities for students to develop disciplinary language in a broad and deep sense.

The key difference between in-texts and out-texts is that they have different didactic functions, which means that the teacher and students need to be more or less focused on different metafunctions. In in-texts, the ideational metafunction is in focus: *What* do the students express about the disciplinary content?

In out-text, however, it is relevant to highlight and discuss all three metafunctions, not only *What* do the students express about the disciplinary content? but also *Who* is participating in the interaction, how are the reader and writer positioned, and how does the disciplinary voice emerge? as well as *How* is the text structured and how relevant are the language structures and other resources to the content-area?

In out-texts, it is relevant to pay attention to the disciplinary language at different text levels. When it comes to *disciplinary content*, on a global text level in an explanatory text you can talk about the problem areas of the text, namely, what the whole text is about. If the purpose of the text is to organise knowledge, the *disciplinary voices* in the text can consist of different scientific sources that are credible on the subject. The writer may also want to address the reader directly to facilitate reading and then, throughout the text, use an informal “you” address, which also relates to the relationship between the writer’s and reader’s voices in the content-area. In the case of *language and resource structures relevant to the discipline*, such text can be structured based on a genre pattern with the different text sequences which need to appear. In an explanatory text, the text sequences can consist of an introduction in which a problem area is presented. This text sequence is followed by specification of the problem or phenomenon. It can be based on why and how questions. In the next text sequence, an explanation is given, i.e. the question is answered or the phenomenon explained and the facts are sorted out. Finally, a comment can follow, where the text is brought to a close with a conclusion or valuation (Adam 1992; Ledin 2000; Schleppegrell 2004).⁵

An example of an explanatory text is found below. It is a translated excerpt from the Swedish picture book *Adjö, Herr Muffin (Goodbye, Mr. Muffin)*, namely, a letter that is a text within the text.

Daddy says dying is nothing to be afraid of. You just go to sleep and there’s no more pain. It goes quickly and then you get to rest. We’re all going to die – you

⁵ Discussions about out-texts can be related to ideas that fit within the “wheel of writing” (see e.g. Berge et al. 2016). It emphasises the importance of connecting the purpose to relevant writing actions (cf. speech functions).

and me and Daddy. Maybe you get to see your mummy and your wife? But, I don't know if there's a heaven... (Nilsson 2002; author's translation)⁶

At a global text level, interest is directed at the text as a whole. In terms of content, the text about Muffin awakens existential thoughts and contains a number of voices. It is mainly the “me” and “Daddy” voices that are presented with their perspectives. In terms of language structures, it is relevant to look at how the text is structured in different sequences. Authentic texts rarely follow the prototypical pattern of the convention fully. The explanatory text in the above example begins with a statement: “Daddy says dying is nothing to be afraid of.” The problem area, death, is not presented separately. It is clarified to the reader while the problem is indirectly presented through the father's statement. The problem is made up of an underlying question: Should we fear death? A number of explanations as to why we do not need to fear it follow. The letter is brought to a close with a thought that can be seen as a central valuation, namely, an agnostic's expression of their belief about life after death.

At the local text level, attention is focused on smaller units in the text. The above text about Muffin uses everyday language. School students should not have any trouble understanding the sentences or words. It is perhaps not obvious what the last sentence means in this context: What does “heaven” mean here? And what could the three dots at the end mean?

In texts where a specific disciplinary language is used, key content-area-specific concepts may need to be explained, discussed and used by the students in order for them to create meaning and develop disciplinary content knowledge. Before the content-area-specific concepts are used in out-texts, students may have written in-texts about the concepts and used them in conversation and processed their meaning-making orally. Through this, they gain a reasonable understanding of the content-area and gradually they learn how to use content-area-specific language. In the work with concepts, different synonyms can be used and both content-area-specific and their everyday counterparts can be made explicit. This way, different disciplinary voices form – e.g. the researcher's and the layman's – through the synonyms. Different terms for the same concept can thus be suitable for different contexts depending on who is participating in the communication. For example, the term “water” may work well in one context, while the term “H₂O” works better in another. In terms of language structure, content-area-specific terms need to be positioned in phrases and longer expressions so that students can gain a clear understanding of how they are usually employed in the culture of the discipline.

⁶ Even though this is not a student text, it is an out-text because it is published and thus communicates with readers.

Development, education and further research

In teacher training, issues related to disciplinary language may be of particular interest and key content for teacher educators and pre-service teachers in all content-areas. A teacher knowledgeable about theories and models related to disciplinary language and disciplinary literacy can teach not only the central disciplinary content – something teachers have always done – but also about the content-area's texts and about language relevant to the area as a whole. In this study, I discussed disciplinary language in terms of *disciplinary content*, *disciplinary voices*, and *language and resource structures relevant to the discipline*. Teachers and pre-service teachers who develop knowledge about teaching and learning the specific disciplinary languages should have good opportunities to create well-functioning instructional practices in which all students have the opportunity to develop and learn in the best way.

A perspective of disciplinary language that requires further study relates to assessment. Teachers' assessments of students' abilities and knowledge are often based on the students' linguistic expression, i.e. their ability to use the disciplinary language. Thus, students are assessed based on all three disciplinary aspects of the disciplinary language. It is then also reasonable for them to participate in a instructional practice in which the teacher clarifies and teaches about the disciplinary language as a whole. The relationship between teachers' more or less informed teaching in terms of disciplinary language and their assessments of students' goal attainment is therefore an interesting area of research.

The disciplinary language of many school subjects has not yet been researched to any great degree. Thus, there are good reasons to study disciplinary languages. Researchers who have studied disciplinary literacy often have their scientific base in teaching and learning language or literature, the second language field, pedagogic work, and sociology (see e.g. af Geijerstam 2006; Christie & Derewianka 2008; Christie & Maton 2011; Nygård Larsson 2011 & 2018; Hertzberg 2011; Hipkiss 2014; Olvegård 2014; Halleson & Visén 2019). There is some research focusing on language and disciplinary literacy where the researchers come from the discipline itself, particularly from natural science subjects (Lemke 1990; Mortimer 2003; Neville-Barton & Barton 2005; Airey 2009; Britsch 2009; Haglund & Jeppsson 2013; Knain 2015). In addition, teachers who took part in development projects related to disciplinary literacy in different content-areas have written about their experiences together with researchers (see e.g. Hertzberg 2011; Bue 2011, Fritzvold 2011; Jakobsson-Åhl 2011; Bergh Nestlog & Fristedt 2016). Knowledge of both language and content-area is needed in order to fully deepen the understanding of disciplinary language. For this reason, studies conducted by researchers from only one field of research have their limitations, and consequently it would be desirable for future research on disciplinary language to involve researchers with both perspectives (cf. e.g. Jewitt et al. 2001; Eriksson 2010).

Subject teachers in different content-areas are, by definition, included in different disciplinary discourses. This may mean, among other things, that they have different views of knowledge and that they speak about the content knowledge in their content-area in different ways. For example, mathematicians have a clear factual approach and strive to find the right answer, while historians hardly talk about “truth” or what is “correct” and instead are interested in source evaluation and different perspectives of time phenomena (Shanahan & Shanahan 2008). The different disciplinary discourses mean that teachers and educational experts within each field understand and speak about disciplinary language in different ways. It can be viewed as a challenge for teacher educators, in-service teachers, pre-service teachers and students in the school that disciplinary language can take different forms in different content-areas, and may not even be defined the same way as a concept. Among content-area teachers and disciplinary experts, “disciplinary language” can be a concept that is open to different meanings or that does not have a clearly defined meaning (cf. Laclau & Mouffe 1985; Bergström & Boréus 2012: 365–366). In further studies, the discourses of teaching and learning in different disciplines could be mapped out based on the perspective of disciplinary language that they represent (cf. Helstad & Hertzberg 2013).

The theories, concepts and models used for deeper discussion in the article can hopefully be useful in future research projects, for example on disciplinary language and disciplinary literacy, which could thereby contribute to important knowledge development regarding teaching and learning in the specific school subjects. It would also be interesting to examine not only the relationship between scientific disciplinary language and the corresponding disciplinary language in the school, but also similarities and differences between the disciplinary language of different content-areas.

By extension, knowledge about disciplinary language should be relevant to pre-service teachers and teachers at all levels of the education system when designing instruction in which disciplinary literacy and critical awareness of disciplinary language as a whole are developed. Such teaching could promote the participants’ ability to communicate subject knowledge that is relevant within both the subject culture which the instructional practice is part of, and in society and life outside of school.

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